



ICoICT 2021

“DIGITAL INNOVATIONS FOR POST-PANDEMIC RECOVERY”

The 9th International Conference
on Information and Communication Technology



Universitas
Gadjah Mada



CONFERENCE INFORMATION

Dates	August, 3 – 5 2021
Organizer	Telkom University, Indonesia
Co-organizer	Multimedia University, Malaysia Universitas Gadjah Mada, Indonesia
Venue	Zoom Virtual Webinar and Meeting
Secretariat	School of Computing, Telkom University Panambulai Building Jl. Telekomunikasi Terusan Buah Batu, Bandung West Java 40257 Indonesia Phone: +62 22 7569131 Fax: +62 22 7565930 Email: icoict@telkomuniversity.ac.id
Conference Website	www.icoict.org

WELCOME MESSAGE

On behalf of the Organizing and Program Committee, we warmly welcome you to the 9th International Conference on Information and Communication Technology (ICOICT) 2021 on August 3-5th, 2021. The 9th ICOICT 2021 is jointly organized by Telkom University Indonesia, Multimedia University Malaysia, and Universitas Gadjah Mada Indonesia, in association with IEEE Indonesia Section, IEEE Signal Processing Society Chapter, and The Indonesia Section Computer Society Chapter. The previous ICOICT conferences have successfully served as a forum to bring together a diverse group of people from academics and industries to share and present the latest issues and recent developments in Information and Communication Technology (ICT). Papers from the previous ICOICT 2013 until 2020 have been published in IEEE Xplore and indexed in Scopus.

The technical program of 9th ICOICT 2021 consists of eight keynotes, one knowledge transfer, five tutorials, six tracks on “Digital Innovations for Post-pandemic Recovery”, and 25 parallel sessions. For the first time, the conference features social events that allow conference participants to meet and discuss with fellow researchers in the same field of interest. Competition for the Best Paper Award is also organized. The 9th ICOICT 2021 received 296 paper submissions from 20 countries, out of which 122 papers have been accepted – corresponding to an acceptance rate of 43.4%. All paper submissions have been subjected to a rigorous peer-review process that evaluates their significance, novelty, and technical quality. Each paper was reviewed independently by at least three experts.

Due to the COVID-19 pandemic, we have decided to hold the 9th ICOICT 2021 as a virtual conference. The organizing committee had been work hard to create a virtual conference that will be valuable and engaging for both presenters and attendees. The full conference format mixes pre-recorded and asynchronous engagement and lives engagement through Question-and-Answer (Q & A).

The 9th ICOICT 2021 has been organized as a result of the work and effort of colleagues, friends, and organizations. We wish to thank all who have participated and supported our work in many ways and all who helped us make this event possible and successful. We would like to express our gratitude to the Organizing Committee and Technical Committee members and all Telkom University colleagues who assisted us in planning and organizing this conference. We also wish to thank all the reviewers who worked very hard in reviewing papers and providing suggestions for the paper’s improvements. We would like to express our sincere gratitude to the Keynote and Tutorial Speakers. We would also like to thank all of the sponsoring organizations for providing their generous financial support. Last but not least, we would like to give appreciation to the authors who have submitted their excellent works to this conference and all the attendees. We appreciate your virtual attendance at the 9th ICOICT 2021. We hope you enjoy all the keynote sessions, the technical sessions, and the social events and inspire your future research.

Dr. Warih Maharani
General Chair of ICOICT 2021

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VIRTUAL CONFERENCE GENERAL INSTRUCTIONS

General Information

ICoICT 2021 will be hosted as a fully virtual conference using Zoom. There are four types of sessions in ICoICT 2021, namely: keynote speeches, tutorials, Birds-of-a-feather (BoF) sessions, and paper presentation sessions. Each session will have a co-host, a moderator or session chair or session host, presenters, and attendees. The co-host will be the person that facilitates the use of the technology. The moderator or session chair is present to coordinate the session and manage Q&A.

Access to sessions

- Keynote speeches and tutorials will be held in the Zoom Webinar room which has a large enough capacity and will also be live streamed via Youtube so that it can be freely accessed by the public.
- Birds-of-a-feather sessions and parallel paper presentations will be held in the Zoom Meeting rooms which are smaller in capacity and can only be attended by presenters and authors of registered papers.

Basic Session Structure

- 10 minutes before the Session: The co-host will start the designated Zoom session.
- 2 minutes before the Session: The co-host will start the recording.
- 1 minute before the Session: The moderator or session chair introduces the session.
- Beginning of the Session: The moderator or session chair will introduce the presenter. The talk will be presented using the video recording submitted by the presenter followed by live Q&A.

The duration of each presentation by type are listed below:

- Keynote speech: (1 hour)
Recorded presentation (video) = 40 minutes
Live Q&A = 10 minutes
- Tutorial: (1.5 hours)
Recorded video = 40 – 60 minutes
Live Q&A = 20 - 40 minutes
- Birds-of-a-feather: (2 – 2.5 hours)
- Paper presentation: (20 minutes)
Recorded presentation (video) = 15 minutes
Live Q&A = 5 minutes
- End of the Session: The moderator or session chair will conclude the session and check attendance, then the co-host will end the session.

Schedule and Time

All time in the program schedule is in Western Indonesia Time / Waktu Indonesia Barat (WIB; UTC+7). Please make adjustments to the time stated in the schedule into your local time. Current time in WIB can be found on <http://time.bmkg.go.id/>.

CONFERENCE SCHEDULE

Day 1, Tuesday 3 August 2021

08.15 – 08.30	Soft Opening by Dean of School of Computing, Telkom University (Dr. Z.K. Abdurahman Baizal)
08.30 – 09.30	Keynote Speech 1: Prof. Haryadi S. Gunawi (University of Chicago) Why Does the Cloud Stop Computing? Lessons from Thousands of Bug Reports, Service Outages, and Anecdotal Evidence
09.30 – 11.30	Tutorial 1: Juneidi Tsai (Microsoft Indonesia) Microsoft Education Transformation Framework for Higher Education
11.30 – 12.30	Break
12.30 – 13.30	Keynote Speech 2: Dr. David Taniar (Monash University) Contact Tracing during Covid-19 Pandemic: An Australian Experience
13.30 – 14.30	Keynote Speech 3: Soleh Ayubi, Ph.D (Chief Digital Healthcare Officer at Bio Farma Indonesia) Covid-19 Vaccine Distribution : an example of Accelerating healthcare transformation
14.30 – 14.45	Break
14.45 – 17.45	Birds of a Feather Sessions
	Room Yudhistira: Dr. Maya Ariyanti "E Learning"
	Room Bima: Afiahayati, Ph.D "AI and Bioinformatics for COVID-19"
	Room Arjuna: Kemas Rahmat Shaleh, Ph.D "Knowledge Management, Knowledge Representation and reasoning"
	Room Nakula: Dr. Agus Hartoyo "Artificial Intelligence of Things (AIoT): The intersection of AI and IoT"
	Room Sadewa: Dr. Muhammad Johan Alibasa "Digital footprints during COVID-19 pandemics"

CONFERENCE SCHEDULE

Day 2, Wednesday 4 August 2021

08.00 – 08.10	Opening Ceremony: Greetings and video presentation
08.10 – 08.20	Welcome Speech by General Chair of ICoICT 2021 Dr. Warih Maharani
08.20 – 08.25	Speech by Dean of the Faculty of Mathematics and Natural Science, Universitas Gadjah Mada Prof. Dr. Triyono, S.U.
08.25 – 08.30	Speech by Dean of the Faculty of Information Science and Technology, Multimedia University Prof. Ts. Dr. Lau Siong Hoe
08.30 – 08.35	Speech by Chair of IEEE Indonesia Section Dr.-Ing Wahyudi Hasbi, S.Si, M.Kom
08.35 – 08.40	Opening Speech by Rector of Telkom University Prof. Dr. Adiwijaya
08.40 – 08.45	Photo Sessions
08.45 – 09.45	Keynote Speech 4: Dr. Ir. Hammam Riza M.Sc, IPU (BPPT) Digital Innovations for Post-Pandemic Recovery
09.45 – 10.45	Knowledge Transfer: Wu Shiwei (HUAWEI CLOUD - CTO of APAC Region) Workforce Enablement in the New Normal of Post-Pandemic, Powered By Cloud Technology
10.45 – 11.00	Break
11.00 – 13.00	Tutorial 2: Dr. Bayu Erfianto (Telkom University) Chest-wall motion tracking using Inertial Measurement Units (IMUs)
	Parallel sessions #1
13.00 – 14.00	Break
14.00 – 16.00	Tutorial 3: Moh Edi Wibowo, S.Kom., M.Kom., Ph.D. (UGM) Face analysis in public space
	Parallel sessions #2
16.00 – 17.00	Keynote Speech 5: Prof. Dr. Kazem Rahimi (The University of Oxford) Machine learning and digital technologies in the context of epidemiology and clinical trials
17.00 – 18.00	Keynote Speech 6: Dr. Mohamad Hardyman Barawi (Universiti Malaysia Sarawak) Modelling sentiment and contrastive opinion of COVID-19 Pandemic on Social Media: Linking Computer Science and Social Science
18.00 – 18.10	Closing day 2

CONFERENCE SCHEDULE

Day 3, Thursday 5 August 2021

08.00 – 08.15	Opening day 3
08.15 – 10.15	Tutorial 4: Dhany Saputra, Ph.D (Brüel & Kjær Vibro) Bioinformatics has helped prevent & control a pandemic. What's next?
	Parallel sessions #3
10.15 – 12.15	Tutorial 5: Assoc.Prof. Dr. Md. Shohel Sayeed (MMU) Big Data: Trends, Challenges & Opportunities
	Parallel sessions #4
12.15 – 13.15	Break
13.15 – 15.15	Parallel Sessions #5
15.15 – 15.30	Break
15.30 – 16.30	Keynote Speech 7: Prof. Hadi Susanto (University of Essex) COVID-19 modelling in Indonesia: A mathematician's apology
16.30 – 17.30	Keynote Speech 8: Reza Khorshidi, D.Phil.(The University of Oxford)
17.30 – 17.35	Greetings
17.35 – 17.45	Best paper award by ICoICT 2021 TPC Chair Dr. Ade Romadhony
17.45 – 17.50	ICoICT 2022 presentation
17.50 – 17.55	Closing by Vice Dean of School of Computing Telkom University Parman Sukarno, Ph.D

INSTRUCTION FOR MODERATORS AND SESSION CHAIRS

- General responsibility of a moderator or session chair:
 1. Introduce the session, explain the structure of the session, rule of the Q&A, and then introduce each speaker or presenter/paper-title before the video playback;
 2. Take chat questions from Q&A panel and chat panel during the presentation playback;
 3. Read the questions to the presenting speaker or author during the Q&A period with absolutely no delay on the allocated Q&A slots;
 4. Conclude the session and check attendance;
 5. Make sure the time is not violated
- Organizer will send you an invitation link via email. Just click on the link to join the Zoom session.
- Please join the session at least 10 minutes in advance, please test your microphone once joined so that the session can start on time.
- We recommend that you turn on your video to engage the attendees during the sessional introduction.
- After introducing the session and the presenter, we recommend you to turn off the video so that the attendees can focus on the talk video.
- As organizers, we would like to ensure a smooth and productive virtual conference.
- During the replay of presentation video, please keep track of the questions on the Q&A and chat panel.
- After the video playback, unmute yourself and share your webcam. The host will also unmutes and shares corresponding speaker's or presenter's webcam.
- Please make sure to ask orally the questions and according to the FIFO time they were first submitted. If there are not many questions, feel free to ask some of your own.
- Sometimes the audience may need to clarify their question. In that case, it is upon the discretion of the Session Chair to unmute the attendee who placed the question to make clarifications.
- Please be mindful of the Q&A time limits! We cannot introduce delays on the predetermined slots of each session, it will push other sessions behind.
- After the presenter addressed a question, please indicate it is answered verbally.
- The screen will contain cues to help you govern the flow of the session.

INSTRUCTION FOR PRESENTERS

- Organizer will send you an invitation link as a presenter via email. Just click on the link to join the Zoom session.
- Please join at least 5 minutes before your designated time slot and be present during the video playback as well as the Q&A session.
- As organizers, we would like to ensure a smooth and productive virtual conference. Following the video presentation there is a short Q&A session.
- Your microphone will be muted during the video playback.
- During the replay of the presentation video, attendees or other presenters will ask questions related to the presentation through the Q&A panel (for attendee) or chat panel (for other presenters).
- You are encouraged to keep an eye on the questions so to answer them during the Q&A Session.
- At the end of the pre-recorded presentation, the host will unmute your microphone and shares your webcam. The moderator or session chair will then ask you to answer some of the questions in sequence they were submitted and within the allotted Q&A period.
- The moderator or session chair will try to cover as many questions as possible depending on the allotted time. In case, some of the questions have not been answered attendees may want to discuss with the presenter off-line.
- You are welcome to stay in the session as an attendee when not presenting.
- When you are not presenting your paper, you can also ask questions to other presenters via chat panel. Begin your text with “[ASK]” to indicate it as a question to the presenter. Send it to session chair (or all panelist if you prefer to do so).
- You are also welcome to register as an attendee for any other session / event that interests you (including keynote speeches, tutorials, Birds-of-a-feather sessions, and other paper presentations) using registration links provided in the icoict.org. Please note that each room has limited capacity.

Breaks

Conferencing, online and in-person can be exhausting! We need to take breaks. We will take breaks. Breaks are built-in to the schedule!

- Stand up and stretch, get a snack, come back refreshed!
- If you leave your Zoom on, make sure that your microphone is muted during the break.

INSTRUCTION FOR BoF SESSION HOSTS

- The main responsibilities of a BoF host are opening a live session on Zoom, welcoming participants to a BoF session, and starting and keeping the conversation going.
- General guidance for a BoF session host:
 1. Introduce the session, explain the structure of the session and rule of the discussion.
 2. BoF session may include a short presentation from the host to introduce important questions or themes of BoF topic.
 3. Share some interesting questions and key research papers related to the BoF topic.
 4. The main purpose of BoF session is discussion and networking. Encourage participants to share their contact info and research interests.
 5. BoF sessions can be formal or informal as the host prefers.
 6. Conclude the session.
 7. Make sure the time is not violated
- Organizer will send you an invitation link via email. Just click on the link to join the Zoom session.
- Please join the session at least 10 minutes in advance, please test your microphone once joined so that the session can start on time.
- We recommend that you turn on your video to engage the attendees during the sessional introduction.
- As organizers, we would like to ensure a smooth and productive virtual conference.

INSTRUCTION FOR ATTENDEES

- You are welcome to register for any session / event that interests you using registration links provided in the icoict.org. Please note that each room has limited capacity.
- Webinars are designed to be in "listen-only" mode, so by default all webinar attendees are muted by the organizer.
- As organizers, we would like to ensure a smooth and productive virtual conference.
- Following the video presentation there is a short Q&A session moderated by the session chair.
- During the replay of presentation video, you are welcome to ask questions using the Q&A panel.
- The moderator or Session Chair will select and ask the questions during the Q&A session. We understand that there maybe not time to ask all the questions. The Chair will make sure to ask complementary questions and hopefully according to the time they were first submitted.
- The organizer will have the ability to unmute participants if this is needed to elaborate on their questions (please note that due to the limited Q&A duration, attendees may want to discuss with the author(s) off-line).
- You do not need to announce yourself arriving or leaving a Session.

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KEYNOTE SPEAKERS

Dr. Ir. Hammam Riza M.Sc, IPU

Head of Agency for the Assessment and Application of Technology (BPPT)

Profile



Dr. Ir. Hammam Riza currently hold position as Deputy Chairman for Natural Resource Technology Development (TPSA) at BPPT and Vice President of ASEAN Chief Information Officer Association (*ACIOA). Currently undertaking Bigdata and IoT project for Earth and Ocean Science Technology including Agricultural productivity mapping (KSA) and Waste to Energy pilot project (PLTSa)

He founded and hold the position of Executive Chief Information Officer (CIO) in conjunction with serving as Director of Center for Information and Communication Technology (PTIK) at the Agency for the Assessment and Application of Technology – BPPT, Government of Indonesia,

delivering cutting edge ICT innovative solution to ministries, regional governments and state-owned enterprises.

Title: **Digital Innovations for Post-Pandemic Recovery**

Abstract

The Covid-19 pandemic is a health crisis that affects all aspects of people's lives, especially the economic aspect. We have now gotten used to the New Normal era, of course, with a high level of vigilance. All countries today are faced with the dilemma of how to restore socio-economic life, in the midst of efforts to stop the spread of Covid-19. Handling COVID-19 in Indonesia involves 3 important roles from stakeholders, namely: Government, Society, and Technology as enablers to facilitate the process of Testing, Tracing, Isolating, to Treatment. The government continues to strive to prepare some strategies for handling Covid-19, one of which is by establishing institutional synergies in the 'Task Force for Research and Technological Innovation for Handling Covid-19 (TFRIC-19) led by the Agency for the Assessment and Application of Technology (BPPT). Digital Transformation is the key to national economic recovery and helps deliver the "new normal" adaptation. This is in line with the President's mandate to expand access, improve infrastructure, accelerate the digital transformation roadmap and its regulations, including the preparation of digital talents. Another aspect that can also encourage increased economic recovery is the aspect of leadership through synergy and collaboration of all related entities. BPPT and TFRIC-19 have established a systematic and constructive ecosystem related to testing technology innovations and medical devices, including: the testing strategy is carried out by designing the RT-PCR test kit which is the golden standard for Covid-19 testing, then the Covid-19 Monitor application is designed which can map the movement of the virus through tracing suspects as carriers. The increase in testing needs is anticipated by building a level-2 biosafety

mobile lab equipped with complete test instruments. Strengthening the prevention process is also carried out by preparing appropriate technology facilities and infrastructure in the form of innovative hand washing tools and disinfectant variants. In the realm of Treatment, an AI-based Medical Image Management diagnostic tool has been prepared to process X-Ray and CT-Scan data, which can be a solution for the uneven distribution of health tools and technology that can become an obstacle in the speed of establishing patient diagnoses under supervision. In the curative aspect, especially for Covid patients with severe symptoms who require respiratory aids, 3 variants of emergency ventilators are prepared, as needed. In the future, the plan for mapping the entire virus variant to identify virus profiling will be carried out through pattern recognition. This national genome research will later become a virtual asset for the development of big data and supercomputing to be able to carry out the process of monitoring data collection, mitigation and produce recommendations and strategic actions that will encourage the emergence of product innovations for handling Covid-19 and awaken national independence in the health sector. TRFRIC-19 Next generation will continue to be committed through 5 main actions, including: Action to strengthen economic and technological studies which include supply chain studies, supply demand studies, pre-commercialization studies, manufacturing industry readiness studies, TKDN studies, technology audits and innovation ecosystem map studies, Medical device technology innovation actions, including ICU ventilator innovations, Direct Digital Radiography (DDR), quantitative antibody levels measuring kits and Antigen Rapid Tests, Health supplement technology innovation actions, including fermented garlic-based health supplements, beta glucan-based health supplements and supplements in the form of nutrient dense biscuits. Actions to strengthen scientific data and applications of artificial intelligence, including AI Application Innovations for Covid-19 detection, Bioprospection Database of Medicinal Plants, Microbes and Compounds with Potential Drugs for Covid-19 and other infectious diseases, as Artificial Intelligence Data Sets, Actions to strengthen Cooperation, Commercialization and Media. This activity is expected to provide a positive estuary for product innovation actions developed by the innovation ecosystem. To create an independent Indonesia and help economic recovery during the Covid-19 pandemic.

KEYNOTE SPEAKERS

Prof. Dr. Kazem Rahimi

Professor of Cardiovascular Medicine at The University of Oxford

Profile



Kazem Rahimi is a Professor of Cardiovascular Medicine and Population Health, at the University of Oxford and a consultant cardiologist at the Oxford University Hospitals NHS Trust. His research interests include hypertension, heart failure, multimorbidity and cardiovascular risk management, using a variety of methodologies such as individual-patient meta-analysis, large-scale decentralised clinical trials, and digital health technologies. Kazem leads the Deep Medicine programme at the Nuffield Department of Women's and Reproductive Health with a major interest in the application of machine learning approaches to electronic health records. He also leads the Blood Pressure Lowering Treatment Trialists'

Collaboration (BPLTTC), which is an international collaboration of all the major trials of blood pressure lowering drugs. He is the Director of the Martin School Programme on Informal Cities and a Co-Investigator of the PEAK-Urban programme.

Title:

Machine learning and digital technologies in the context of epidemiology and clinical trials

Abstract

Applications of machine learning/AI have given solutions to the most intractable healthcare challenges and it is also changing fundamentally the way we practice medicine. In this talk, we discuss the machine learning from the perspective of large-scale epidemiology. Dataset from electronic health records allow us to discover hidden associations between diseases. In a case of valvular heart disease, it is considered as a "degenerative" condition. Blood pressure is found to have a strong relationship with valvular conditions, similar to what has been described for major vascular diseases. The promise of machine learning and digital health is to use analytical approaches for high dimensional data set. Machine learning and healthcare professional's job can be categorized into three types, i.e., Diagnosis, where we predict what problem that the patient currently has, Prognosis, where we predict the course of disease for a patient, and Intervention, where we predict how a patient will respond to an intervention. Those are similar with aims in the machine learning; pattern recognition, forecasting, and causal prediction, respectively. One of the great promises of applying machine learning to clinical data is the possibility of learning optimal per-patient treatment rules or termed as personalized medicine. There are three common misconceptions about 'treatment failure'; 1. Confusion of low incidence conditions with low effectiveness of interventions, 2. Confusion of deterministic causal links with probabilistic multicause nature of most conditions, and 3. Misunderstanding of individual risk and undue criticism towards average treatment effects. Especially for the third misconception, average treatment effects are the problem and we need personalized risk models for better management.

Individual will either experience or not experience the outcome; so, a risk cannot be determined for the individual, models will provide an estimate of true risk. Unfortunately, no amount of data or modelling technique can fix this problem and provide the true risk of an outcome for an individual, but they can be better at discriminating groups of individuals by identification of more meaningful subgroups or stratification. In this case, we need risk prediction for stratified medicine. When interactions are found they are not reliable and usually only generate a hypothesis for further testing. There are opportunities for machine learning for better stratified medicine. For low-incident events, risk distribution is skewed, which means that average treatment effects may not reflect the experience of the typical patient. Moreover, average effects might be determined by a minority of high-risk patients.

KEYNOTE SPEAKERS

Dr. David Taniar

Associate Professor Department of Software Systems & Cybersecurity, Monash
University

Profile



David Taniar received his MSc and PhD in Computer Science, from Swinburne University of Technology and Victoria University, respectively. His research is in the area of Big Data Management, covering the 3Vs of Big Data (Volume, Variety, and Velocity). In Big Data Volume, he works on parallel databases, in which he has published a book in this topic (High Performance Parallel Database Processing, Wiley 2008). In Big Data Variety, he works on various data structures for data warehousing, especially for non-relational data. And in Big Data Velocity, he works on IoT data processing, where he has completed IoT projects for manufacturing, railway, environment and ecology, utility, and healthcare. He has published more than 150 journal papers in various areas of

data management. He is the Founding Editor-in-Chief of two SCI-E journals (Data Warehousing and Mining, and Web and Grid Services). He is currently an Associate Professor at Monash University, Australia.

Title:

Contact Tracing during Covid-19 Pandemic: An Australian Experience

Abstract

Contact Tracing is the activity of retrieving historical activities and trips for a person where his presence at a specific location might affect other persons within a certain radius. In related to a contagious disease, an infected person might spread the pathogens to the nearby people during close contact that can trigger a chain reaction of community transmission. The biggest problem in obtaining the historical activities in a contact tracing procedure is privacy and security issues. The privacy issue refers to private-related sensitive information that is not meant to be shared with anyone. However, during a contact tracing investigation, the authorities have the right to know every detail from a suspected patient. The security issue refers to the safety of the shared private information to the authority. Due to these issues, many patients are reluctant to share their past activities to the authority. This condition makes it even harder to obtain the right information from the patients. The next consequence is that the spreading of the diseases will be off the radar since contact tracing could not be done correctly. Several methods have been proposed to help contact tracing procedures. In general, there are two types of contact tracing methods, proximity-based and trajectory-based. While the proximity-based method lacks historical trips and suffers from multi-platforms communication issues, trajectory-based suffers from privacy issues. This speech will discuss these methods together with their pros and cons. In conclusion, a method that can preserve privacy and retain the details of the trip will also be explained in this session as an alternative method to support contact tracing.

KEYNOTE SPEAKERS

Prof. Haryadi S. Gunawi, Ph.D

University of Chicago

Profile



Haryadi S. Gunawi is an Associate Professor in the Department of Computer Science at the University of Chicago where he leads the UCARE research group (UChicago systems research on Availability, Reliability, and Efficiency). He received his Ph.D. in Computer Science from the University of Wisconsin, Madison in 2009. He was a postdoctoral fellow at the University of California, Berkeley from 2010 to 2012. His current research focuses on cloud computing reliability and new storage technology. He has won numerous awards including NSF CAREER award, NSF Computing Innovation Fellowship, Google Faculty Research Award, NetApp Faculty Fellowships, and Honorable Mention for the 2009 ACM

Doctoral Dissertation Award. His research focus is in improving dependability of storage and cloud computing systems in the context of (1) performance stability, wherein he is interested in building storage and distributed systems that are robust to latency tails and "limping" hardware, and (2) reliability and scalability, wherein he is interested in combating concurrency and scalability bugs in cloud-scale distributed systems, and (3) interactions of machine learning and systems, specifically how machine learning techniques can address operating/storage system problems.

Title:

Why Does the Cloud Stop Computing? Lessons from Thousands of Bug Reports, Service Outages, and Anecdotal Evidence

Abstract:

Cloud computing, "the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a personal computer," has fundamentally changed the way society performs daily businesses and social activities. Emails, text and video chats, picture and video sharing, blogs and news, are all backed by a large complex collection of Internet services, which we refer as "the Cloud." As dependency on cloud computing increases, society demands high availability, an ideal 24/7 service uptime if possible. Yet, service outages are hard to escape from. Not only do outages hurt customers, they also cause financial and reputation damages. Minutes of service downtimes can create hundreds of thousands of dollar, if not multi-million, of loss in revenue. Company's stock can plummet after an outage. Sometimes, refunds must be given to customers as a form of apology. As rivals always seek to capitalize an outage, millions of users can switch to another competitor, a company's worst nightmare. In this talk, I will share many studies that my research group has performed in the last 8 years. We conducted a cloud outage study of tens of popular Internet services by analyzing over 1000 headline news and public post-mortem reports that detail hundreds of unplanned outages. We also conducted a comprehensive study of over 3000 bug reports in many popular open-source cloud systems. Finally, we also looked into fail-slow hardware, an under-studied failure mode, by collecting over

100 anecdotal evidence of fail-slow hardware incidents in 12 large institutions. We hope these studies can help cloud architects and engineers build more and more reliable systems in the future.

KEYNOTE SPEAKERS

Prof. Hadi Susanto

Professor at the Department of Mathematics of Khalifa University

Profile



Hadi Susanto was born and grew up in Lumajang (watch the beauty of the region here), East Java province of Indonesia. He was an undergraduate student (BSc 2001) in the Department of Mathematics of Institut Teknologi Bandung, with a thesis study supervised by Barbera van de Fliert and Edy Soewono. He subsequently did his postgraduate studies (MSc 2003, PhD 2006) in the Department of Applied Mathematics of the University of Twente under the supervision of Stephan van Gils. He was Visiting Assistant Professor (2005-2007) at the Department of Mathematics and Statistics of the University of Massachusetts, Amherst mentored by Panos Kevrekidis. He was then Lecturer in Applied Mathematics (2008-2013) at the

School of Mathematical Sciences of the University of Nottingham. In 2013, he moved to the Department of Mathematical Sciences of the University of Essex as Senior Lecturer and then Professor of Applied Mathematics. He is currently on-leave from Essex and is Professor at the Department of Mathematics of Khalifa University. He is also Adjunct Professor (Guru Besar Luar Biasa) in the Department of Mathematics, Institut Teknologi Bandung. His research interests are in theoretical and computational dynamical systems and analysis applied to the study of, among others, nonlinear waves in differential equations that model physical reality in many different fields, including biology, condensed matter physics and nonlinear optics. He also enjoys writing literature, including poetry, prose and essay.

Title:

COVID-19 modelling in Indonesia: A mathematician's apology

Abstract

The emergence of SARS-CoV-2 in December 2019 in China and its worldwide dissemination has become a major public health priority, including in Indonesia. In this talk, I will share some background stories of my involvement in the SIMCOVID consortium that model the disease and help local governments in the country in fighting the pandemic. I will discuss some mathematical models and methods that we developed, that have been used to extract information for developing and evaluating policy responses. I will also discuss my 'apologies' on the limitations of the work.

KEYNOTE SPEAKERS

Reza Khorshidi, D.Phil.

Programme Lead, Machine Learning and Biomedical Informatics at The University of Oxford

Profile



Dr. Reza Khorshidi is currently the chief scientist at AIG, and a principal investigator (in machine learning and medicine) at Deep Medicine program of The University of Oxford. His current research at Oxford is focused on probabilistic machine learning, and deep sequence models, for biomedical informatics, population health, and precision medicine; more specifically, he is interested in using machine learning for the development of personalised health predictions and recommendations, and an improved understanding of multimorbidity. Reza's team at AIG (i.e., Investments AI) is a group of scientists, engineers, designers and product managers/strategists, primarily focused on the development of AI-first products in the FinTech space.

Title:

From Model.fit() to Market.fit(): A path towards turning ML research into ML products with real-world fit

Abstract

Scientists in the field of machine learning (ML) – including deep learning (DL) -- aspire to build better models (usually judged by beating SOTA in well-defined tasks and datasets); successful applications of such models, on the other hand, are about product-market fit (PMF) in environments with ever-growing complexities. As many expect ML to play a bigger role in our society, ML scientists' ability to influence this journey will depend on putting ML research in a PMF context and vice versa (i.e., optimizing for $\text{market.fit()} + \alpha * \text{model.fit()}$, instead of optimizing for model.fit() alone). Therefore, in this talk, I aim to cover the general principals of building AI products in the “real world”, covering topics such as AI product-market fit and impact evaluation in medicine

KEYNOTE SPEAKERS

Soleh Ayubi, Ph.D

Chief Digital Healthcare Officer at Bio Farma Indonesia

Profile



Soleh Ayubi currently trusted as Director of Transformation & Digital of PT Bio Farma (Persero) as well as Chairman of BUMN Muda. Prior to his career in STATE-OWNED enterprises, Ayubi was a business, tech, & healthcare professional, who had a variety of prestigious experiences in various international health companies in the United States. Soleh graduated from the Informatics Engineering Program in 2005, then graduated from the Informatics Master Program in 2007, both from the Bandung Institute of Technology. Soleh continued his education and obtained a Doctor of Philosophy (Ph.D) degree in Health Sciences from the University of Pittsburgh in 2012. Before returning to Indonesia and joining Bio Farma, Soleh had 12 years of global experience in healthcare by joining several international companies; among others, Novo Nordisk (Seattle, United States) as Director, Head of Digital Therapeutics and Data Science for 2019-2020; Unitedhealth Group (Boston, United States) as Director of Innovation, Research and Development in 2017 - 2019; Boston Children's Hospital (Boston, United States) as Technical Innovation Manager 2013-2016; Veterans Affairs Hospital (Pittsburgh, USA) as Senior Software Engineer in 2011-2012. Besides in the world of health industry, Soleh Al Ayubi is also active in the world of education and was appointed to become Digital and Health Entrepreneurship at Harvard University (Boston, United States) since 2017 until now, which has the task of providing training and mentoring to medical students, doctoral (PhD) and post-doctoral students at Harvard Medical School. Since 2020, he has also become the Adjunct Faculty at the School of Business Management, Bandung Institute of Technology. In the scientific and R&D communities, besides holding 2 patents in America, Soleh is also active in various international conferences and publications in the fields of healthcare innovation and healthcare technology both as a speaker, reviewer, and as a journal writer. As a writer, Soleh has published 15 papers in international journals and proceedings.

Title:

Covid-19 Vaccine Distribution: an example of Accelerating healthcare transformation

Abstract

Indonesia is severely impacted by COVID-19 with more than two million cases and a current thousand deaths a day. With a 270 million population living in 514 cities within 6,000 islands, it is a logistical nightmare for vaccine distribution. To navigate that challenge Bio Farma as a state-owned enterprise specialized in vaccine production and distribution has been collaborating with several technology companies coordinated by Telkom to develop a Supply Chain 4.0 system of COVID-19 vaccine distribution.

A blessing in disguise, the 3-year stalled development of the Supply Chain 4.0 called Track and Trace system, was catalyzed by this pandemic. The system enables us to track and trace every vial of vaccine from the first mile of production pipeline to the last mile delivery at the clinic or hospital.

The system applies a 2-D Data Matrix in vaccine vial, secondary package, and tertiary package which allows overall product identification, traceability, and authentication from end-to-end. Utilizing IoT sensors, the system steadily records the location and temperature of vaccines while being stored or transported to ensure vaccine quality until the last mile. The system is integrable with other monitoring such as senior leader's dashboard at the Ministry of Health, the Ministry of State-owned Enterprises, and other senior leader offices. This allows for well-orchestrated operations, fast response to the challenge in operations and data-driven decision making for both operations and strategies.

KEYNOTE SPEAKERS

Dr. Mohamad Hardyman Barawi

Universiti Malaysia Sarawak

Profile



Hardyman is currently an academician at the UNIMAS. He received his PhD in Computing Science from the University of Aberdeen. Before joining UNIMAS, he was an Operation Support Specialist at Hewlett Packard and a System Engineer at Misza Technology.

He is best known for his work on sentiment analysis and opinion mining, automatically labelling sentiment-bearing topics, abstractive and extractive labelling, and opinion summarization. Over the last few years, he has been interested in statistical techniques for natural language generation. His research in this area has included work in the subareas of text summarization, topic modelling, and, more recently, opinion summarization through word statistics, linear approach, and lexical resource acquisition through statistical means.

Title:

Modelling Sentiment and Contrastive Opinion of COVID-19 Pandemic on Social Media: Linking Computer Science and Social Science

Abstract

Sentiment analysis is the computational study of people's opinions, attitudes, and emotions expressed in a text or written language. Due to many challenging research problems and a wide range of practical applications, it has become one of the most active research areas in natural language processing in recent years. In this talk, I will discuss mainstream sentiment analysis research before moving on to describe some more recent work on modelling opinion and comments of COVID-19 Pandemic on Social Media. This research naturally connects computer science and social science, especially communication and political sciences, in social media analysis.

KNOWLEDGE TRANSFER

Wu Shiwei

HUAWEI CLOUD, CTO of APAC Region

Profile



15 years working in the IT industry, I have experienced various roles from developer to lead solution architect, with various projects in various environments from a startup of a dozen people to a top 100 MNC. As CTO of Huawei Cloud, APAC region, one of my key responsibilities is to lead the solution team to address technical challenges from various projects/clients with proper solution designs; advise R&D team regarding to product/service enhancements as well as support building partner eco-system of Huawei Cloud in this region.

Title:

Workforce Enablement in the New Normal of Post-Pandemic, Powered by Cloud Technology

Abstract

The outbreak of pandemic was quite unexpected. Many digital solutions/innovations were put into place for emergency use only, without considering the long term impact, especially in supporting workforce; however it is becoming increasingly likely that we will be living in this new normal thus we need to rethink, redesign the initial solutions to enhance security, enrich features and improve user experience. In this session, I will explore some typical digital solutions for workforce enablement and discuss how these types of technology may impact our work and life and what features that need to be enabled to become more sustainable.

TUTORIAL SPEAKERS

Dr. Bayu Erfianto

Senior Lecturer and researcher at School of Computing Telkom University

Profile



Bayu Erfianto graduated from the Department of Mathematics, majoring in Computer Sciences, Universitas Padjadjaran (UNPAD), Bandung, Indonesia in 1999 for his Bachelor of Sciences (S.Si.). He continued his Master Degree in Telematics, Universiteit Twente, the Netherlands from 2002 to 2004. He also continued his Master Degree in Information Technology, Universiti Teknologi Petronas Malaysia from 2007 to 2009. He received Doctoral Degree in Electrical Engineering from School of Electrical Engineering and Informatics (STEI), Institut Teknologi Bandung in 2017. Dr. Bayu was also as Postdoctoral researcher in School of Electrical Engineering and Informatics (STEI) in 2017-2018. Bayu is with the school

of computing (Fakultas Informatika), Telkom University, Bandung, Indonesia as Lecturer since 2002 (a.k.a. STT Telkom). His research interests are in the field of Cyber-physical System, including: Internet of Things, Network and Control System of Cyber-physical System, and Formal Modelling of Cyber-physical System.

Title:

Chest-wall Motion Tracking using Inertial Measurement Units (IMUs)

Abstract

Inertial Measurement Units (IMUs) is mostly embedded in wearable devices. Nowadays, IMUs motion tracking systems are allowing for long-lasting tracking of user motion in a situated environment. Instead of body motion tracking, on the other hand, wearing IMUs on the chest wall offers a few advantages, such as for cardiac activity parameters estimation and respiration parameter estimation. For example, current research shows that inertial sensors are low-cost and easy-to-use breathing-monitoring systems. Breathing parameters from chest-wall inclination signals are easily measured using IMU. This tutorial presents several techniques for IMUs based motion tracking to reconstruct chest wall motion with respect to angular velocity and linear acceleration. Several techniques for data or signal processing architectures are also discussed. This tutorial also tries to introduce the applications of chest-worn IMUs based motion tracking to estimate heart-rate, blood-pressure, and respiration rate.

TUTORIAL SPEAKERS

Dhany Saputra, Ph.D

Data Scientist at Brüel & Kjær Vibro

Profile



Dr. Dhany Saputra is a bioinformatician and data scientist. He currently works at Brüel and Kjær Vibro. He finished his Ph.D. in Bioinformatics at the Center for Genomic Epidemiology, TU Denmark, in 2013. He has participated in many bioinformatics cases, from controlling outbreaks, paleontology excavation analysis, stool transplant, marine biology, food safety, and cancer research. He has an M.Sc. in Computer Science from Universiti Teknologi PETRONAS Malaysia in 2008 and a B.Sc. in Information System from Sepuluh Nopember Institute of Technology Surabaya Indonesia in 2005.

Title:

Bioinformatics has Helped Prevent & Control a Pandemic. What's Next?

Abstract

Bioinformatics and cloud technologies have been beneficial in many countries' decision-making during this pandemic. Sequence analysis algorithms, such as fast algorithms on sequence alignment, de-novo assembly, gene annotation, gene expression analysis, gene prediction, and antibiotic resistance finding, have been crucial in solving an outbreak. Nowadays, DNA sequencing has become a routine task, and people can even do it in their kitchen. Improvements in DNA sequencing techniques have encouraged the popularity of shotgun metagenomics. The whole metagenome shotgun enables finding the microbial diversity - or in medical bioinformatics, the list of pathogens - in one sample. Additionally, it is also the primary key to discover the cure for genetic diseases and cancer. Together with microbiome research, bioinformatics has encouraged fecal microbiota transplant (FMT) research to cure many diseases such as CDI, bipolar disorder, autism, and cancer.

TUTORIAL SPEAKERS

Assoc.Prof. Dr. Md. Shohel Sayeed

Associate Professor and researcher at Multimedia University (MMU)

Profile



Dr. Shohel has more than 25 years meritorious working experience and he holds a challenging career which combines research, versatile administration and excellent teaching. His core research interest is in the area of Biometrics, big data, cloud computing, artificial intelligence, information security, image and signal processing, pattern recognition and classification. He has published over 60 research papers in international peer-reviewed journals and international conference proceedings as a result of his research work. Dr. Shohel has been a member of Multimedia University since 2001 and now he serves as an Associate Professor and the Chairperson of Centre for Intelligent Cloud Computing (CICC)

of the Faculty of Information Science and Technology. He received his doctor of philosophy from Multimedia University in Engineering, specializing in hand signature verification, and holds masters of information technology degree from the University Kebangsaan Malaysia, specializing in industrial computing. He received his Bachelor of Science degree in Agricultural science from Bangladesh Agricultural University.

Title:

Big Data: Trends, Challenges & Opportunities

Abstract

Every day, approximately 2.5 quintillion bytes of data are created. These data come from digital pictures, videos, posts to social media sites, intelligent sensors, purchase transaction records, cell phone GPS signals, to name a few. This is known as Big Data. There is no doubt that Big Data and especially what we do with it has the potential to become a driving force for innovation and value creation. Innovations in technology and greater affordability of digital devices have presided over today's Age of Big Data, an umbrella term for the explosion in the quantity and diversity of high frequency digital data. These data hold the potential as yet largely untapped to allow decision makers to track development progress, improve social protection, and understand where existing policies and programmes require adjustment. Turning Big Data—call logs, mobile-banking transactions, online user-generated content such as blog posts and Tweets, online searches, satellite images, etc. into actionable information requires using computational techniques to unveil trends and patterns within and between these extremely large socioeconomic datasets. New insights gleaned from such data mining should complement official statistics, survey data, and information generated by Early Warning Systems, adding depth and nuances on human behaviours and experiences and doing so in real time, thereby narrowing both information and time gaps. The promise of data-driven decision-making is now being recognized broadly, and there is growing enthusiasm for the notion of "Big Data." There is currently a wide gap between its potential and its realization.

Heterogeneity, scale, timeliness, complexity, and privacy problems with Big Data impede progress at all phases of the pipeline that can create value from data. A large amount of data today is not natively in structured format; for example, tweets and blogs are weakly structured pieces of text, while images and video are structured for storage and display, but not for semantic content and search. Transforming such content into a structured format for later analysis is a major challenge. The value of data explodes when it can be linked with other data, thus data integration is a major creator of value. Since most data is directly generated in digital format today, we have the opportunity and the challenge both to influence the creation to facilitate later linkage and to automatically link previously created data. Data analysis, organization, retrieval, and modelling are other foundational challenges. Data analysis is a clear bottleneck in many applications, both due to lack of scalability of the underlying algorithms and due to the complexity of the data that needs to be analyzed. Finally, presentation of the results and its interpretation by non-technical domain experts is crucial to extracting actionable knowledge. The many novel challenges and opportunities associated with Big Data necessitate rethinking many aspects of these data management platforms, while retaining other desirable aspects. It should be pointed out that the appropriate investment in Big Data will lead to a new wave of fundamental technological advances that will be embodied in the next generations of Big Data management and analysis platforms, products, and systems. Thus, we should believe that these research problems are not only timely, but also have the potential to create huge economic value in the world economy for years to come. However, they are also hard, requiring us to rethink data analysis systems in fundamental ways. A major investment in Big Data, properly directed, can result not only in major scientific advances, but also lay the foundation for the next generation of advances in science, medicine, and business.

TUTORIAL SPEAKERS

Moh Edi Wibowo, S.Kom., M.Kom., Ph.D.

Senior Lecturer and researcher at Gadjah Mada University (UGM)

Profile



Moh Edi Wibowo received the bachelor degree and master degree in computer science from Universitas Gadjah Mada in 2004 and 2006 respectively, and the Ph.D. degree in computer science from Queensland University of Technology in 2014. His current focus area is human and object detection and identification. He currently works as the vice head of the doctoral program of computer science at the Department of Computer Science and Electronics, Universitas Gadjah Mada.

Title:

Face Analysis in Public Space

Abstract

This tutorial discusses various methods to detect and to identify faces, facial landmarks, and facial attributes in images and videos collected from public spaces. Such methods provide information that might be useful for public space monitoring and access control in particular during the current pandemic situation. Algorithms such as cascaded regression and probabilistic discriminant analysis will be discussed and implemented in the tutorial.

TUTORIAL SPEAKERS

Juneidi Tsai

Technical Specialist at Microsoft

Profile



CRM Specialist with more than 10 years of professional work experience encompassing various facets of application and data analysis across many industries including automotive, education, retail, and financial service industry.

Title:

Microsoft Education Transformation Framework for Higher Education

Abstract

Higher education institutions are complex and multifaceted organizations comprised of multiple departments that must work together to execute a successful vision. The Microsoft Education Transformation Framework enables a holistic look at the institution but provides you with the ability to develop your digital strategy in discrete phases, answering that all important question, “Where should I start?”

The Microsoft Education Transformation Framework provides practical advice to help you develop a strategy for digital transformation with a holistic, long-term view implemented in discrete phases that you can begin today to help drive innovative student engagement, transform operations, and ensure a secure, connected campus to empower you to reimagine education.

SOCIAL EVENTS

Birds of a feather Sessions

Host: Afiahayati, Ph.D

Universitas Gadjah Mada

Theme: AI and Bioinformatics for COVID-19



Afiahayati, S.Kom., M.Cs, Ph.D is a Lecturer and Researcher at the Department of Computer Science and Electronics, Faculty of Mathematics and Natural Sciences, Gadjah Mada University. She finished her Doctoral Degree in Dept. of Biosciences and Informatics/Faculty of Science and Technology, Keio University, Japan. Her research interests include Bioinformatics, Machine Learning and Artificial Intelligence.

Host: Dr. Muhammad Johan Alibasa

Theme: Digital footprints during COVID-19 pandemics



Muhammad Johan Alibasa is a lecturer at the School of Computing, Telkom University, Indonesia. He received the School of Computer Science Research Students Excellence Prize 2019 from the University of Sydney, Australia, where he completed his doctoral degree. He was also a recipient of the Indonesian Endowment Fund for Education (LPDP) scholarship from Ministry of Finance, Republic of Indonesia. His research interests include human-computer interaction and artificial intelligence, specifically on the applications of machine learning to improve wellbeing. Prior to his PhD study, he worked as a mobile application developer and developed mobile apps in the area of workplace wellbeing. He received

the M.Sc. and B.Sc. degrees in electrical engineering from Institut Teknologi Bandung, Indonesia, in 2014 and 2012.

SOCIAL EVENTS

Birds of a feather Sessions

Host: Kemas Rahmat Shaleh, Ph.D

Telkom University

Theme: Knowledge Management, Knowledge Representation and reasoning

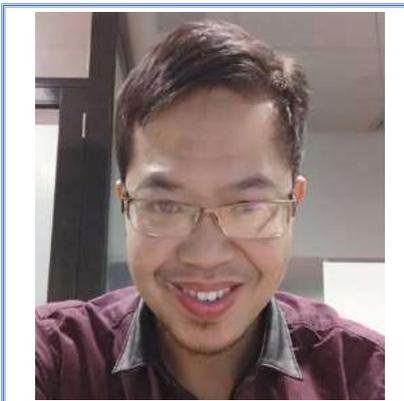


Kemas Rahmat Saleh Wiharja is a full time lecturer in Telkom University since 2006. He got his Ph.D from University of Aberdeen in 2020 and his research interests are knowledge representation and reasoning, knowledge graph, and data science.

Host: Dr. Agus Hartoyo

Telkom University

Theme: Artificial Intelligence of Things (AIoT): The intersection of AI and IoT



Agus Hartoyo received a B.Sc. in Informatics from IT Telkom (now Telkom University), Indonesia, in 2008 on his thesis in AI development for solving a problem in NLP. He completed his M.Sc. in Computer Science from TU Kaiserslautern, Germany, in 2015 with his research work focusing on solving a reachability problem in the safety and reliability of embedded systems. In 2021 he obtained a Ph.D. in Bioinformatics from Swinburne University of Technology, Australia, on a thesis in the inference and modeling of brain dynamics. His Ph.D. dissertation was examined by two experts in computational biology, one of whom graded the thesis with the highest grade: "Excellent - Summa cum Laude". Right after

his Ph.D., Agus Hartoyo joined the School of Computing, Telkom University, as a lecturer and researcher. His research interests include artificial intelligence, statistical inference, safety and reliability of embedded systems, bioinformatics, and computational linguistics.

SOCIAL EVENTS

Birds of a feather Sessions

Host: Dr. Maya Ariyanti

Telkom University

Theme: E Learning



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for the field, has published several books such as Credit Management, Introduction to Monetary Theory, and Marketing Plan. The author is also a consultant and writes cases in the field of marketing management. Currently the author is also a lecturer for management courses, introduction to business, marketing management, digital marketing, digital consumer behavior, digital business consumer behavior, and digital marketing communications.

TECHNICAL PARALLEL SESSION SCHEDULE

Parallel Session #1: Wednesday, August 4, 2021, 11:00 - 13:00 UTC/GMT+7

Session 1A – Applications for Post-Pandemic Recovery
 Venue Room A: Yudhistira
 Session Chair Dr. Agus Sihabuddin, S.Si., M.Kom

Time	Paper Title	Presenter
11:00	The role of technology capabilities and innovation capabilities in achieving business resilience of MSMEs during Covid-19: Empirical Study	Grisna Anggadwita
11:20	Gaze-Controlled Digital Signage for Public Health Education during Covid-19 Pandemic	Sunu Wibirama
11:40	Analysis of the House of Risk (HOR) Model for Risk Mitigation of the Supply Chain Management Process (Case Study: KPBS Pangalengan Bandung, Indonesia)	Ratih Hendayani
12:00	Evaluation of the Social Restriction and its Effect to the COVID-19 Spread in Indonesia	Inna Syafarina
12:20	Contributing Clinical Attributes to COVID-19 Mortality in Jakarta: Machine Learning Study	Muhamad Erza Aminanto

Session 1B – Computer Vision
 Venue Room B: Bima
 Session Chair Tee Connie (MMU)

Time	Paper Title	Presenter
11:00	Multi-Target Regression Using Convolutional Neural Network-Random Forest for Early Earthquake Warning System	Adi Wibowo
11:20	Vision-Based Employee Activity Classification	Rizal Putra
11:40	Compressive Sensing Image Watermarking Orthogonal Matching Pursuit	Irma Safitri
12:00	Traffic Sign Recognition with Convolutional Neural Network	Zhong Bo Ng
12:20	Deep Convolutional Generative Adversarial Network Application in Batik Pattern Generator	Moch. Chamdani Mustaqim

Session 1C – Data Science
 Venue Room C: Arjuna
 Session Chair Dr. Yuliant Sibaroni

Time	Paper Title	Presenter
11:00	Convolutional Neural Networks for Indonesian Aspect-Based Sentiment Analysis Tourism Review	Ahmad Hidayatullah
11:20	Sentiment Analysis on Marketplace Review using Hybrid Lexicon and SVM Method	Muhammad Mukhtar
11:40	Forecasting Number of COVID-19 Cases in Indonesia with ARIMA and ARIMAX Models	Bimo Aji
12:00	Disaster Tweet Classification Based On Geospatial Data Using the BERT-MLP Method	Iqbal Maulana
12:20	Cyberbullying Detection on Indonesian Twitter using Doc2Vec and Convolutional Neural Network	Shindy Laxmi

Session 1D – E-Learning and HCI
 Venue Room D: Nakula
 Session Chair Dr. Kusuma Ayu Laksitowening

Time	Paper Title	Presenter
11:00	Digital Nudge Evaluation on COVID-19 tracing Application	Dyah Sukmaningsih
11:20	Developing Suicide Risk Idea Identification for Teenager (SERIINA) Mobile Apps Prototype using Extended Rapid Application Development	Tenia Wahyuningrum
11:40	Designing An Educational Game Evaluation Framework Based On Game Mechanic	Fais Zharfan Azif; Satrio Rukmono
12:00	Cultivating Recycling Awareness in Preschoolers using Animated Interactive Comic	Siti Zulaiha Ahmad
12:20	Analysis Influence of The Organizational Learning Environment Factors To Encourage Employee Motivation Using E-Learning	Nanik Qodarsih

Session 1E – Healthcare, Bioinformatics, and Biomedical Applications
Venue Room E: Sadewa
Session Chair Dr. Dodi Qory

Time	Paper Title	Presenter
11:00	Distributed Phylogenetic Tree Processing on Biology Sequences Using Mapreduce	Renaning Susilo
11:20	Linear Regression Model to Predict the Spread of COVID-19 in Tangerang City	Yusuf Sudiyono
11:40	Strategic Information System Planning for Indonesia Non-franchise Pharmacies Based on John Ward and Factor Analysis Method	Tabah Arwiyanto
12:00	Flexible Multi-Layer Condura Fabric Ultra Wide-Band Antenna For Telemedicine Application	Yusnita Rahayu
12:20	Anonymizing Prescription Data Against Individual Privacy Breach in Healthcare Database	Dedi Gunawan

TECHNICAL PARALLEL SESSION SCHEDULE

Parallel Session #2: Wednesday, August 4, 2021, 14:00 - 16:00 UTC/GMT+7

Session 2A – Networking, IoT, and Security
 Venue Room A: Yudhistira
 Session Chair Dr. Bayu Erfianto

Time	Paper Title	Presenter
14:00	Simulation Of Jellyfish Topology Link Failure Handling Using Floyd-Warshall and Johnson Algorithm in Software Defined Network Architecture	Muhammad Nugroho
14:20	Game Theoretical Power Control in Heterogeneous Network	Anggun Isnawati
14:40	IoT Drone Camera for a Paddy Crop Health Detector with RGB Comparison	Aji Putrada
15:00	A Review on IoT with Big Data Analytics	Abu Fuad Ahmad
15:20	Vehicle Blind Spot Area Detection Using Bluetooth Low Energy and Multilateration	Aji Putrada

Session 2B – Computer Vision
 Venue Room B: Bima
 Session Chair Lim Kian Ming

Time	Paper Title	Presenter
14:00	Facial Emotion Recognition using Transfer Learning of Alexnet	Sarmela Raja Sekaran
14:20	Visually Similar Handwritten Chinese Character Recognition with Convolutional Neural Network	Wei Han Liu
14:40	Pneumonia Classification using Gabor-Convolutional Neural Networks and Image Enhancement	Muhammad Alfarizy
15:00	Fingerprint Enhancement using Iterative Contextual Filtering for Fingerprint Matching	Brama Satria
15:20	Histogram of Oriented Gradient Random Template Protection for Face Verification	Lucas Chong Wei Jie

Session 2C – Data Science
 Venue Room C: Arjuna
 Session Chair Dr. Imelda Atastina

Time	Paper Title	Presenter
14:00	Aspect-Based Sentiment Analysis in Beauty Product Reviews Using TF-IDF and SVM Algorithm	Nadira Arthamevia
14:20	Aspect Term Extraction Using Deep Learning-Based Approach on Indonesian Restaurant Reviews	Rachmansyah Adhi Widhianto
14:40	Spam Detection on Indonesian Beauty Product Review	Muhammad Ahsan Athallah
15:00	Emotion Classification on Indonesian Twitter Using Convolutional Neural Network (CNN)	Firhan Maulana Rusli
15:20	Mapping Complex Tourist Destination Preferences: Network Perspectives	Dian Ramadhani

Session 2D – E-Learning and HCI
 Venue Room D: Nakula
 Session Chair Dana Sulistyو Kusumo, Ph.D

Time	Paper Title	Presenter
14:00	Exploring the existence and variation of Game Player Traits among Undergraduate students in Malaysia	Mageswaran Sanmugam
14:20	Implementation of Continuous Integration and Continuous Delivery (CI/CD) on Automatic Performance Testing	Mohammad Rizky Pratama
14:40	Understanding Government Reorganization Impact from Knowledge Management Perspective: A Study Case	Yulia Sulistyaningsih
15:00	Enterprise Resource Planning Teaching in Post Pandemic using Gamification	Kaushal Jheengut; Dinesha Cauleechurn; Bibi Cadessaib
15:20	RPA-based Bots for Managing Online Learning Materials	Siti Fatimah Abdul Razak

Session 2E – Healthcare, Bioinformatics, and Biomedical Applications
Venue Room E: Sadewa
Session Chair Satria Mandala, Ph.D

Time	Paper Title	Presenter
14:00	Holick's Rule Implementation: Calculation of Produced Vitamin D from Sunlight Based on UV Index, Skin Type, and Area of Sunlight Exposure on the Body	Jonathan Salomo
14:20	T-COFFEE Multiple Sequence Aligner on Hadoop Spark Cluster	Viebiyanty Prihatiningrum
14:40	Relaxation Oscillator Using Closed-loop Dual Comparator for Biomedical Applications	Theodora Valerie
15:00	Wireless Programmable body sensor networks and Situated Healthcare	Alberto Faro

TECHNICAL PARALLEL SESSION SCHEDULE

Parallel Session #3: Thursday, August 5, 2021, 08:15 - 10:15 UTC/GMT+7

Session 3A – Networking, IoT, and Security
 Venue Room A: Yudhistira
 Session Chair Dr. Vera Suryani

Time	Paper Title	Presenter
08:15	Detection of Sinusoids with Frequency Drift in White Gaussian Noise	Bradley Comar
08:35	Tone Detection System Design for Targets with Frequency Drift	Bradley Comar
08:55	AADC 3: Active-Active Distributed Controller with 3-in-1 Asynchronous Heartbeat Synchronization Method in Software-Defined Networks	Muhammad Nugroho
09:15	4G LTE Cellular Network Coverage Planning and Simulation on Mandalay Area with Propagation Model Cost-Hatta	Ahmad Idris
09:35	USB Flash Drives Forensic Analysis to Detect Crown Jewel Data Breach in PT. XYZ (Coffee Shop Retail - Case Study)	Daniel Septianto

Session 3B – Computer Vision
 Venue Room B: Bima
 Session Chair Dr. Ema Rachmawati

Time	Paper Title	Presenter
08:15	Enhanced AlexNet with Super-Resolution for Low-Resolution Face Recognition	Jin Chyuan Tan
08:35	An End-to-End Optical Character Recognition Pipeline for Indonesian Identity Card	Andreas Chandra
08:55	A Study of Batik Style Transfer using Neural Network	Aditya Ihsan
09:15	Tomato Plant Disease Identification through Leaf Image using Convolutional Neural Network	Aulia Yoren

Session 3C – Data Science
 Venue Room C: Arjuna
 Session Chair Didit Aditya, Ph.D

Time	Paper Title	Presenter
08:15	Non-Stationary Order of Vector Autoregression in Significant Ocean Wave Forecasting	Fikka Raudiya
08:35	FN-Net: A Deep Convolutional Neural Network for Fake News Detection	Kian Long Tan
08:55	Sentiment Analysis of Ojek Online User Satisfaction Based on the Naïve Bayes and Net Brand Reputation Method	Alam Rahmatulloh
09:15	Raw Paper Material Stock Forecasting with Long Short-Term Memory	Febryo Kurniawan
09:35	Mobile Customer Behaviour Predictive Analysis for Targeting Netflix Potential Customer	Suryadi Tanuwijaya

Session 3D – E-Learning and HCI
 Venue Room D: Nakula
 Session Chair Siti Zainab Ibrahim

Time	Paper Title	Presenter
08:15	Master Data Management Maturity Model (MD3M) Assessment: A Case Study in Secretariat of Presidential Advisory Council	Chielsin Ko
08:35	Capturing Institution and Learners Readiness of e-Learning Implementation: A Case Study of a University in Bandung, Indonesia	Dawam Dwi Jatmiko Suwawi
08:55	Satisfaction Factors of Indonesian National Civil Servant Recruitment System	Galih Avianto
09:15	Implementation and Analysis of Reusability Framework Design for Event User Interface Component in Phaser 3	Dana Sulistyو Kusumo
09:35	The Preliminary Study on the Perception of Engineering Students on Blended Learning	Min Chi Low

Session 3E – Healthcare, Bioinformatics, and Biomedical Applications
Venue Room E: Sadewa
Session Chair Ng Chong Han

Time	Paper Title	Presenter
08:15	Implant Segmentation in Radiographic Imagery Using Multiresolution MTANN and Wavelet Decomposition	Rangga Perwiratama
08:35	Improving Multi-Class Motor Imagery EEG Signals Classification Using Ensemble Learning Method	Deni Nugroho
08:55	Implementation and Experimental Characterization of Dual-Band Wearable Reflector Composed of AMC Structure for Wireless Communication	Ichsan Nusobri

TECHNICAL PARALLEL SESSION SCHEDULE

Parallel Session #4: Thursday, August 5, 2021, 10:15 – 12:15 UTC/GMT+7

Session 4A – Networking, IoT, and Security
 Venue Room A: Yudhistira
 Session Chair Dr. Rio Guntur Utomo

Time	Paper Title	Presenter
10:15	Modified Pixel Value Ordering-based Predictor for Reversible Data Hiding on Video	Tohari Ahmad
10:35	Simulation and Analysis of Partial Transmit Sequence on Palm Date Leaf Clipping for PAPR Value Reduction	Vincent Vincent
10:55	Design Automation of Single Photon Counting Method for Quantum Random Number Generation	Dedy Putranto
11:15	On the Modifications of a Digital Signature Algorithm with Secret Sharing	Mareta Wahyu Ardyani
11:35	Connected Vehicle Communication Concept for Flood Level Warning Using Low Cost Microcontroller	Sumendra Yogarayan; Mohd Fikri Azli Abdullah
11:55	Randomness, Uniqueness, and Steadiness Evaluation of Physical Unclonable Functions	Rivaldo Sembiring

Session 4B – Computer Vision
 Venue Room B: Bima
 Session Chair Wikky Fawwaz, Ph.D

Time	Paper Title	Presenter
10:15	A Low-Cost High-Accuracy Thermal Camera Using Off-the-shelf Hardware Devices	Dinh-Tien Tran
10:35	Sentinel 1 Classification for Garlic Land Identification using Support Vector Machine	Muhammad Agmalario; Imas Sitanggang
10:55	Recognition of Academic Emotions in Online Classes	Tee Connie
11:15	Image Steganography Compressive Sensing Orthogonal Matching Pursuit	Irma Safitri

Session 4C – Data Science
 Venue Room C: Arjuna
 Session Chair Faizal Makhrus,S.Kom., M.Sc., Ph.D

Time	Paper Title	Presenter
10:15	Indonesian Hoax Identification on Tweets Using Doc2Vec	Titi Widaretna
10:35	Electronic Nose Dataset for Classifying Rice Quality using Neural Network	Ferdy Erlangga
10:55	SVM Parallel Concept Test with SMO Decomposition on Cancer Microarray Dataset	Rahmat Prasojoe
11:15	Detecting Online Recruitment Fraud Using Machine Learning	Hridita Tabassum
11:35	Data mining for revealing relationship between Google community mobility and macro-economic indicators	Gunawan Gunawan

Session 4D – E-Learning and HCI
 Venue Room D: Nakula
 Session Chair Lew Sook Ling

Time	Paper Title	Presenter
10:15	Suitable Knowledge Management Process Implementation: a case study of PT Sinergi Sentra Digital	Yusuf Pratama
10:35	Critical Success Factors for Project Tracking Software Implementation: A Case Study at a Banking Company in Indonesia	Hendro Hadi
10:55	Assurance Case Pattern using SACM Notation	Nungki Selviandro
11:15	Sustainability And Aptness Of Game Elements In A Gamified Learning Environment	Mageswaran Sanmugam
11:35	User Interface Model for Visualization of Learning Materials in Comic Strip Form Using Goal-Directed Design Method	Danang Junaedi

Session 4E – Networking, IoT, and Security
Venue Room E: Sadewa
Session Chair Chong Siew Chin

Time	Paper Title	Presenter
10:15	Accessibility and Response Time Analysis on the COVID19 Website in Indonesia	Ryan Wicaksono
10:35	Modified Bit Parity Technique for Error Detection of 8 Bit Data	Fakhira Zulfira
10:55	IoT Application on Agricultural Area Surveillance and Remote-controlled Irrigation Systems	Ratnasari Rohmah
11:15	Present-80 Encryption Algorithm Implementation on GPRS Arduino Mega-2560 Cyber Physical Tracking System	Rini Wisnu Wardhani
11:35	Hunting Cyber Threats in the Enterprise Using Network Defense Log	Ardian Oktadika

TECHNICAL PARALLEL SESSION SCHEDULE

Parallel Session #5: Thursday, August 5, 2021, 13:15 – 15:15 UTC/GMT+7

Session 5A – Networking, IoT, and Security
 Venue Room A: Yudhistira
 Session Chair Ooi Shih Yin

Time	Paper Title	Presenter
13:15	Building an ID Card Repository with Progressive Web Application to Mitigate Fraud based on the Twelve-Factor App methodology	Kevin Akbar Adhiguna
13:35	XB-Pot: Revealing Honeypot-based Attacker's Behaviors	Ryandy Djab
13:55	Design of a Snort-based IDS on the Raspberry Pi 3 Model B+ Applying TaZmen Sniffer Protocol and Log Alert Integrity Assurance with SHA-3	Rini Wisnu Wardhani
14:15	Learning Method of Performance-oriented Congestion Control (PCC) for Video Streaming Analysis	Sidik Prabowo
14:35	Experimental Investigation of Wave Absorber Made of Ring Resonator-Based AMC Structure	Ichsan Nusobri

Session 5B – Data Science
 Venue Room B: Bima
 Session Chair Dr. Dyah Aruming Tyas, S.Si

Time	Paper Title	Presenter
13:15	Information Cascade Mechanism and Measurement of Indonesian Fake News	Asla Sonia
13:35	Fraud Accounts Identification Modelling on Multi-Platform E-Commerce	Grawas Sugiharto
13:55	Classification on Participants Renewal Process in Insurance Company: Case Study PT XYZ	Noperida Damanik; Deddy Utomo
14:15	Hybrid Space-Time Model and Machine Learning for Forecasting Multivariate Spatio-Temporal Data	Hendri Prabowo
14:35	Comparative Study of Covid-19 Tweets Sentiment Classification Methods	Untari Wisesty

Session 5C – Data Science
 Venue Room C: Arjuna
 Session Chair Muhammad Alfian Amrizal, B.Eng., MIS, Ph.D

Time	Paper Title	Presenter
13:15	Count Data Forecasting using Poisson Autoregression for COVID-19 Case Prediction in Jakarta	Bahrul Nasution
13:35	Optimization of Crops Allocation Planning in Cianjur Involving Water Cost Constraints Using Genetic Algorithm	Bambang Wahyudi
13:55	Fake News Detection with Hybrid CNN-LSTM	Kian Long Tan
14:15	Aspect Based Sentiment Analysis With Combination Feature Extraction LDA and Word2vec	Rizka Vio Octriany Inggit Sudiro
14:35	Sentiment Analysis on Beauty Product Reviews using LSTM Method	Muhammad Rafii Danendra

Session 5D – Data Science
 Venue Room D: Nakula
 Session Chair Chong Lee Ying

Time	Paper Title	Presenter
13:15	Indonesian ID Card Extractor Using Optical Character Recognition and Natural Language Post-Processing	Firhan Rusli
13:35	Analysis of Records Management Maturity Level for Data Collection of Network Assets in Indonesian Telecommunication Industry	Rizky Eka Putri
13:55	Data Acquisition Guide for Forest Fire Risk Modelling in Malaysia	Yee Jian Chew
14:15	Implementation of Hidden Markov Model (HMM) to Predict Financial Market Regime	Irma Palupi
14:35	Prediction of Graduation with Naïve Bayes Algorithm and Principal Component Analysis (PCA) on Time Series Data	Wishnu Herlambang

Session 5E – Data Science
Venue Room E: Sadewa
Session Chair Ong Thian Song

Time	Paper Title	Presenter
13:15	Comparative Analysis of Support Vector Machine (SVM) and Random Forest (RF) Classification for Cancer Detection using Microarray	Irawansyah Irawansyah
13:35	Evaluating the BPPT Medical Speech Corpus for An ASR Medical Record Transcription System	Elvira Nurfadhilah
13:55	Implementation of Simulated Annealing-Support Vector Machine on QSAR Study of Indenopyrazole Derivative as Anti-Cancer Agent	Isman Kurniawan
14:15	Ransomware Detection on Bitcoin Transactions Using Artificial Neural Network Methods	Hairil Hairil
14:35	Emotional Context Detection on Conversation Text with Deep Learning Method Using Long Short-Term Memory and Attention Networks	Afrida Helen

ABSTRACT

SESSION 1A: Applications for Post-Pandemic Recovery

The role of technology capabilities and innovation capabilities in achieving business resilience of MSMEs during Covid-19: Empirical Study

Grisna Anggadwita, Ratih Hendayani, Erni Martini, Muhammad Kamil

This study aims to identify the role of technological capabilities and innovation capabilities in the business resilience of Micro, Small and Medium Enterprises (MSMEs) during the Covid-19 pandemic. This study also examines the mediating role of innovation capability on the relationship between technology capability and business resilience. This study uses a quantitative method with a causality approach to examine the relationship between variables. A survey was conducted of 400 MSME owners in Jakarta, Indonesia using a random sampling technique. Structural equation models are used to predict and estimate relationships. The results of this study indicate that technological capabilities and innovation capabilities have a positive and significant effect on business resilience in MSMEs during the Covid-19 pandemic. In addition, innovation capability has also been shown to play a significant role as a mediator in the relationship between technological capability and business resilience. This study emphasizes that the increasing importance of the concept of business resilience in the face of the Covid-19 pandemic thus encouraging MSMEs to improve their technological capabilities and innovation capabilities.

Gaze-Controlled Digital Signage for Public Health Education during Covid-19 Pandemic

Sunu Wibirama, Suatmi Murnani, Irawan Dharma Sukawati, Ridi Ferdiana

For more than a decade, digital signages have been used in health facilities and public environment to provide fun and interactive approach of education. Unfortunately, interacting with conventional digital signage during Covid-19 pandemic raises a concern on its hygiene. Thus, touchless interaction is preferable to avoid direct contact on the touch screen. Here we present a novel study on effectiveness of gaze-based interaction in a digital signage for public education about Covid-19. Instead of touching the screen, the users engage with the content by gazing at a dynamic button that moves in horizontal or vertical direction. Experimental results show that gazing at faster dynamic buttons (angular speed of 60.28 °/s) than its slower counterpart (angular speed of 30.14 °/s) requires shorter time to complete a three-steps task ($T = 84$, $Z = -1.977$, $p < 0.05$). Our study provides a scientific proof of concept for development of touchless digital signage that complies with technical guidelines of the World Health Organization on cleaning and disinfecting surfaces in non- health care settings.

Analysis of the House of Risk (HOR) Model for Risk Mitigation of the Supply Chain Management Process (Case Study: KPBS Pangalengan Bandung, Indonesia)

Ratih Hendayani, Ellysa Rahmadina, Grisna Anggadwita, Rina Pasaribu

This study identifies risk management in the supply chain of dairy companies in Bandung, West Java, Indonesia. Using a single case study methodology, semi-structured interviews were conducted with various departments of supply chain agents working in dairy companies. Data were collected about the dairy processing company supply chain network, manager's knowledge of supply chain risk management, and the risks inherent in the milk supply chain. In general, companies have an

awareness of supply chain risks. By using the House of Risk (HOR) model, which combines two methods, namely Failure Mode and Effect Analysis (FMEA) and Quality Function Deployment (QFD), the risks identified in the supply chain have been assessed and prioritized. Several recommendations have been made to mitigate high priority risks. The study found 15 risk events in the company's supply chain process, 11 risk agents where seven of them belong to the priority risk agent category which has a share of 79.55% of the total risk experienced by the company. To deal with these priority risk agents, the company found seven risk mitigation actions to minimize the impact that could harm the company.

Evaluation of the Social Restriction and its Effect to the COVID-19 Spread in Indonesia

Inna Syafarina, Ayu Shabrina, Arnida Lailatul Latifah, Didit Adytia

The government of Indonesia has implemented a large-scale social restriction of various levels, in the local and national region to control the COVID-19 transmission over the country. Successful social restrictions are believed as a powerful way in controlling COVID-19 spread. This paper evaluated the social restriction that has been implemented in Indonesia and its connection to the spread of COVID-19. The social restriction is quantified by the changes in human movement, while the spread of COVID-19 is computed by a growth rate and doubling time of the COVID-19 cases. This paper showed the social restriction reduced human mobility up to more than 50% when the restriction was started. It flattened the cases but it only lasted for approximately two months. Afterward, the growth rate and the doubling time showed an increase of the COVID-19 cases and it was getting much worse starting at the end of the year 2020. Moreover, we found that the implemented social restriction in Indonesia is less effective to reduce the COVID-19 spread in Indonesia as human mobility during a holiday, an especially long weekend is much stronger.

Contributing Clinical Attributes to COVID-19 Mortality in Jakarta: Machine Learning Study

Muhamad Erza Erza Aminanto, Bahrul Ilmi Nasution, Andi Sulasikin, Yudhistira Nugraha, Juan Kanggrawan, Alex Lukmanto Suherman

Since December 2019, we have lived in a pandemic era of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Medical records of COVID-19 patients have been reported and analyzed worldwide. The Health Agency of Jakarta, Indonesia, collected clinical symptoms, demographics, travel history, and mortality information from March 2020 up to now. Despite massive research on COVID-19 patients' data, the significant clinical symptoms that lead to COVID-19 mortality in Jakarta have not been well described to the best of the authors' knowledge. We extracted the COVID-19 records in Jakarta and compared them between patients who were discharged and deceased. This paper examines each clinical symptom's importance to mortality using machine learning techniques, namely weighted Artificial Neural Network, Decision Tree, and Random Forest. We observed that Pneumonia, Shortness of Breath, Malaise, Hypertension, Fever, and Runny Nose are the top six significant clinical symptoms that lead to deaths in Jakarta. We suggest medical experts become more cautious with these symptoms. Also, in medical facilities, these symptoms can be used as pre-screening before entering the facilities.

ABSTRACT

SESSION 1B: Computer Vision

Multi-Target Regression Using Convolutional Neural Network-Random Forest For Early Earthquake Warning System

Benaldy Yuga Adhaityar, David Sahara, Cecep Pratama, Adi Wibowo, Leni Sophia Heliani

Indonesia occupies a very active tectonic zone because the world's three large plates and nine other smaller plates meet each other in Indonesian territory and form a complex plate meeting path. East Java Province is part of the Sundanese arc, which has a relatively high level of seismicity and has a complex geological system that is a result of the Indo- Australian plate. Therefore, a system that can provide earthquake early warning (EEW) is needed to reduce casualties. In this paper, we determine the location and magnitude of the earthquake using the Convolutional Neural Network (CNN) as feature extraction and Random Forest (RF) for multi-target regression. Earthquakes in East Java in 2009-2017 are used to train and validate the proposed model. Based on the experiment, the lowest error obtained from the CNN-RF model is 18 km for longitude, 32.2 km for longitude, and 0.3490 for magnitude.

Vision-Based Employee Activity Classification

Rizal Kusuma Putra, Ema Rachmawati, Febryanti Sthevanie

An employee should be competent and expertise in their respective fields. An evaluation is needed to maintain the quality of employee's performance, one of which can be done by observing their activity during working hours. This research discusses the classification of the employee's activity in desk work. Classification of employee's activity is investigated using ResNet and the Cyclical Learning Rate method in a novel dataset, i.e. vision-based employee activity. Classification is done by looking at three types of employee activities: talking on the phone, using a PC, and playing smartphone. The most optimal result of this research is ResNet50 using CLR with image input of 224x224x3, which has an accuracy of 87.01% and 12.99% error rate for talking on the phone, 99.95% accuracy and 0.05% error rate for using a pc, 81.67% accuracy and 18.83% error rate for playing smartphone, and has a decreasing loss value. In addition, this research shows that cyclical learning rate significantly affects the model performance.

Compressive Sensing Image Watermarking Orthogonal Matching Pursuit

Irma Safitri

Ease of access to digital data on the internet is prone to rampant piracy, especially of copyright and ownership in the multimedia industry. Therefore, we need a security system that can protect and secure the copyright of data ownership. Watermarking is one solution to overcome piracy that occurs. Watermarking allows the embedded confidential information to be solved by other parties. This study discusses image watermarking using the discrete wavelet transform (DWT) method which is used to decompose the host image as an image where the watermark is embedded, the spread spectrum (SS) method used in the insertion process by spreading watermark bits on the host image and compressive sensing (CS) which is used to increase the efficiency of the watermark technique to increase the capacity and perceptibility of the watermarking process. The reconstruction process was carried out using orthogonal matching pursuit (OMP). The result is that the host image has a watermark embedded in the best sub-band. The test results showed the performance of the PSNR value was 53.3553 dB, MSE 0.30029, and BER 0.20027.

Traffic Sign Recognition with Convolutional Neural Network

Zhong Bo Ng, Kian Ming Lim, Chin Poo Lee

This paper presents an ablation analysis of Multilayer Perceptron and Convolutional Neural Networks in traffic sign recognition. The ablation analysis studies the effects of different architectures of Multilayer Perceptron and Convolutional Neural Networks, batch normalisation and dropout. A total of 8 different models are reviewed and their performance is studied. A traffic sign dataset with approximately 5000 images is collected. The experimental results demonstrate that Convolutional Neural Networks outperform Multilayer Perceptron in general. Leveraging dropout layer and batch normalisation is effective in improving the stability of the model thus yielding better results.

Deep Convolutional Generative Adversarial Network Application in Batik Pattern Generator

Agus Eko Minarno, Moch. Chamdani Mustaqim, Yufis Azhar, Wahyu Andhyka Kusuma

Batik has been alleged as one of the oldest cultural heritages worldwide. Since the initiation, batik has been identified with various types and patterns. Various kinds of batik making techniques have long been popularized by the wider community. DCGAN serves as a new idea for the modern batik world. Such algorithm is capable of reproducing a novel image to produce batik patterns previously unnotified. Hence, this study aims to propose a DCGAN model to craft a new type of batik pattern. By utilizing a large dataset of batik images and a variety of the proposed DCGAN models, the proposed algorithm has succeeded in crafting a novel and diverse synthetic batik pattern.

ABSTRACT

SESSION 1C: Data Science

Convolutional Neural Networks for Indonesian Aspect-Based Sentiment Analysis Tourism Review

Royan Nayoan, Ahmad Fathan Hidayatullah, Dhomas Hatta Fudholi

In recent years, electronic word of mouth (e- WOM) has been widely used by people around the world. Tripadvisor is an e-WOM travel website which provides information about reviews and opinions on travel-related content. To help users gather information faster, aspect-based sentiment analysis is necessary. Aspect-based sentiment analysis helps users to capture and extract important features from the reviews. Therefore, this study aims to build an aspect-based sentiment analysis model of Indonesian tourism review by extracting aspect-category and their corresponding polarities from user reviews. To gain the best model, we performed several experiments by using Convolutional Neural Networks (CNN). Moreover, we compared our CNN model with CNN-LSTM and CNN-GRU to identify the sentiment and aspects from the reviews. We also performed negation handling in our feature extraction process to improve our CNN models. Based on our experiments, CNN combined with both POS tag and negation handling outperformed the other models with the accuracy of sentiment analysis of 0.9522 and aspect category of 0.9551.

Sentiment Analysis on Marketplace Review using Hybrid Lexicon and SVM Method

Muhammad Mukhtar, Wikky Fawwaz Al Maki, Ade Romadhony

Nowadays, especially during the Covid-19 pandemic time, there is enormous rise in online transactions. There are several popular marketplaces that provide review facility to help customers choosing the right products or sellers. Sentiment analysis is a study to classify a review text to sentiment classes Tables. In this paper, we present a study of sentiment analysis on marketplace review text using hybrid method: based on lexicon from Sentiwordnet 3.0 and Support Vector Machine (SVM) method. The experimental results show that the hybrid method outperforms the lexicon approach and SVM approach.

Forecasting Number of COVID-19 Cases in Indonesia with ARIMA and ARIMAX Models

Bimo Satrio Aji, Indwiarti, Aniq Atiqi

During the pandemic COVID-19, Indonesia has a significant number of positive cases among countries in Asia. In early December 2020, the death rate in Indonesia had been reached more than 3%. Meanwhile, the daily number of positive is also continued to increase, it happens due to lack of anticipation rules made by local authorities and central government. Thus, the preventive step such forecasting becomes a major issue in the area of science and technology, to make all stakeholders well-prepared against this pandemic. This paper provides the performance of The Autoregressive Integrated Moving Average (ARIMA) to forecast several COVID-19 and also examines Auto Regressive Integrated Moving Average with exogenous variables (ARIMAX) model by considering Google Trends as an external variable. We consider a daily dataset from the official website of the Jakarta's COVID-19 and the Google Trends data based on certain queries as external variables on March 1 - November 25, 2020. According to ARIMA and ARIMAX models, we have ARIMAX model with Google Trends improving ARIMA's performance by reducing the MAPE by 0.8 %.

Disaster Tweet Classification Based On Geospatial Data Using the BERT-MLP Method

Iqbal Maulana and Warih Maharani

As a popular social media in the world and even in Indonesia, Twitter has a variety of popular topics making these topics trending, including the topic of natural disasters that have occurred in Indonesia. The DKI Jakarta flood disaster in early 2020 made a big scene on trending twitter topics. This study aims to classify these tweets into "flooded" and "not flooded" predictions with the tweets and geospatial features. The model proposed for classifying is BERT-MLP. Bidirectional Encoder from Transformers (BERT) is used in the pre-trained model to classify these tweets and Multi Layer Perceptron (MLP) is used to classify geospatial features. The scenario designed for the model focuses on the preprocessing of tweets as follows without stopword removal, without stemming, with both, and without both. Once classified, the tweet will be visualized into a two-dimensional interactive map. The best scenario results have an accuracy of 82% in scenarios without stemming and with stopword removal. This is due to the stemming process eliminates some of the features in tweets around 6%. This study also shows the relationship between the influence of negative context tweets on the "not flooded" class with an orientation of 65% of the total data. However, defining manual stopwords can affect because stopword removal will not delete words that still have context related features to the topic.

Cyberbullying Detection on Indonesian Twitter using Doc2Vec and Convolutional Neural Network

Shindy Trimaria Laxmi, Rita Rismala, Hani Nurrahmi

Cyberbullying is the act of threatening or endangering others by posting text or images that humiliate or harass people through the internet or other communication devices. According to a survey from Polling Indonesia and Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) about cyberbullying, 49% of 5900 participants claimed they have been bullied. Therefore, this research conducted with the intention to prevent cyberbullying acts, especially in Indonesia. We collected the data from Twitter based on Twitter's Trending keywords which correlated to cyberbully events. Then we combined it with the data from previous research. We obtained a total of 1425 tweets, consists of 393 data labeled as cyberbully and 1032 data labeled as non-cyberbully. Thereupon, we build the Doc2Vec model for features extraction, and a classifier model using the baseline classification method (SVM and RF) and CNN to detect the cyberbully texts. The results shows that the classifier using CNN and Doc2vec has the highest F1-score, 65.08%.

ABSTRACT

SESSION 1D: E-Learning and HCI

Digital Nudge Evaluation on COVID-19 tracing Application

Dyah Wahyu Sukmaningsih

Nudge is considered as an intervention to change user behavior and influence decision making. Mobile apps have become a part of our everyday life. In this pandemic era, governments use mobile apps' technology to control the spread of COVID-19 infection. Many governments implemented COVID-19 tracing apps, and citizens are forced to use the apps to record their contact tracing and alert them if they have contact with an infected person. The key to control the increasing spread of the virus also depends on citizens adhere to health protocol. Government experience difficulty in enforcing the protocol without strict surveillance. Therefore, building awareness of risk is essential-this study attempt to design nudge intervention into COVID-19 tracing apps. From the evaluation of the original apps, four nudge interventions can be applied in the application.

Developing Suicide Risk Idea Identification for Teenager (SERIINA) Mobile Apps Prototype using Extended Rapid Application Development

Tenia Wahyuningrum

Suicide death is the number 15 cause of death in the world. Suicide cases go undetected because the perpetrator shows no signs beforehand. Therefore, it is necessary to identify the risk of suicide in adolescents early, accessed quickly, maintains user privacy, and understand user needs. Using the Risk Factors of Suicidal Ideation (RFSI) questionnaire, it hoped to detect early suicide incidents in adolescents. This research proposed a Suicide Risk Idea Identification for Teenager (SERIINA), a mobile application developed using the Extended Rapid Application Development (ERAD) method. The ERAD method combines the concept of design sprint and RAD in the system development cycle. Based on the research results, SERIINA mobile apps development is completed in 19 days. The functional testing using Black-Box testing shows that the application works well and compatible in the five main scenarios. The results of interface design testing using heuristic evaluation indicate that the application has been well designed, with a usability value of 2.34 or about 72-85% according to design rules.

Designing An Educational Game Evaluation Framework Based On Game Mechanic

Satrio A Rukmono, Fais Zharfan Azif, Muhammad Zuhri Catur Candra

Children in everyday life are increasingly using educational games. However, the quality of each of the many educational games available varies. Some evaluation frameworks exist, but most are prone to the evaluator's subjectivity, which cannot be compared objectively. This study aims to formulate a framework that evaluates the quality of educational games objectively based on the game mechanics used. The framework is built upon Bloom's taxonomy as the basis to ascertain the academic side and MDA (Mechanics-Dynamics-Aesthetics) Framework to distinguish the game side. Then, it assesses each educational mechanic based on a standard in the evaluation framework to obtain an accurate, quantifiable score as a measure. Validation of the framework involves using the framework to evaluate existing educational games and comparing the results with expert reviews. With this framework, an educational game quality can be measured objectively and quantitatively based on the technical and fundamental elements that exist in each game.

Cultivating Recycling Awareness in Preschoolers using Animated Interactive Comic

Siti Zulaiha Ahmad, Ariffin Abdul Mutalib, Nurul Aina Kamarulzaman

Recycling awareness is a crucial social responsibility that needs to be cultivated in the community especially to the young generation. Knowledge of recycling awareness is less exposed to children, especially in school since it is an activity that is not applied by parents at home because they are busy with work. Therefore, this study introduces an interactive animated comic of recycling, as an alternative learning application to facilitate children in preschool in learning and gaining new knowledge. I-Recycle consists of numerous storylines such as weekly activities, collecting recycled items at home with family, cleaning the park with friends and learning activities in the classroom. This study integrates all components using three-phase development model, which consists of pre-development, development, and post-development phases. Usability testing has been conducted with 20 children in individual setting to ensure that i-Recycle is usable and learnable, as those are the important elements to cultivate awareness among the children. The result revealed that 79.75% of the participants agreed i-Recycle is applicable, easy to use and easy to learn. In fact, the user acceptance results also proven that the application is useful, easy to use and acceptable ($\mu = 3.9$). The result disclosed that i-Recycle is interesting for target users to gain new knowledge and learn about recycling through storytelling and animated comic. However, it requires improvement in terms of audio and interface design to ensure the application could suffice the needs of preschoolers.

Analysis Influence of The Organizational Learning Environment Factors To Encourage Employee Motivation Using E-Learning

Nanik Qodarsih, Achmad Hidayanto, Muhammad Rifki Shihab

The successful use of e-learning of course depends on how much great employees have engagement to e-learning. Related to this case, organizations that rely on technology e-learning so we need to build motivation of employees. We can build employee motivation when use e-learning, one thing that the writer look important is organizational support learning environment. This study will answer how the influence of the organizational learning environment to encourage employee motivation using e-learning. The research was conducted in Indonesia Judicial Training Centre. The research methodology used in this study is a case study research, research survey and quantitative research. The number of respondents who took part in the survey amounted to 318 responses. The questionnaire data was processed using the CB SEM method. Data processing is done using the AMOS 22 application. This research has been proven to provide a new perspective on the field of technology and information systems how the influence of organizational learning environment factors such as management support, technology support, organizational support, friend support, and job support can affect the Self Determination Theory and Technology Acceptance Model variables in e-learning acceptance.

ABSTRACT

SESSION 1E: Healthcare, Bioinformatics, and Biomedical Application

Distributed Phylogenetic Tree Processing on Biology Sequences Using Mapreduce

Renaning Susilo, Setyorini, Siti Amatullah Karimah

Multiple Sequence Alignment (MSA) is an important process in the analysis of biological sequences by making comparisons of several biological sequences. In some MSA algorithms (such as CLUSTALW, for example), the formation of phylogenetic trees as a guideline in the alignment process has an important role in determining the accuracy of the final alignment results. From the whole MSA process, the formation of phylogenetic tree computational time increased as the number of sequences increases. Computing the similarity score for all sequence pairs takes a lot of time, causing a long computation time problem. In addition, this research uses the neighbor join method as a technique to build a phylogenetic tree. This Research examines the potential efficiency of computational phylogenetic trees in parallel and is distributed to the Hadoop environment using MapReduce. The results showed that a phylogenetic tree can be generated using MapReduce computation and results 19% time efficiency from 2 and 3 computation node.

Linear Regression Model to Predict the Spread of COVID-19 in Tangerang City

Yusuf Sudiyono, Agung Trisetarso, Harjanto Prabowo, Meyliana Meyliana

The outbreak of acute respiratory syndrome virus disease in China at the end of 2019 has caused a global epidemic as well as high mortality rates in affected countries. This research aimed at examining the extent of the spread of confirmed Covid-19 cases in Tangerang City. The data used included the data of confirmed Covid-19 patients. Such data was integrated with geospatial data found in 13 sub-districts in Tangerang City. The prediction of the spread of confirmed Covid-19 cases was made by using Linear Regression model. The results of the MAPE calculation with a value below 10% in 13 districts resulted in a very good predictive value. This prediction resulted in a graph and was connected to each other in a thematic map coordinate point system. The results of the Covid-19 spread prediction were divided into several districts and indicated with different color variations. Therefore, the darker the resulting color on the thematic map visualization, indicate an increase in Covid-19 cases that have occurred.

Strategic Information System Planning for Indonesia Non-franchise Pharmacies Based on John Ward and Factor Analysis Method

Tabah Arwiyanto, Adian Fatchur Rochim, R Rizal Isnanto

This study aims to produce a strategic planning proposal for the IS / IT of non-franchise pharmacies to be able to compete with franchised pharmacies and to realize the vision, mission, and objectives of the pharmacy. This research was conducted using a mixed-method with a sequential explanatory design. Observation and interview methods are used to formulate the vision, mission, and objectives of the pharmacy. The data obtained is used as a basis for making objective factors in the form of Likert scale questions. The results of the questionnaire were analyzed for validity and reliability using Pearson's Product Moment and Cronbach's Alpha and showed the results of the r-count value of all the questions were positive and greater than the r-table ($r\text{-table} > 0.457$) with a value of $\alpha = 0.980$, which means the question items in the questionnaire valid and reliable. These questions are then described in the form of a decomposition diagram with the consideration of value chain analysis. The output of the decomposition diagram is used as data for analyzing the company's success factors

(CSFs). Quantitative factor analysis was also carried out with the help of statistical applications using Bartlett's Test of Sphericity and the Keizer-Meyer-Olkin (KMO) test. As a result, the chi-square value is 279.591 and the MSA value is 0.738, so it can be concluded that the data has met the requirements for factoring. Based on the factor analysis, 7 (seven) components were also extracted which were then used to compile the application portfolio in the McFarlan quadrant. The Customer Relationship Manager (CRM) application and the Point of Sales (POS) application occupy a strategic position, while the Inventory Module, Finance Module, Sales Module occupy a high potential position.

Flexible Multi-Layer Condura Fabric Ultra Wide-Band Antenna For Telemedicine Application

Yusnita Rahayu and Tasya Kirana

In the medical world, a check-up is the first step doctors take to obtain information about a patient's health. Many advances in telemedicine, including health tracking, have advanced with the times. A wearable antenna was developed to enhance the monitoring process and make it more convenient for patients. Fabrics that are both flexible and comfortable used are often applied. It is also necessary to have an antenna with sufficient data transmitting capacity. An Ultra Wide-Band (UWB) antenna is a device that can transmit large quantities of data. This is because the UWB antenna's bandwidth has a wide transmission band. This paper proposes a UWB flexible telemedicine antenna working at 6.55 GHz. The condura substrate is used with frog patch shaped. Condura fabric was proved to be an interesting fabric for textile antennas because of its strength, constant thickness, and high water resistance properties. From simulated results, the antenna has 7.86 GHz of bandwidth with 10.8 dBi of gain. The simulated return loss of -20.57 dB is achieved at 6.5 GHz.

Anonymizing Prescription Data Against Individual Privacy Breach in Healthcare Database

Dedi Gunawan, Fatah Al Irsyadi, Yusuf Sulisty Nugroho, Maryam M

Prescription data is a subset of the health-related data which can be collected by drug store during the patient's medication period. In general, prescription data consists of a set of transaction records which contains patients name or patients identification number and their prescribed medicine name. Analyzing such data using data mining techniques brings various advantages for drug stores. However, performing data mining task is not trivial for the drug stores and possibly the drug store dispatches the prescription data to another party for data analysis. While it can solve the data analysis problem, unfortunately, such activity may result in privacy breach since sensitive information i.e., types of patients' disease due to the data miner has background knowledge to infer certain medicine to the disease type. To guarantee individual privacy preserving of the sensitive information a method called data anonymization should be employed prior to handling the prescription data to another party for data mining purpose. Current data anonymization technique such as suppression technique can successfully address the problem, however, it results in significant item lost and consequently a lot of useful information is lost from the database. To minimize the side effect of the suppression based technique, a data anonymization which is based on swapping techniques can be a solution. Experimental results show that the swapping method successfully protects individual privacy with respect to reduce the number of item lost.

ABSTRACT

SESSION 2A: Networking, IoT, and Security

Simulation Of Jellyfish Topology Link Failure Handling Using Floyd-Warshall and Johnson Algorithm in Software Defined Network Architecture

Muhammad Arief Nugroho and Andrian Rakhmatsyah

Data center designed to accommodate all IT infrastructure, which is currently in great demand by the companies. In the data center, there are several types of network topologies, one of which is the Jellyfish Topology. The main problem in Jellyfish is link failure. Link failure causing connectivity between devices goes down. In order to solve that problem, it is necessary to design and simulate backup path for the networks. The emerging technology in networks called Software Defined Networks (SDN). Using SDN, administrator can easily program the network via controller. SDN can solve the problem by configuring the controller in order to create backup path on-the-fly. In order to find the optimum backup path when link failure occurs in Jellyfish topology, floyd-warshall and johnson algorithm are used in this paper. Simulations are carried out with parameters convergence time, packet loss and throughput. Based on our experiments, Floyd Warshall outperform Johnson algorithm in all parameters.

Game Theoretical Power Control in Heterogeneous Network

Anggun Fitriani Isnawati and Mas Aly Afandi

The development of wireless technology has penetrated in femtocell communication systems, where this communication system is very flexible to develop. However, with many networks running simultaneously, which is called a heterogeneous network, a combination of macrocell and femtocell networks, interference between networks is unavoidable. To resolve this interference, it can be done with adaptive power control techniques by the user. One of the adaptive power control methods is Game Theory. The use of Game Theory on power control or Game Theoretical Power Control is often referred to Power Control Game (PCG). By determining the appropriate utility function, the optimal power is obtained when using the power update iteration process. The results show that in the Proposed method when it reaches a convergent condition, both femto users and macro users are able to reach SINR that exceeds the target SINR of 5.496 for femto users and 10.04 for macro users. Meanwhile, the Distributed Power Control (DPC) method is only able to achieve the SINR user value which is the same as the target SINR, which is 5 and 10 for femto users and macro users, respectively. The Proposed method produces a higher SINR value for the user than the DPC method so that in terms of achieving the target SINR, it can be concluded that the Proposed method is better than the DPC.

IoT Drone Camera for a Paddy Crop Health Detector with RGB Comparison

Elvaretta Yucky, Aji Gautama Putrada, Maman Abdurohman

This paper proposes the system of paddy crop health detector using drone camera. Indonesia is an agricultural country that has very large agricultural land, where every plant health monitoring activity is done manually. However, applying technological developments in land monitoring activities will shorten time and increase work efficiency. In this paper, drone with a raspberry pi camera has used to capture several images of rice fields from several regions. The image data will be processed into a digital leaf color chart (LCC) through the process of image acquisition, RGB color extraction, and k-NN classification. The data has been compared with the real LCC, which is a reference to the health color of rice plants. The paddy fields that are used as the research material are 25 days after planting. The

result shows that the precision of the method is 88.89%, the recall is 93.02%, the accuracy is 98.22%, and the specificity is 98.77%.

A Review on IoT with Big Data Analytics

Abu Fuad Ahmad, Md. Shohel Sayeed, Choo Peng Tan, Kim Geok Tan, Md Ahsanul Bari, Ferdous Hossain

The Internet of Things (IoT) is a powerful and transformative force for the convergence of the physical and digital world of technology. The IoT is connecting things, businesses and people in real-time and on a massive scale. The IoT is actually the network of interconnected devices that contains actuators, sensors, electronics, software and connectivity which lets these things connect, interact and transfer data. Connected devices and software work in ways that produce massive amounts of data where Big Data comes into the picture. Big data is the diverse sets of information that are both very large and complex in nature. Big data offers a better way of managing and using a large amount of data with the opportunity to conduct deeper and richer analysis. Although the extensive number of works done on big data analytics and IoT, the overlapping of these two fields of study creates various possibilities for thriving data analysis in the IoT environment. This article provides a thorough review of the recent advancement of IoT with big data and analytics. We also make a review of the relationship between these fields. This article discusses the application area of IoT and big data analytics as well as the opportunities created by enabling analytics in an IoT system.

Vehicle Blind Spot Area Detection Using Bluetooth Low Energy and Multilateration

Muhammad Reza Widya Pratama, Maman Abdurohman, Aji Gautama Putrada

Blind spot is the area around the vehicle that cannot be seen by the driver's view even with the help of the rear view mirrors on the vehicle. Therefore a solution is needed to overcome this problem. This study proposes a system that can detect other road users in the blind spot area. This system uses the Bluetooth Low Energy (BLE) module to detect the presence of objects (smartphones) belonging to other road users. Prediction of the distance to the road user is obtained by calculating the RSSI value between the user's smartphone and the detecting BLE module. Meanwhile, the object's position is obtained by using a multilateration algorithm. In this study, the Kalman Filter is also used to suppress the noise obtained during the target detection process. Detection results in the form of user distance and location prediction are displayed on the driver's smartphone screen. Testing the detection of vehicles in a blind spot area in stationary conditions produces an accuracy value of 88.3%.

ABSTRACT

SESSION 2B: Computer Vision

Facial Emotion Recognition using Transfer Learning of Alexnet

Sarmela Raja Sekaran, Chin Poo Lee, Kian Ming Lim

This paper presents a deep learning method based on AlexNet architecture for emotion recognition. The idea behind our proposed framework is transfer learning. We manipulate certain layers of the pre-trained AlexNet model and fine-tune the model on the publicly available facial expression datasets so that it can perform emotion recognition. The proposed model is trained and tested on two widely used facial expression datasets, namely extended Cohn-Kanade (CK+) dataset and FER dataset. The proposed framework outperforms the existing deep learning methods in facial emotion recognition.

Visually Similar Handwritten Chinese Character Recognition with Convolutional Neural Network

Wei Han Liu, Kian Ming Lim, Chin Poo Lee

Computer vision has penetrated many domains, for instance, security, sports, health and medicine, agriculture, transportation, manufacturing, retail, and so like. One of the computer vision tasks is character recognition. In this work, a visually similar handwritten Chinese character dataset is collected. Subsequently, an enhanced convolutional neural network is proposed for the recognition of visually similar handwritten Chinese characters. The convolutional neural network is enhanced by the dropout regularization and early stopping mechanism to reduce the overfitting problem. The Adam optimizer is also leveraged to accelerate and optimize the training process of the convolutional neural network. The empirical results demonstrate that the enhanced convolutional neural network achieves a 97% accuracy, thus corroborate it has better discriminating power in visually similar handwritten Chinese character recognition.

Pneumonia Classification using Gabor-Convolutional Neural Networks and Image Enhancement

Agus Eko Minarno and Muhammad Alfarizy

Pneumonia is a respiratory disease caused by bacterial and, viral or fungal infections and has a high mortality rate. Pneumonia is usually characterized by the presence of fluid in the air sacs of the lungs or alveoli. Identification of pneumonia can be done with Chest X-Ray image, but hampered by other lung problems that have been experienced by the patient. Therefore, in this study proposed Deep Learning with CNN method to solve classification problems quickly and precisely. In solving this problem, this research proposed Gabor Filter-Convolutional Neural Network method and Image Enhancement pre-processing technique. Before the image is processed, data augmentation will also be carried out by several techniques. The use of Gabor Filter managed to get good accuracy while Image Enhancement was less suitable for use in this case. However, combining image enhancement and Gabor filter gets smaller loss. This study obtained the highest accuracy with the Gabor Filter-CNN model of 94.9% and get lowest loss with the Image Enhancement-CNN model 35.8%.

Fingerprint Enhancement using Iterative Contextual Filtering for Fingerprint Matching

Brama Yoga Satria, Agus Bejo, Risanuri Hidayat

Fingerprint matching depends on the quality of the fingerprint images. When fingerprint image quality is low, it can degrade the performance of fingerprint matching significantly. Fingerprint images are often contaminated by noise. Therefore, image quality is crucial for fingerprint matching. In this paper, an image enhancement algorithm in which contextual filtering is applied iteratively to a fingerprint image has been proposed. The main idea of the algorithm is to iterate the output of the Gabor filter to get better enhancement and matching performance. The result of the algorithm has five filtered images due to five times iteration. It showed that the proposed method is significantly better based on Equal Error Rate (EER) compared to the Gabor filter and the modified Gabor filter. The proposed method surpassed the Gabor filter by 3.08 % and the modified Gabor filter by 2.95 %.

Histogram of Oriented Gradient Random Template Protection for Face Verification

Lucas Chong Wei Jie and Siew Chin Chong

Privacy preserving scheme for face verification is a biometric system which is embedded with template protection to protect the data in ensuring data integrity. In this paper, a new method dubbed Histogram of Oriented Gradient Random Template Protection (HOG RTP) is proposed. The proposed method utilizes Histogram of Oriented Gradient approach as a feature extraction technique and fuses with Random Template Protection method. The proposed method acts as a multi-factor authentication technique and adds a layer of data protection to avoid the biometric compromising issue due to the fact that biometric is irreplaceable. The performance accuracy of HOG RTP is tested on the unconstrained face images using the benchmarked dataset, Labeled Face in the Wild (LFW). A promising result is obtained to prove that HOG RTP achieves higher verification rate in percentage than the pure biometric scheme.

ABSTRACT

SESSION 2C: Data Science

Aspect-Based Sentiment Analysis in Beauty Product Reviews Using TF-IDF and SVM Algorithm

Nadira Putri Arthamevia, Adiwijaya, Mahendra Dwifabri Purbolaksono

Product reviews are essential in e-commerce as they can help potential buyers make decisions prior to making purchases and help sellers get the measure of their products. A product can have thousands of reviews, making it burdensome for potential buyers and sellers to draw a conclusion from those abundant reviews. This research built a system that applies Aspect-based Sentiment Analysis (ABSA) with a dataset from product reviews on the Female Daily website. The system was built using TF-IDF as its feature extraction method combined with word bigram and word bigram. The Support Vector Machine (SVM) algorithm is used to classify the sentiments. This experiment results indicate that the preprocessing stage, especially the stemming and stopwords removal process are greatly affect the accuracy results. The choice of word N-gram is also crucial, where this research shows that the word unigram gives a higher accuracy than the word bigram. The final results of this research show that TF-IDF combined with word unigram and SVM with a linear kernel brings out the best accuracy, that is to say, 88.35%.

Aspect Term Extraction Using Deep Learning-Based Approach on Indonesian Restaurant Review

Rachmansyah Adhi Widhianto, Ade Romadhony

Aspect term extraction is a fundamental process in aspect-based sentiment analysis. Aspect term extraction aims to identify the review text span that contains the aspect mentions. In this paper, we present our work on aspect term extraction for Indonesian restaurant reviews, using a deep learning-based approach. We collected and annotated an Indonesian restaurant reviews dataset, obtained from a restaurant review website. We performed the annotation at a token-level and used the following aspect labels to annotate the reviews: FOOD, PRICE, AMBIENCE, SERVICE, and MISCELLANEOUS. This paper treats aspect extraction as a token-level classification. We employed a Convolutional Neural Network (CNN) model and Long Short-Term Memory (LSTM) model for the classification. The experimental result showed that the LSTM method gives the best performance, with the micro average F1-score is 55,1%.

Spam Detection on Indonesian Beauty Product Review

Muhammad Ahsan Athallah and Ade Romadhony

A product review is one of the most important sources of information which can help consumers to find the most suitable products for their needs. However, there is a chance a reviewer has other intentions than providing an honest review, including to advertise the brand or other brands. A review that does not contain any information related to the product's aspects/features could be considered spam. This paper presents our work on spam review detection, specifically in the domain of beauty products. We used SVM and Logistic Regression classifier and the following features: the review sentiments, product-related features, and review-centric features extracted from the reviews. We classified the beauty product review texts as spam and non-spam reviews. The experimental result showed that the best accuracy percentage was 81%, obtained when we used the sentiments and review-centric features with the SVM algorithm.

Emotion Classification on Indonesian Twitter Using Convolutional Neural Network (CNN)

Firhan Maulana Rusli, Rita Rismala, Hani Nurrahmi

Humans are inseparable from emotions, emotions fill human life at all times. Emotions have an impact on social relationships, memory and decision-making. In the era of this research, humans tended to express emotions through social media such as Twitter in the form of videos, images and text. Over time, social media has become an important part of most people's lives. Emotion detection is a research area that is widely researched, especially in the field of linguistics. Therefore, we classify emotions with a Convolutional Neural Network. The tweet data used were 4403 tweets which will be classified into 5 classes, namely: love, joy, anger, sadness, and fear. In addition, we conduct feature engineering to decide the best feature in emotion classification. The features used in this research are Word2Vec, FastText and Glove. F1- score is employed as an evaluation metric. The results of our experiments show that by implementing the combination of CNN and Word2Vec our dataset can achieve 72.06% of F1-Score, which increases the baseline model by 63.71%

Mapping Complex Tourist Destination Preferences: Network Perspectives

Dian Puteri Ramadhani, Andry Alamsyah, Muhammad Nashir Atmaja, Joe Panjaitan

Given the rapid evolution of information technology increases the number of individual tourists who choose to enjoy free travel without depending on guidebooks and tour agency services. Information sharing activities continue without limitation facilitates most tourists to explore and independently decide their destinations based on online traveller review pages. This freedom generates an increasingly complex tourist visiting pattern. In other side, the abundance of data provides a new approach in analyzing this visiting pattern. We collected 215,168 reviews written by tourists all over the world regarding tourist destinations in Bali, Indonesia. This research analyzes the online traveller review data through association rule mining techniques to detect pairs of tourist visiting destination and mapped them through the network analysis approach. We separate our exploration by tracing the tourist visiting movement as the underlying factor to understand tourist visiting behaviour. We discovered the most popular tourist destination visiting pattern and the differences in tourist visit preferences for each continent. This research contributes to support efficient mobility in tourism management by providing tourism destination networks insight.

ABSTRACT

SESSION 2D: E-Learning and HCI

Exploring the existence and variation of Game Player Traits among Undergraduate students in Malaysia

Mageswaran Sanmugam

The use of game has become ordinary for students of generation-z whose live revolves around technology. The ease of access towards these games, via handheld devices such as tablets or smartphones, cultivates a specific type of motivation and aims among students when it comes to using games. These motivational goals will indirectly influence ways students investigate tasks in virtual forms that may or may not have a snippet of game-like learning environments. As such, it will be vital to identify the breakdown of player motivation among these students. Participants from a tertiary institution were tested using Bartle Player Motivation after going through the learning process via an e-learning. It was found that the highest tendency was for killer type players among the students, followed by socializers. There was a difference when it came to genders; as such, the tendency to investigate the needs of individuals plays a vital role.

Implementation of Continuous Integration and Continuous Delivery (CI/CD) on Automatic Performance Testing

Dana Sulisty Kusumo and Mohammad Rizky Pratama

Performance test is one of the test components in the development phase to ensure that the services created can accommodate the specified targeted performance load and avoid performance bottlenecks. Nowadays, with the development of agile development processes, the development processes can run faster and iteratively. Continuous Integration and Continuous Delivery (CI/CD) are methods used in Agile development to automate and speed up the following process: building, tests, and validation of services. This research aims to implement CI/CD in the performance test. In the existing test, the test still needs humans to conduct the test. Our proposed solution for performance tests with CI/CD can be performed automatically and reduce human role in the test. The implementation of CI/CD in the performance test makes test processes integrated, automatically, and periodically executed. It can also quickly respond to parameter value changes that can prevent the tester from setting new parameters in a new test scenario.

Understanding Government Reorganization Impact from Knowledge Management Perspective: A Study Case

Yulia Sulistyaningsih, Khairiyah Rizkiyah, Sofian Lusa, Assaf Arief

Reorganization is a common issue that often occurs in Indonesia's government institutions that can increase the risk of losing tacit knowledge and decrease the agility of the institution's public service. Proper knowledge management (KM) supported by adequate Information Technology (IT) can be one of the solutions. However, there is some consideration required to make sure the implementation of KM can be done successfully. This study aims to take the initial step by evaluate the existing KM practice and assess KM implementation readiness using a proposed model in one of the government departments in XYZ institution. This study using questionnaires to collect data while internal experts are involved in validating the questionnaire and confirmed the assessment result. The finding shows that there is still no KM standard or policy applies in the study case, and the readiness has reached the level Not Ready Needs Some Work with a score of 2.909. These findings cannot be claimed applied to

all government institutions, but it can be the pilot assessment for the institution, and the highlighted issue can be listed as common factors to beware of in similar institutions' conditions.

Enterprise Resource Planning Teaching in Post Pandemic using Gamification

Siti Fatimah Abdul Razak, Faizuniza Mashhod, Zulfadhli Najmi bin Zaidan

The global COVID-19 pandemic has seen a rise in digital learning materials being shared with students of all levels of education. Learning institutions usually provide a learning management system where all the notes, tutorial and example past year examination questions are provided for students to support their learning activities in courses throughout their studies. Students usually download the learning materials either as .zip or individual files in various file formats. The steps are repetitive for each registered course, therefore can be time consuming for students. Students also need to have a sense of appropriate file management skill in order to organise downloaded materials for easy access whenever necessary. When the number of courses grow throughout the years, improper files organisation may result in lost of access or unidentifiable files in student machine or devices. Hence, the purpose of this paper is to investigate the potential of Robotic Process Automation (RPA) to address related challenges faced by students in managing the amount of learning materials provided through a learning management system or portal. A RPA-based bot was developed and integrated with a learning management system to accomplish the goals. The integration shows that RPA-based bots can minimise students effort in managing their learning materials efficiently.

RPA-based Bots for Managing Online Learning Materials

Kaushal Jheengut, Dinesha Cauleechurn, Bibi Zarine Cadarsaib

The past decade has been witnessing a considerable technological evolution, gearing companies towards a constant competitive sense. One of the ways to maintain a competitive edge has been the adoption of Enterprise Resource Planning (ERP) systems to streamline business processes, therefore setting a high demand for ERP professionals. Although universities have ERP in their curricula, there is still a skill mismatch regarding ERP skills with industry. Existing teaching methods for ERP consists of numerous challenges that must be addressed to ensure learning and skill acquisition take place. Furthermore, the impact of the COVID-19 pandemic accelerated the populace to revert to online behaviors, including online teaching. This paper proposes a gaming approach to ERP teaching, with the aim of complementing existing traditional teaching methods, if not replace them. The game exposes the user to basic concepts through online lectures and then engages the user in different types of games such as crosswords, quizzes, scenario-based games and a simulation game. This game was experimented with a group of university students in Mauritius who already had exposure to an ERP related subject. Overall, the game was much appreciated by the students and they were positive about its implementation in the teaching curriculum that is gradually metamorphosing into distance learning.

ABSTRACT

SESSION 2E: Healthcare, Bioinformatics, and Biomedical Application

Holick's Rule Implementation: Calculation of Produced Vitamin D from Sunlight Based on UV Index, Skin Type, and Area of Sunlight Exposure on the Body

Jonathan Salomo, Eduardus Ariasena, Athaya Syaqla, Salma Majidah

Vitamin D is important to maintain cardiovascular, skin, bone, and mental health. Unfortunately, 63% of Indonesians have inadequate levels of vitamin D. One of its major causes is the lack of practical methods to measure the amount of produced vitamin D for each individual. This study constructs a practical, mathematical formula to measure the amount of the produced vitamin D from sunlight exposure. It is conducted based on Holick's rule through skin type, body surface area exposed to sunlight, and ultraviolet (UV) index. Aided by correction from UV spectrum analysis, the formula enables practical measurement of vitamin D intake through sunlight for the general public. The future works of this paper may include corrections of measurement accuracy and on-device implementation of the algorithm.

T-COFFEE Multiple Sequence Aligner on Hadoop Spark Cluster

Viebiyanty Prihatiningrum, Setyorini, Siti Amatullah Karimah

DNA (Deoxyribose Nucleid Acid) is a series of nucleotide acid proteins that exist in the organism body where DNA will be identical with inheritance. DNA in the organism body is in pairs, so biological analysis is needed to match the similarity between the DNA data. Since DNA computation used huge amount of data, it should be compute by Big Dat Environment to compute the similarity matching of data. Big Data is used for large-scale computation by having several frameworks that support searching for biology sequence similarities. Hadoop is a framework which is very appropriate for running Big Data. In this study, we used MSA (Multiple Sequence Alignment) where one of the algorithms which has a high accuracy value is T-COFFEE (Tree Based Consistency Objective Function for Alignment Evaluation) algorithm. T-COFFEE is an algorithm for multiple sequences which is very suitable for finding similarities in DNA data by focusing on very high accuracy values. Besides having a high accuracy value, T-COFFEE requires a very long time to process. So this research did implementation of T-COFFEE on hadoop parallelization using Spark which has been proven to reduce the execution time.

Relaxation Oscillator Using Closed-loop Dual Comparator for Biomedical Applications

Theodora Valerie, Dodi Garinto, Prapto Nugroho, Ary Syahriar, Harki Yanto

People's rising concerns about health has fueled research into high-performance biomedical devices and circuits, such as sensors and implantable systems on a chip. It is important for these biomedical devices to operate at the same low frequency to treat certain organs and diseases. Thus, the clock generator needs to be able to provide low frequency clock pulses with minimal size and high reliability. These constraints elevate power consumption and production cost within the circuit design to key parameters. One promising candidate is relaxation oscillator which have good on-chip compatibility, and superior frequency stability. This paper proposes a novel relaxation oscillator using closed-loop dual comparator. A frequency in the band of 50Hz to 2.5kHz can be generated by replacing the value of resistors and capacitor in all possible combinations. The simulation and experimental result confirm that closed-loop dual comparator-based relaxation oscillator provide low frequencies with lower cost and more simplicity due to less components.

Wireless Programmable body sensor networks and Situated Healthcare

Alberto Faro, Daniela Giordano, Mario Venticinque

Wireless Body Sensor Networks represent an interesting challenge to effectively control dangerous pathology and to monitor the well being status of elder and fragile people. However, such networks don't take into account the context that highly influence the health status. This counteracts with the notion of situated healthcare more and more claimed from both sociological and medical point of view to provide effective healthcare interventions. Following this point of view, the paper illustrates an effective architecture to control health status in the context of the bodily activity and the environment. In particular, programmable wireless body sensor networks recently available on the market fused with environmental portable sensors are evaluated to provide a viable step towards a smart situated healthcare, i.e., monitoring and control from remote sites and in real time people in their context by using IoT devices provided with artificial intelligence, i.e., AIoT devices, and suitable web services that allow such smart bodily networks to internetwork with networks of other people, doctors or hospitals. Current limits and potentialities are pointed out by a case study.

ABSTRACT

SESSION 3A: Networking, IoT, and Security

Detection of Sinusoids with Frequency Drift in White Gaussian Noise

Bradley Comar

In this study, 4 methods of detecting sinusoid targets in white Gaussian noise are investigated. Averaging FFTs coherently and non-coherently is examined. A brute force method is introduced and investigated. Using a single large FFT spanning the observation window is also considered. Detection performance is studied on targets whose frequencies drift over time. It is determined that averaging non-coherent FFTs is a safe choice in a detection system. The preferred size of the FFT used for tone detection as well as the number of spectra to average is driven by the nature of the target tone frequency drift. This information is especially useful when high sample rate detectors are used to find tones from low quality transmitters because making FFTs too large or taking too many averages may hinder detection.

Tone Detection System Design for Targets with Frequency Drift

Bradley Comar

In this study, 3 methods of tone detection are investigated, the non-coherent averaging method, the power spectral method, and the cross-power spectral method. The target tones are simulated with frequency drift. Analysis is performed to find optimal FFT sizes and number of spectra to average. PD vs. PF A curves are then created and used to compare these methods. This analysis is particularly useful when using high sampling rate detectors to find tones produced with lower quality oscillators that experience frequency drift since using FFTs that are too large or averaging too many spectra may actually decrease detectability.

AADC 3: Active-Active Distributed Controller with 3-in-1 Asynchronous Heartbeat Synchronization Method in Software-Defined Networks

Muhammad Arief Nugroho and Vera Suryani

The problem of Distributed Controllers (active-active) using synchronous message exchange is that every message sent by controller A (sender) will be responded to by controller B (receiver), therefore the process of sending the next message after receiving that response. It is Causing a decrease in performance and an increase in the controller's workload because every message that will be responded to requires an immediate process to produce acknowledgments. Therefore, we developed a method to improve the message exchange mechanism and reduce message resources' burden in sending synchronization message information between controllers. This study proposes using asynchronous messages as distributed SDN controller message exchanges with the 3-in-1 method, which is the mechanism carried out by sending three messages and producing a reply in one acknowledgment. Our experiments show that 3-in-1 method gives lower CPU and memory usage and has a higher throughput than the traditional message exchange in Distributed SDN Controller.

4G LTE Cellular Network Coverage Planning and Simulation on Mandalay Area with Propagation Model Cost-Hatt

Ahmad Idris and Suci Rahmatia

Cellular network is expensive, be it the technology or the supporting infrastructure. In order to achieve maximum resource efficiency and effectiveness, a plan is needed. To estimate most appropriate cell throughput, to decrease the number of equipments, to answer the need for traffic analysis, and to get the most optimal capacity network planning and simulation are required. Network planning is a process that consists of several activities whose final target is to define an optimal cost- effective network design, which is then built as a mobile cellular network. This research was made in Mandalay area, located in Myanmar with the total size of computational zone is 656,198 km² while aiming to have a better understanding on planning and doing simulation on said region. With Cost-Hatta model propagation, CVVPX310R1 antenna type, and E-UTRA Band 3 - 20MHz frequency band, 58 LTE transmitter are placed..

USB Flash Drives Forensic Analysis to Detect Crown Jewel Data Breach in PT. XYZ (Coffee Shop Retail - Case Study)

Daniel Septianto

USB flash drives is used widely as portable storage devices and become popular choice to stored or transfer the data among the employee. There was a greater concern about leaks of information especially company crown jewel or intellectual property through USB flash drives due to theft, lost, negligence, or fraud. This research is a case study within PT. XYZ company which aims to find remaining information related to the company crown jewel or intellectual property inside the USB flash drives within company environment. The research showed that the sensitive information (such as company crown jewel or intellectual property, and customer credit card data) could be recovered from the USB flash drives. It could obtain high risk impact (reputational) to the company that has low security awareness.

ABSTRACT

SESSION 3B: Computer Vision

Enhanced AlexNet with Super-Resolution for Low-Resolution Face Recognition

Jin Chyuan Tan, Chin Poo Lee, Kian Ming Lim

With the advancement in deep learning, high-resolution face recognition has achieved outstanding performance that makes it widely adopted in many real-world applications. Face recognition plays a vital role in visual surveillance systems. However, the images captured by the security cameras are at low resolution causing the performance of the low-resolution face recognition relatively inferior. In view of this, we propose an enhanced AlexNet with Super-Resolution and Data Augmentation (SRDA-AlexNet) for low-resolution face recognition. Firstly, image super-resolution improves the quality of the low-resolution images to high-resolution images. Subsequently, data augmentation is applied to generate variations of the images for larger data size. An enhanced AlexNet with batch normalization and dropout regularization is then used for feature extraction. The batch normalization aims to reduce the internal covariate shift by normalizing the input distributions of the mini-batches. Apart from that, the dropout regularization improves the generalization capability and alleviates the overfitting of the model. The extracted features are then classified using k-Nearest Neighbors method for low-resolution face recognition. Empirical results demonstrate that the proposed SRDA-AlexNet outshines the methods in comparison.

An End-to-End Optical Character Recognition Pipeline for Indonesian Identity Card

Andreas Chandra and Ruben Stefanus

Optical Character Recognition has been long studied over the past few years. The challenge remains for the specific purpose of extracting information from image documents. The aim of this study is to create an end-to-end pipeline for an Indonesian identity card. A deep learning approach was used to localize an area of text interest by using Faster R-CNN with ResNet-50 as the backbone, YOLOv5 for character detection, and combined machine learning algorithms using the Random Forest algorithm to classify characters. The proposed pipeline showed a remarkable result for both identity number and full name. This provides a powerful tool for the auto-fill form and verification process effectively and efficiently.

A Study of Batik Style Transfer using Neural Network

Aditya Firman Ihsan

In this study, two remarkable applications of convolutional neural network, i.e. texture synthesis and style transfer are applied to batik texture. Individual layers from four pre-trained networks such as VGG-19, Inception V3, ResNet-50, and DenseNet-121 are compared and analyzed. Different batik motifs with some specific criteria are also compared to see the capability of original style transfer algorithm to regenerate concrete texture of Batik. Lastly, we propose a way to reconstruct batik images with some patterns following an object's shape contained in content image.

Tomato Plant Disease Identification through Leaf Image using Convolutional Neural Network

Aulia Ikvanda Yoren and Suyanto Suyanto

The problem that often occurs in agriculture is about diseases in plants. Plant diseases can result in reduced yields from agricultural production. Therefore, the detection and analysis of plant diseases are

critical and should be done as early as possible. Diseases in plants often appear on the leaves, and the characteristics of the affected leaves are very diverse and difficult to distinguish. This phenomenon results in difficulty in the identification of plant diseases automatically. One of the technologies that can be used in identifying leaf problems is digital image processing technology. The plant used as a case study in this research is the tomato plant. *Alternaria Solani*, *Septoria leaf spot*, Yellow virus are some of the disorders that tomato plants can experience. These disorders should be classified according to their type. This research designs a system to classify three types of disease experienced by the tomato plant leaves. A dataset of 4400 leaf images is collected and learned to the Convolutional Neural Network (CNN) to classify three tomato plant problems using the Augmentation process. An evaluation using 5-fold cross-validation shows that CNN with augmentation data gives an average accuracy of 97.8% and the highest accuracy of 99.5%. This result is better than the previous methods: AlexNet, Faster R-CNN, and CNN + red green blue (RGB).

ABSTRACT

SESSION 3C: Data Science

Non-Stationary Order of Vector Autoregression in Significant Ocean Wave Forecastin

Fikka Raudiya and Aniq Atiqi

This paper studies the implementation of nonstationary multivariate time series model to fit the wave ocean data. A model which comprises a regression term and an association with exogenous variables in a particular time horizon. Because of the trend fluctuation in the data leading to unstable process, differenced data are used in fitting the model. The approach suggested is applied to the finite order of Vector Autoregression for an improved prediction simultaneously of wave ocean by carrying out wind-related information to waves. The proposed model is compared with linear simple Autoregressive model. The performance of both forecasting procedures is assessed by means of well-known error measures. The forecast based on the proposed methodology indicated that it can be regarded as a promising method for wave ocean prediction, it outperforms using 4-order Vector Autoregression.

FN-Net: A Deep Convolutional Neural Network for Fake News Detection

Kian Long Tan, Chin Poo Lee, Kian Ming Lim

Information and communication technology has evolved rapidly over the past decades, with a substantial development being the emergence of social media. It is the new norm that people share their information instantly and massively through the social media platforms. The downside of this is that the fake news also spread more rapidly and diffuse deeper than before. This has caused a devastating impact on people who are misled by the fake news. In the interest of mitigating this problem, fake news detection is crucial to help people differentiate the authenticity of the news. In this research, an enhanced convolutional neural network (CNN) model, referred to as Fake News Net (FN-Net) is devised for fake news detection. The FN-Net consists of more pairs of convolution and max pooling layer to better encode the high-level features at different granularities. Besides that, two regularization techniques are incorporated into the FN-Net to address the overfitting problem. The gradient descent process of FN-Net is also accelerated by the Adam optimizer. The empirical studies on four datasets demonstrates that FN-Net outshines the original CNN model.

Sentiment Analysis of Ojek Online User Satisfaction Based on the Naïve Bayes and Net Brand Reputation Method

Alam Rahmatulloh, Rahmi Shofa, Irfan Darmawan, Ardiansah Ardiansah

Gojek and Grab are the most popular online motorcycle taxis and are often used today in Indonesia, based on Hootsuite's survey. However, it is not yet known how the response from online motorcycle taxi users. So it is necessary to have a sentiment analysis of online motorcycle taxi users whether they are satisfied or dissatisfied with the drivers and Gojek and Grab companies' services. Twitter with 52% active users of all internet users in Indonesia allows users to write various topics so that to find out the level of user satisfaction with Gojek and Grab. Sentiment analysis can be used as a reference for the development of Gojek and Grab services in the future. They measure the level of satisfaction with the Net Brand Reputation (NBR) method from the Naïve Bayes classification results using the rapid miner tool. The rating with accuracy has an accuracy value of 99.80% for Gojek and 99.90% for Grab. This study shows that more tweets have negative opinions compared to positive opinions for Gojek and Grab. Namely 616 positive opinions and 2317 negative opinions for Gojek drivers, 3560 positive opinions and 6419 negative opinions for Gojek Company. 594 positive opinions, and 1866

negative opinions for Grab drivers. As well as 3516 positive opinions and 4407 negative opinions for Grab Comp.

Raw Paper Material Stock Forecasting with Long Short-Term Memory

Febryo Kurniawan, Dyah Herwindiati, Manatap Dolok Lauro

The manufacturing business is one of the businesses in Indonesia that continues to show its development from year to year. Like a manufacturing business in general, one of the important efforts made in the printing business is the supply of raw paper materials to produce finished goods. The purpose of this research is making a forecasting of the raw paper material for printing company on 7 different types of 269 historical data with weekly intervals from January 2015 to February 2020 before the Covid19 pandemic season. Forecasting is done using the Long Short Term Memory method with Python language. The model architecture for training and testing is carried out using vanilla LSTM with single input, hidden and output layer with the configuration of 64 neurons in the hidden layer, 150 epoch, 12 batch size and Adam Optimizer ($lr = 0.0001$) which was repeated 10 times for best result. The test results show the best window size length in the model for each paper raw material differently from 4 to 16. All models was successfully forecasting the test data with an average MAPE of the overall forecast of 21.48%.

Mobile Customer Behaviour Predictive Analysis for Targeting Netflix Potential Customer

Suryadi Tanuwijaya, Andry Alamsyah, Maya Ariyanti

The development of Indonesia's ICT environment has made the mobile video-on-demand (VOD) platform one of the emerging lifestyles. With advanced smartphone technology, mobile phone subscribers able to enjoy high-resolution mobile VOD service with a greater user experience. The purpose of this study is to profile and predict potential customers of one of the VOD platforms, Netflix, for personalizing marketing targets. Using machine learning predictive analytic methodology, customer profile and behavior data are divided into 3 clusters using the K-Means model before tested with several supervised models for getting the best model for each cluster. Feature importance analysis is conducted to support marketing insight for product offering follows up to each targeted potential customer. Significant variables affecting Netflix buyers and non-buyers within 3 different clusters are defined clearly with the number of potential customers that can be targeted as Netflix's future subscribers. The result shows the method can be used by the mobile operator to target potential customers with effective promotional or product offering by personalized marketing approach based on the behavioral pattern and customer needs. It is expected by implementing this methodology, effectivity and accuracy of marketing effort will be increased compared to the conventional method.

ABSTRACT

SESSION 3D: E-Learning and HCI

Master Data Management Maturity Model (MD3M) Assessment: A Case Study in Secretariat of Presidential Advisory Council

Chielsin Ko, Andytrias Adywiratama, Achmad Hidayanto

Implementation of Master Data Management (MDM) in an organization aims to help the process of consolidating and integrating various sources of master data into a solitary truth source. MDM is also able to help to solve the complexity of data that occurs in the synchronization, consolidation and cleaning process of data from redundancy, and to increase the value of operational efficiency through the standardized content which represents business-based process. The goal of this study is to assess the level of MDM maturity at Secretariat of Presidential Advisory Council during the COVID-19 pandemic era. The assessment was done using Master Data Management Maturity Model (MD3M) by Spruit-Pietzka. The master data management maturity level in the organization was assessed using a questionnaire filled out by SMEs in a group discussion. The result of the assessment showed that MDM maturity level at Secretariat of Presidential Advisory Council is 1. There are 61.29% (38 of total 62) implemented capabilities. This means that organization already has awareness in the management of master data. The organization can improve its MDM maturity to a higher level by implementing the missing capabilities.

Capturing Institution and Learners Readiness of e-Learning Implementation: A Case Study of a University in Bandung, Indonesia

Dawam Dwi Jatmiko Suwawi, Bayu Aditya, Nungki Selviandro, Anisa Herdiani, Yati Rohayati, Yanuar Firdaus Arie Wibowo

E-learning readiness assessment is a critical process that an institution needs to do in implementing e-learning. By conducting an e-learning readiness assessment, an institution could identify the factors that hinder the successful implementation of e-learning and develop a strategic plan to enhance the e-learning implementation continuously. The higher education institution (HEI) needs to adopt this approach to implement e-learning successfully. Previous studies, such as in Turkey HEIs, Egyptian University, and the University of Mysore, India, reported that e-learning readiness assessment provides benefits in defining a future direction in e-learning innovation. Telkom University, one of the top private universities in Bandung, Indonesia, has launched many policies and programs related to e-learning to provide high-level academic services and increase productivity and efficiency in the learning process. Some individuals have raised some resistance to these policies and programs, but the actual data regarding this is minimal. The management needs data related to e-learning readiness to intervene and make this e-learning program a success. This study aims to capture the e-learning readiness in Telkom University from the institutional and learner's perspective. Data for this study were collected using an online questionnaire as well as depth-interview as archival sources. Besides identifying the e-learning readiness index, the output from this study is also to provide recommendations to policymakers regarding the implementation and the development of e-learning in Telkom University.

Satisfaction Factors of Indonesian National Civil Servant Recruitment System

Galih Kenang Avianto, Fitria Elliyana, Dana I. Sensuse

Citizen satisfaction is the key to the success of e-government services. The computer-based selection system is one of the Indonesian government's services for recruiting civil servant candidates.

Therefore, finding factors of Indonesian electronic satisfaction is goal of the research. Based on the literature study, six hypotheses and six factors were identified that can determine the level of user satisfaction with the computer-based selection system. Survey of 1,070 respondent from different provinces in Indonesia was conducted. Data analysis using multiple regression and factor analysis shows that the factors that influence computer assisted test system of National Civil Service Agency (BKN) user satisfaction are security and privacy, accessibility, awareness of service, and transparency.

Implementation and Analysis of Reusability Framework Design for Event User Interface Component in Phaser 3

Ahmad Arsyel Abdul Hakim, Dana Sulisty Kusumo, Jati H. Husen

The growth of game development is now widely supported by software such as game engines and game frameworks. Phaser 3 is a popular HTML5 based game framework on the browser platform. However, Phaser 3 does not facilitate managing code of User Interface (UI) event component. Sometimes a game developer discovers that UI event component codes, such as buttons or joysticks that have been created, must be regenerated on subsequent projects with the same function. In this research, we proposed a reusability framework for Phaser 3 by combining the factory method and the singleton pattern in managing UI event components. The aim is to make developer productivity increased so that there is no need to repeat the algorithm or code that has been created previously. Our results show that the Phaser 3 UI standard has less a reusability value of 64,241%, while the proposed framework that was built has relatively higher reusability, that is equal to 84,576%. Game developers can add the combination of design patterns, as good software development practices, into an existing game framework to achieve code reusability without major changing on the existing game framework. This approach can also be used for the creators of game framework to use design patterns from the outset of development of game framework.

The Preliminary Study on the Perception of Engineering Students on Blended Learning

Min Chi Low, Chen Kang Lee, Manjit Singh Sidhu, Zaimah Hasan, Seng Poh Lim, Seng Chee Lim

Mechanics Dynamics is an important fundamental course in engineering education. However, this course experiences a high failure rate among engineering students. This may be due to visualization problems associated with static images, complex engineering models, and concept misunderstanding. This paper presents the preliminary research of student perception on the blended learning flipped classroom approach in overcoming their learning difficulties in Mechanics Dynamics course. This pilot study aims to collect the learning difficulties of students in the Mechanics Dynamics and students' perception of blended learning using flipped classroom approach. A questionnaire has been designed and distributed through an online platform. The sample size is 30 which targets the engineering students in Malaysia's university who already took the Mechanics Dynamics course in less than five years. The findings are analyzed using a descriptive statistics approach. The initial findings indicate that the visualization problem is the main concern among the students. Although the students show low awareness regarding the blended learning flipped classroom approach, they have a positive attitude towards the element of the blended learning approach to be implemented in their classroom.

ABSTRACT

SESSION 3E: Healthcare, Bioinformatics, and Biomedical Application

Implant Segmentation in Radiographic Imagery Using Multiresolution MTANN and Wavelet Decomposition

Rangga Perwiratama, Pranowo Pranowo, Djoko Budiyo Setyohadi

Occasionally implants are covered with a musculoskeletal system in medical imaging, it could be difficult for medical personnels as well as computers to perceive these implants. In this paper, we use image processing techniques to suppress the musculoskeletal system contrast in X-ray images that contain implants through artificial neural networks called massive training artificial neural networks (MTANN). MTANN is a non-linear filter that can be trained using appropriate X-ray images input and learning images. Learning images are obtained through the editing process using a graphical editor, which is used to correct learning images from noise. To effectively suppress a musculoskeletal system that has multiple spatial frequencies, we use multiresolution MTANN consisting of wavelet decomposition/composition techniques and dedicated MTANN for every resolution. Multiresolution MTANN hopefully can provide images that are really close to learning images. By reducing the contrast of the musculoskeletal system from X-ray images, we will be able to create X-ray images where the musculoskeletal system is substantially suppressed and be able see the implant clearly in contrast. We use MURA as a training database and for validation tests. MURA is a large set of bone radiographic data, which is designed to train ANN to determine whether X-ray images are normal or abnormal. Once the model is done, when our technique is applied to non-training X-ray images, the musculoskeletal image system is substantially suppressed while maintaining the visibility of the implant. Our image processing technique to suppress musculoskeletal systems using multiresolution MTANN will potentially be useful to medical personnels.

Improving Multi-Class Motor Imagery EEG Signals Classification Using Ensemble Learning Method

Deni Kurnianto Nugroho, Noor Akhmad Setiawan, Hanung Adi Nugroho

Electroencephalography (EEG) is a technique for measuring electrical activity on the scalp. The EEG detects voltage fluctuations caused by ion currents in brain neurons. The brain-computer interface (BCI) is intended to enable humans to monitor machines and interact with computers through their brains. It intends to construct non-muscular production pathways to convert brain function into discriminatory control commands correlated with various EEG signals dependent on motorized image patterns. Research on EEG is currently growing, especially in the field of motor imaging. EEG signal processing would be a feasible option for developing such a BCI device. The four basic stages in classical BCI are multi-channel EEG signal acquisition, signal preprocessing, feature extraction, and classification of motor image patterns based on EEG. This study aims to determine the effect of wavelet packet decomposition (WPD) and common spatial pattern (CSP) feature extraction to optimize feature selection using the ensemble learning method. The method used in this research is experimental, where the stages begin with preprocessing, feature extraction with WPD and CSP, classification using ensemble learning and implementing feature selection using the principal component analysis (PCA) and select from the model (SFM). The results are the comparison of the accuracy generated from each method, including random forest (RF) of 74.71%, random forest with principal component analysis (RFPCA) of 68.01%, random forest with select from the model (RFSFM) of 82.15%, extra trees (ET) of 77.97%, extra trees with principal component analysis (ETPCA) of 64.18% and extra trees with selected from the model (ETSFM) of 83.28%.

Implementation and Experimental Characterization of Dual-Band Wearable Reflector Composed of AMC Structure for Wireless Communication

Achmad Munir, Dwiki Haryanto, Ichsan Nusobri, Levy Olivia Nur

This paper presents an implementation of dual-band wearable reflector composed of artificial magnetic conductor (AMC) structure and its characterization through experimental measurement. The proposed wearable reflector designed for wireless communications is configured by 3x3 unit cell of AMC structure. Each unit cell is constructed by a combination of a square patch and a square ring patch with gaps arranged concentrically. An RT/Duroid R03003 dielectric substrate with the thickness of 0.5 mm is employed for the design as well as the implementation. Meanwhile, a printed dipole antenna as an inseparable part of wearable reflector is also deployed on the same dielectric substrate. This configuration, i.e., a printed dipole antenna and a wearable reflector, is expectable to operate at two different frequency bands, or dual-band, covering the required frequencies of wireless communications while maintaining its compact size and simple configuration. Experimental characterization is applied to validate the proposed design, in which the results demonstrate the ability of configuration to work at two frequency responses, namely 2.45 GHz band and 3.35 GHz band.

ABSTRACT

SESSION 4A: Networking, IoT, and Security

Modified Pixel Value Ordering-based Predictor for Reversible Data Hiding on Video

Tohari Ahmad, Alek Nur Fatman, Ahmad Hoirul Basori

Communication security has become an issue where massive data exchanges take place. Hiding secret data in certain file during transmission can be a potential way to protect those data. Nevertheless, some parameters, such as the resulted stego file quality and the data capacity, are still challenging. In this paper, a method that modified Pixel-based Pixel Value Ordering (PPVO) Predictor is proposed for reversible data hiding on video. PPVO can embed the payload into a pixel whose value is equal to the maximum or minimum context pixel. To increase the number of payloads that can be embedded, we modify the PPVO method by using only both right and bottom pixels to develop the predictors. Embedding process is carried out if the considered pixel has the same value as that in the right or bottom. The experimental result shows that this method has a significant increase in the embedding capacity and quality. Nevertheless, the overall maximum capacity of each cover is less than some others, while its corresponding quality is still the highest.

Simulation and Analysis of Partial Transmit Sequence on Palm Date Leaf Clipping for PAPR Value Reduction

Vincent, Antonius Suhartomo, Joni W. Simatupang, Mia Galina

The usage of FFT that has become the key concept in OFDM system produces a high PAPR value. In order to reduce it, there are several techniques that can be implemented, such as the Palm Date Leaf clipping, and the Partial Transmit Sequence. Previous researchers have evaluated each technique individually. In this research, the Authors evaluate the PAPR value as the effect of adding Partial Transmit Sequence to the Palm Date Leaf clipping technique. The evaluation is done with several modulation techniques, such as QPSK, 8-PSK, 16-PSK, 8-QAM, and 16-QAM. Since low PAPR performance is not advantageous if the signal's BER value is worsened, thus the evaluation also considers the BER performance of the signal. In this case, the Author focuses on the BER performance over AWGN channel. The result shows that in all of the scenarios, PTS technique could improve the signal's BER and PAPR performance for a low CR value such as 5 dB and 7 dB. Additionally, for the higher CR value such as 10 dB and 20 dB, the signal's BER performance is similar with the normal OFDM signal. Even so, it provides a consistent PAPR reduction of approximately 3 dB. This way, PTS technique always provides improvement in BER performance of the signal. As for the PAPR performance, PTS technique is able to improve all cases except for 8-QAM and 16-QAM signal with clipping technique at low clipping ratio such as 5 dB.

Design Automation of Single Photon Counting Method for Quantum Random Number Generation

Dwi Novazrianto, Alwan Muhamad Fajar, Muhammad Yusuf, Aprilia Kusuma Dewi, Rini Wisnu Wardhani, Dedy Septono Catur Putranto

EDU-QCRY1 is one of the quantum key distribution devices in order to generate quantum random bit. In this paper, we conduct a mechanism to produce a key sequence based on single photon counting using EDU-QCRY1 Single Photon Detector module for receiving data which can be acquired using the receiver's device automation using a Light Dependent Resistor parameter. The design of quantum random generator is using protocol of Quantum Key Distribution (QKD) then compared to true table of the BB84 protocol. The average speed of the quantum bit in the automation device is 0.0604 seconds with estimation for 106 quantum random bit around 16 hours experiment. Within the random bits,

some difference occurs when the sender and receiver have a different basis. This research proves the efficiency of automation bit storage on the EDU-QCRY1 Single Photon Detector for generating a quantum random bit and has the valid result as the experiment in performing key distribution simulations using EDU-QCRY1 devices.

On the Modifications of a Digital Signature Algorithm with Secret Sharing

Mareta Wahyu Ardyani and Umi Uli Zulfah

Cryptographic algorithms are vulnerable not only from attacks, but also from the issues raising from storing the private key. Once the private key is leaked, no matter how strong the algorithms are claimed to be, we are severely compromised and hence, lose the secrecy. One of the solutions to remedy this situation is to employ the secret sharing scheme. The basic idea of secret sharing is to split one private key value into several share values. Those share values are then stored into different places by different secret share holders. The presence of only one share value cannot represent the whole secret value, and further, is unable to reconstruct the private key. In this study, we inserted a secret sharing scheme into a digital signature algorithm based on conic curve cryptography. We opted to perform the scheme on conic based algorithm because these curves are believed to have simpler computations than those of elliptic curves. We split the private key value into several share values, which are then utilized to generate signature values. The alteration on signature value generation process (by adding a secret sharing scheme) does not alter the verification process taking place on the original algorithm (without the secret sharing scheme). We also employed additional mechanism by using the solution of congruence system based on the Chinese Remainder Theorem (CRT) and Fermat's Little Theorem. The whole process is expected to provide if not layers of security, a mechanism in which we can mitigate the possibility of losing secrecy.

Connected Vehicle Communication Concept for Flood Level Warning Using Low Cost Microcontroller

Mohd Fikri Azli Abdullah, Sumendra Yogarayan, Siti Fatimah Abdul Razak, Fremont Kwong

In Malaysia, there are some areas that frequently have flood due to ditch blockage or sudden rising of river's water. Most floods can cause vehicles and other infrastructures to be damaged. The victims of every flood that occur could be reduced if they receive any message through a communication medium to alert in advance. Therefore, this study aims to develop a prototype system to send a message on flood detection via wireless connection using ESP8266 as a means of communication. This prototype is specifically applied for vehicles to be warned much earlier. The outcome shows that sending flood detection message by using the communication medium is possible and took less than a minute to transmit the message. The flood detection data are saved in Firebase cloud.

Randomness, Uniqueness, and Steadiness Evaluation of Physical Unclonable Functions

Parman Sukarno, Rivaldo Ludovicus Sembiring, Rizka Reza Pahlevi

The development of the Internet of Things (IoT) can be found in various places. However, multiple kinds of attacks have also increased. IoT devices are very vulnerable to attacks, both physical and non-physical, because of their unmanned nature. In non-physical attacks, the most important thing is to secure the data on memory devices. Physical unclonable function (PUF) is the strongest and lightest method to securing memory devices and can be used on unmanned IoT devices. The advantage of PUF over current classical cryptography types is its compatibility on IoT devices with limited computing resources. However, before PUF can be claimed to provide security property, it must meet the evaluation indicators: randomness, uniqueness, and steadiness. PUF can be the best solution for

securing data on IoT devices because the encryption process does not put a secret key on the device. Instead, the key is generated randomly. This research is evaluating two different PUF chips with the same PUF design. We designed the arbiter PUF on the FPGA and evaluated the results of the responses given. Through rigorous experiments, this research succeeded to evaluate the three indicators of PUF where the randomness is 54.43%:45.4%, and 25.88%: 74.2%, the uniqueness between chip is 69.53%, and lastly, the steadiness is 89.84%, and 91.41%.

ABSTRACT

SESSION 4B: Computer Vision

A Low-Cost High-Accuracy Thermal Camera Using Off-the-shelf Hardware Devices

Dinh-Tien Tran, Viet-Khoa Nguyen, Ngoc-Thien Nhan, Duc-Hiep Nguyen, Hoang-Anh Pham

The Covid-19 pandemic is spreading worldwide, the demand for controlling and screening fever is increasing very rapidly. Some traditional methods like using thermometers or medical checking cannot handle many people in crowded areas such as airports, train stations, or buildings. Some thermal imaging systems are used to control people's ins and outs. These systems help many governments decrease and prevent viruses' spread by screening human temperature based on skin radiation. Despite all of the advantages this technology has had, this system's very high cost is one reason to prevent some organizations from applying it despite the high potential of image processing, artificial intelligence, and the Internet of Things. This paper will present a system combining a low-cost thermal camera and a standard RGB camera for screening fever combined with attendance checking. The experimental results show that this proposed system can be applied in many areas, from universities to buildings, with the minimum cost and acceptable performance.

Sentinel 1 Classification for Garlic Land Identification using Support Vector Machine

Muhammad Asyhar Agmalaro, Imas Sukaesih Sitanggang, Mia Waskito

The high demand for garlic is not comparable with the results of domestic garlic production. Indonesian garlic needs fulfilled by imports up to 95% of national needs. The Ministry of Agriculture has a program of the cultivation of garlic in Sembalun, East Lombok, West Nusa Tenggara in order to realize garlic self-sufficiency. This study aims to identify the garlic land in Sembalun using the Sentinel 1A satellite image. The image consists of dual-polarization VV and VH values. Images were acquired in July and November 2019 for the area of Sembalun, East Lombok, West Nusa Tenggara Indonesia. Preprocessing data steps involve applying orbits, calibrations, speckle filters, terrain corrections, and linear to dB. Support vector machine algorithm is used to classify Sentinel 1A images. Hyper parameter tuning was done to get the best parameters which are regularization parameter (C) 10, gamma 1, and the RBF kernel. The classification model has accuracy of 76%, precision of 71% and recall of 89%.

Recognition of Academic Emotions in Online Classes

Jordan Ming Han Pang, Tee Connie, Goh Kah Ong Michael

Online education has proliferated since the COVID-19 pandemic. Classes have been moved online as a result of school closures. Despite the flexibility offered by online learning, there are several challenges faced. Creating a good classroom climate for online classes is a challenging task. It is difficult for the teachers to obtain emotional feedback from the students, especially in asynchronous classes or classes with large number of students. It is hard for the teachers to evaluate the engagement of the students in class without knowing the students' emotional response. The existing facial expression recognition databases focus on basic human emotions like happy, angry, sad, surprise and neutral. These basic emotions are not appropriate for learning as psychological and pedagogical studies have shown that there are differences between basic human emotions and academic emotions. In view of these problems, this paper presents a study on academic emotions. A dataset comprising four pertinent academic emotions have been established. Empirical analysis on the dataset is conducted using both hand crafted and deep learning approaches. The baseline evaluation demonstrates the suitability of the established academic dataset for online learning.

Image Steganography Compressive Sensing Orthogonal Matching Pursuit

Irma Safitri

Steganography is the art of writing or hiding messages in a certain way on a digital file. The purpose of steganography is that a message can only be seen by the two related parties without being noticed by the other person. In this study, a steganography system was designed using image media to hide a secret message. Image compression is first performed using compressive sensing (CS) so that an image with a smaller resolution is obtained. Stationary wavelet transforms (SWT) are used as the transformation method and singular value decomposition (SVD) is used as the insertion method. To reconstruct or return the compressed message to the original message, orthogonal matching pursuit (OMP) algorithm is used. The system performance was tested using salt & pepper noise attack and gaussian noise. The test results show that the BER value is 0.05765 and the PSNR value is 105.666 dB in the steganography system when attacked with salt & pepper noise at a density noise of 0.01. In addition, our system also shows a BER value of 0.0509 at sigma 1 and a PSNR of 104.615 dB when Gaussian noise attacks are applied.

ABSTRACT

SESSION 4C: Data Science

Indonesian Hoax Identification on Tweets Using Doc2Vec

Titi Widaretna, Jimmy Tirtawangsa, Ade Romadhony

In this paper, we present our work on hoax detection on a collection of Tweets. We tackle the hoax detection as a text classification problem, with Doc2Vec as the text representation method and SVM as the classifier. We collected and annotated 5000 Tweets that consist of 2500 hoax Tweets and 2500 truth Tweets. The experimental results show that the accuracy of our proposed hoax detection on Tweets is 93.4%.

Electronic Nose Dataset for Classifying Rice Quality using Neural Network

Ferdy Erlangga, Dedy Rahman Wijaya, Wawa Wikusna

Rice is a staple food ingredient because it is the main food element for Indonesia and the world. However, the quality of rice can decline over time until it becomes expired or smelly and cannot be consumed. At present, the conventional method to distinguish between expired rice and not expired rice is still carried out by observing rice with the human sense of smell. However, this method is still considered ineffective because the human sense of smell can change due to changes in body health. In this case, this study uses an electronic nose (e-nose) and a machine learning neural network (NN) algorithm to detect rice consistency (expired and non-expired). The dataset was obtained from the e-nose by recording sensor information for 25 weeks by storing 48,486 total data and 2,017 data records for one week. The results of the classification using NN are with an accuracy score of 99.84%, the proposed method successfully classified rice quality.

SVM Parallel Concept Test with SMO Decomposition on Cancer Microarray Dataset

Rahmat Ramadan Prasojoe, Setyorini

Support Vector Machine (SVM) is a reliable method for performing classification and regression especially in supervised machine learning. However, SVM has scalability issues in compute time and memory usage. Therefore, there are many proposals for Parallel Support Vector Machine (PSVM) for mining large-scale data. In this study, the authors conducted a PSVM concept test with SMO decomposition that could be handled and classified cancer using microarray data. The author applies the Sequential Minimal Optimization (SMO) technique which uses LaGrange multipliers to solve quadratic programming (QP) problems that arise during training. To test the concept of SMO decomposition, the data set will be broken down into several subsets and then independently conduct SMO training for each subset and combine each training result into one SMO classification model. Evaluation is done by comparing the accuracy and performance of SMO decomposition and non-decomposition SMO. Evaluation result are accuracy of SMO decomposition 75% and non-decomposition SMO 63%, and as well as SMO decomposition training time 5.7 times faster than to non-decomposition SMO.

Detecting Online Recruitment Fraud Using Machine Learning

Hridita Tabassum, Gitanjali Ghosh, Afra Atika, Amitabha Chakrabarty

Online Recruitment fraud (ORF) is becoming an important issue in the cyber-crime region. Companies find it easier to hire people with the help of the internet rather than the old traditional way. But it has greatly attracted scammers. In this paper, we have proposed a solution on how to detect ORF. We have presented our results based on the previous model and the methodologies, to create the ORF detection model where we have used our own dataset. We have created our dataset based on the Bangladesh job field and by using a publicly accessible dataset as a reference. Furthermore, Logistic Regression, AdaBoost, Decision Tree Classifier, Random Forest Classifier, Voting Classifier, LightGBM, Gradient Boosting are the algorithms that have been used. We have found the accuracy of different prediction models, where LightGBM (95.17%) and Gradient Boosting (95.17%) give the highest accuracy. Through this paper, we tried to create a precise way for detecting fraudulent hiring posts.

Data Mining for Revealing Relationship between Google Community Mobility and Macro-economic Indicators

Gunawan

Google community mobility reports have helped to evaluate the effectiveness of government-imposed movement control among countries. However, the relationship between the mobility data and the characteristics of regions is less reported. This study aims to reveal hidden information from Google community mobility reports and relate them to all 34 Indonesian provinces' macro-economic indicators. This secondary research implements a data mining approach using the CRISP-DM process framework and Knime Analytics Platform. The community mobility data of residence and workplace are collected as a time series covering Feb 16, 2020, to Jan 31, 2021. Macro-economic indicators are collected from the website of the Indonesian national statistics agency. The clustering method has grouped provinces into three based on their mobility. The findings indicate the relationship between mobility fluctuation during the COVID-19 pandemic and macro-economic indicators, namely human development index and labor force participation rate. In the theoretical aspect, this study has been initiating the investigation of community mobility and macro-economic. Policymakers in dealing with post-pandemic recovery planning might consider the cluster characteristics for better planning.

ABSTRACT

SESSION 4D: E-Learning and HCI

Suitable Knowledge Management Process Implementation: A Case Study of PT Sinergi Sentra Digital

Yusuf Pratama, Dana I. Sensuse, Sofian Lusa, Damayanti Elisabeth, Nadya Safitri, Ghanim Kanugrahan, Bryanza Novirahman

Some companies nowadays that are not focused on informative technology (IT) development have not yet implemented a knowledge management (KM) process which can be seen from the lack of KM system from the application that they have. This will then lead to the IT division in the company having to deal with struggle in extracting, reading, as well as reviewing many kinds of documents. PT XYZ, or also known as Port Cities Indonesia, is one of the company examples which mainly focused their business on developing open-source enterprise resource planning (ERP) for the other companies. It is expected that implementing one of the perfect knowledge management processes that fit with the company can support the use of maintaining their knowledge due to some integration to its data. The contingency factor theory was used in this study to obtain the KM process needs. Based on the results of interviews with employees from each division involved, this study finds that Socialization for Knowledge Sharing is the most prioritized contingency process with chatting and sharing media to manifest that process.

Critical Success Factors for Project Tracking Software Implementation: A Case Study at a Banking Company in Indonesia

Hendro Prabowo Hadi, Ridha Eryadi, Teguh Raharjo

In today's business environment, location is not an obstacle anymore. Teams can work virtually and collaboratively with ease using web-based project tracking software. As a result of computer technology and information flow advances, companies are moving to new project management tools, improved project governance, and increased stakeholder engagement. To keep its competitiveness and ability to deliver products on schedule, one of the Bank in Indonesia adopted Jira Atlassian as project tracking software to replace the previous in-house system which is called e-SDLC (electronic Software Development Life Cycle) that can monitor and track project status. But it did not go well and faced obstacles at the beginning of implementation. This study aims to find and evaluate the Critical Success Factors (CSF) for project tracking software implementation in one of Indonesia banking company. From previous research, there are identified challenges and obstacles when applying project management tools which are governance, adoption process, technology & knowledge, and stakeholders. From this research, we identified 4 keys criteria, namely people, process, organization, and technical as CSF (ordered from the most important criteria using analytical hierarchy process-AHP). The findings of this study could help company increasing the success probability in implementing project tracking software.

Assurance Case Pattern using SACM Notation

Nungki Selviandro

The Structured Assurance Case Metamodel (SACM) is a metamodel and specification that can be used to represent structured assurance cases. An assurance case is an approach for analysing, documenting, and communicating a clear structured argument and evidence about a particular system within a specific environment and circumstances. SACM provides abstract syntax with a set of features to develop assurance cases, including supporting the development of an assurance case pattern. A

pattern in the assurance case development context is useful, for example, as an approach for abstracting the details of the argument, and when possible, it can be used for the development of other arguments by instantiating the pattern in a specific domain application. To support the development and adoption of SACM, we have developed SACM Notation (SACMN) as a concrete syntax that consists of visual vocabularies and compositional rules (as visual grammar). The developed notation has been included as part of the SACM standard 2.1 update version. In this paper, we introduce and discuss the application of the assurance case pattern using SACMN to support the SACM adoption in the development of assurance cases.

Sustainability And Aptness Of Game Elements In A Gamified Learning Environment

Mageswaran Sanmugam

Sustaining the interest level of students in any form of technology-based learning poses a significant challenge. Infusion of any tech-based elements into learning may not be sufficient enough for the Generation-Z students, whose lives revolve around technology. Although gamification, game elements in non-gaming contexts are more comfortable being implemented by ordinary people with no tech-based knowledge. Nevertheless, in the context of learning, the sustainability of the game elements needs to be identified. Therefore, mixed-method research was conducted on 28 students aged 13 years old from an urban school in Malaysia for 14 weeks. The students were introduced to a gamified learning method that infused gamification elements in the traditional classroom and the online classroom. The game elements tested were points, badges, and leader boards. Students were taught two separate topics in the Malaysian Science syllabus using gamified learning to ensure the students' continuity effects. Upon completion, the game elements' final tally was assessed and supported by the interview feedback from the top 3 students from each game element. Based on the findings, gamified learning with game elements helped reduced boredom, and using technology made learning fun. Although some respondents shared the fear of complacency of using games in learning and the mixed response was reported when it came to the preferred type of game elements or type of learning that suits the game elements.

User Interface Model for Visualization of Learning Materials in Comic Strip Form Using Goal-Directed Design Method

Muhammad Fauzan Nur Adillah, Danang Junaedi, Yanuar Rahman

In a learning process to help students remember and understand the material, one effort can be made is to provide essential points from a material. Students are less interested in delivering essential points based on text because they are considered monotonous. Nowadays, many students tend to read comic books rather than books. Comics can wash away the emotions of readers in the storyline. Therefore, we need supporting media to help teachers visualize essential points in the book in comic form. So that to help teachers in this regard, a user interface model is needed. This research was conducted with a Goal-Directed Design approach to gain user perspective in developing supporting tools to visualize the material's crucial points in the form of comic strips. Testing the resulting model was carried out twice and each test involved 15 respondents to get maximum results. Based on the evaluation results using the USE Questionnaire evaluation method for the prototype made and the results were in the excellent category. Thus, the resulting user interface model is a supporting medium for teachers in delivering learning material in comic form following the expected objectives.

ABSTRACT

SESSION 4E: Networking, IoT, and Security

Accessibility and Response Time Analysis on the COVID19 Website in Indonesia

Ryan Wicaksono and Hilal H. Nuha

Ping is a computer network utility software used to test the reliability of hosts on IP (Internet Protocol). This is used to measure the time sent from the host to the destination computer or central computer. Ping operates by sending the Internet Control Message Protocol (ICMP). Traceroute is used to show the route the packet passes to reach the destination or route diagnostic tool. This process is done by sending the message Internet Control Message Protocol (ICMP) Echo Request_ to the destination with the value of Time to Live or commonly referred to as TTL which is increasing. The route shown is a list of router interfaces found on the path between the host and destination. The purpose of pinging and traceroute is to find out the status of up or down in the network. With traceroute, we can analyze information about the location of the router.

Modified Bit Parity Technique for Error Detection of 8 Bit Data

Fakhira Zulfira, Hilal H. Nuha, Dodi Wisaksono Sudiharto, Rio Guntur Utomo

Bit parity is often used as an error detection technique in sending digital data that has interruption during transmission. Error detection techniques allow correcting data to be error-free. Research that has been used using bit parity has been done but only detected even parity and odd parity where the process is very simple so that modifications can be made to detect other than even or odd parity. In this study a modification of the bit parity method was built in which each message received in the first 4 bits will be detected whether the bit value is a multiple of 4 and the remaining bits will be evenly detected. Error detection using the proposed parity bits results in a fairly good detection system and is more efficient if there are more bits in the message.

IoT Application on Agricultural Area Surveillance and Remote-controlled Irrigation Systems

Ratnasari Nur Rohmah

This research applies IoT technology to help farmers overcome two problems by proposing agricultural land surveillance system and remote-controlled irrigation systems. The agricultural land surveillance system in this research is designed to detect object's motion, take pictures of objects and send image data to the user's smartphone. This surveillance system also provides a live streaming video mode by request. The irrigation system is designed to monitor temperature, send data to user, and allowing to remote control submarine pump operation by the user via a smartphone. Test on systems performance showed that system performed properly. In the surveillance system, the optimal distance for motion detection by the sensor is in 6 meters. On sunshine day, time interval from image taken when some motion detected and notification received by the user was 4.9 seconds, whilst interval time from notification to image sent was 3.9 seconds. In live streaming video mode, user should wait 2.3 seconds in average to receive live streaming video on smartphone. In the irrigation system performance, the sensor measured average temperature measurement error is 1.49%. Sensor data transmission to user's smartphone works well and user can remotely control the pump operation.

Present-80 Encryption Algorithm Implementation on GPRS Arduino Mega-2560 Cyber Physical Tracking System

Dwi Novazrianto, Rini Wisnu Wardhani, Naufal Hafiz Syahidan

Cyber Physical System (CPS) can be characterized as a physical system and an engineering system which can be monitored, controlled, coordinated and integrated processes with computing and communication. The more development of mobile internet technology, the more vulnerabilities in information security. In the information age, cyberattacks are a challenge. Increasing security on Communication device can map the actual location of the GPS into a different representation. VTS will send vehicle location data to the server or system user periodically. The VTS device consists of the Arduino Mega-2560 and the PRESENT-80 algorithm. The GPS module serves to provide location data, and the sim800L v2 module as a communication module with GPRS services. PRESENT-80 implementation on the Vehicle tracking system was successfully carried out. Location data can be sent in ciphertext form and location data can be decrypted in an Android-based monitoring application.

Hunting Cyber Threats in the Enterprise Using Network Defense Log

Ardian Oktadika, Charles Lim, Kalpin Erlangga

As business continues to evolve, the systems that support its functionalities also becomes more complex and sophisticated. This situation constitutes even larger cyber security threats, hence increased business risks that requires more security protection for the business systems. Firewalls, Intrusion Detection System and Web Application Firewalls have been utilized extensively to counter these threats at the perimeter between the Internet and internal systems. Unfortunately, these security perimeter devices failed to detect new unknown threats due to its reliance on signature-based methods. In this research, we propose a framework that employs threat hunting that utilize the security device log and network forensics to uncover the unknown threats and validate the results using memory forensics. New rules created from this discovery will allow the protection at the border to be more dynamic and effective in handling previously unknown security threats.

ABSTRACT

SESSION 5A: Networking, IoT, and Security

Building an ID Card Repository with Progressive Web Application to Mitigate Fraud based on the Twelve-Factor App Methodology

Kevin Akbar Adhiguna, Firhan Maulana Rusli, Hendy Irawan

Data and information have been a part of human life. They are mostly accessed through the Internet and can be provided in various ways such as texts, files, and images. Nowadays, a lot of people use personal computers and mobile phones and rely more on cloud computing services to store, backup, and share data. To cut down the probability of potential fraud, ID Card of users are stored in a repository in order to be verified. The ID Card repository is meant to be used both on mobile phones and desktop computers, so the concept of progressive web application (PWA) is utilized. Therefore, the ID card PWA should fulfill cloud-native standards in order to gain maximum benefits of cloud computing. In this paper, we will discuss a recommendation on how to develop a PWA using the Twelve-Factor App methodology and deploy it to a cloud infrastructure with cloud-related technologies such as Docker and Amazon Web Services (AWS).

XB-Pot: Revealing Honeypot-based Attacker's Behaviors

Ryandy Djap, Charles Lim, Andi Yusuf, Kalpin Erlangga

The development of Deception technology such as the honeypot is predicted to continue to take a sharp dip. Where this makes perfect sense due to the large volume of attacks, complexity and defense evasion manoeuvres. This causes the use of honeypot to become more prevalent in addition to deceiving services which are popularly attacked by attackers. Honeypots are also used to study methods attackers use to compromise certain services. It is hoped that the aim of the attacker can be known and after the mapping can be searched for attack patterns that can be used as a rule to look for patterns that are terminated when the patterns found are similar to those in Honeypot. This research aims to take advantage of the honeypot in terms of mapping the attacks that the honeypot has collected in order to know the technique, tactic and intention of each command that is launched against the honeypot. Apart from mapping commands. The purpose of this paper is to provide insight to readers about the threats that are rife with being modeled with statistical explanations using high volume and long tail. In addition, this research is a continuation of our previous paper where this research contained an enhancement framework and added honeypot data types to understand broader attacks.

Design of a Snort-based IDS on the Raspberry Pi 3 Model B+ Applying TaZmen Sniffer Protocol and Log Alert Integrity Assurance with SHA-3

Garand Yudha and Rini Wisnu Wardhani

The COVID-19 pandemic has forced many people to do work from home (WFH). In practice, networks used in homes generally do not apply security and lack awareness of possible cybersecurity threats. The development and use of security systems on home networks with inexpensive and practical solutions are highly demanded. Therefore, a device that can detect cybersecurity threats is needed to minimize the risks with practical solutions and affordable costs. This conducted research provides a design of a Snort-based Intrusion Detection System (IDS) device that was applied to the Raspberry Pi 3 Model B+. TaZmen Sniffer Protocol (TZSP) is also implemented to analyze network traffic and The SHA3 algorithm used to calculate periodical hash value. This paper implements five types of attacks, there are ICMP BlackNurse, SYN Flood, SMTP Brute Force, RDP Brute Force, and Web Phishing. In addition, this research using the 'htop' program to perform performance testing, and 'sha3sum'

program to conduct the test vector algorithm. The system has 100% accuracy rate detecting the attacks and requires less than 50% CPU and 10% RAM. So that the system can be applied to home networks as a practical and affordable cost solution in order to implement cybercrime security.

Learning Method of Performance-oriented Congestion Control (PCC) for Video Streaming Analysis

Rezy Noerdyah, Hilal H. Nuha, Sidik Prabowo

Transmission Control Protocol (TCP) congestion control architecture suffers from performance issues that are not optimal. Thus making the TCP and the variations have little hope of achieving high performance. This is due to the use of hardwired TCP mapping where each event has been assumed to be a specific disruption and TCP must cope with the incident without understanding the real condition of the network. This assumption results in performance degradation. Performance-oriented Congestion Control (PCC) is a new congestion control that makes every sender observing the action and network performance empirically to be able to take action that yields high performance. PCC has been tested in several cases. One case is video streaming. The experiment is designed to obtain the performance for video streaming in terms of throughput, delay and packet loss for the PCC and the TCP to determine better performance results. Results from the testing of each metric in which TCP and PCC throughputs are 1064.841 and 150.825 kbps respectively. Delay of TCP and PCC are 5.326 ms and 3.843 ms respectively. Packet loss of TCP and PCC are 0.905% and 0.016%, respectively. So the PCC achieves good performances on the parameters of delay and packet loss. Whereas the TCP is shown to perform better in terms of throughput.

Experimental Investigation of Wave Absorber Made of Ring Resonator-Based AMC Structure

Levy Olivia Nur, Ichsan Nusobri, Budi Syihabuddin, Achmad Munir

This paper deals with an experimental approach for investigating characteristics of an electromagnetic (EM) wave absorber made of artificial magnetic conductor (AMC) structure. An array of ring resonators in symmetrical shape used as the basis of AMC structure is designed to absorb the incoming EM waves at a certain operating frequency. The proposed design of wave absorber made of ring resonator-based AMC structure is deployed on a Flame Retardant (FR) 4 Epoxy dielectric substrate with the thickness of 1.6 mm. The shape and dimension of ring resonator are optimized to work at the certain operating frequency using a unit cell with proper boundary conditions. To investigate the absorptivity rate of proposed wave absorber, resistive elements are incorporated into the ring resonator. Here, the experimental measurement aims to verify the realized wave absorber with the proposed design and to measure the absorptivity characteristics of realized wave absorber. The measured results for the realized wave absorber which takes the dimension of 220 mm x 220 mm have the absorptivity rate, in terms of reflection coefficient (S_{11}), of -16.65 dB and -25.72 dB for the wave absorber without and with resistors, respectively. These results are comparable to the simulated ones with the S_{11} values of -18.01 dB and -23.41 dB for the design without and with resistors, respectively.

ABSTRACT

SESSION 5B: Data Science

Information Cascade Mechanism and Measurement of Indonesian Fake News

Andry Alamsyah and Asla Sonia

The high number of social media actors has the potential to produce fake news. Fake news could be motivated by various agendas, such as politics, government, and health. Therefore, we need to know how the mechanism and measurement of the spread of fake news. One approach to studying the spread of it is the information cascade. This paper will model the information cascade mechanism using Social Network Analysis (SNA) and Susceptible-Infected (SI) model. SNA is adopted to investigate the spreading mechanism and determine the proportion of actors exposed to fake news. SI is applied to measure the speed of transmission of fake and true news. Using several topic samples, the results allow us to understand the mapping of cascade information from fake news by a level that differentiates the node level from the source news to the rest of the nodes in the network. Our finding fake news can reach 0,6414 more fractions and spread 4,6 times faster than true news.

Fraud Accounts Identification Modelling on Multi-Platform E-Commerce

Grawas Sugiharto and Yudistira Asnar

Nowadays, cybercrime is increasingly prevalent in society. Based on data compiled by the Indonesia National Police, the number of cybercrimes increases by 6.46% annually, with online fraud as the most reported crime with 7.892 cases or 44.40% out of the total cases handled. The modus operandi in online fraud primarily uses manipulated profile account to gain the victims' trust. Therefore, it is necessary to have a common detection model for fraud accounts on multi-platform e-commerce to avoid online fraud. This research uses the Naïve Bayes classification, Decision Tree, and K-NN as the modeling algorithms. The classification test result showed that the optimal performance with the highest accuracy differs among the platform. The green platform reaches the highest accuracy using the K-NN algorithm (90.51%), the red platform went to the optimal performance using the Decision Tree algorithm (96.89%), and the multi-platform reached the optimal performance using the Naïve Bayes algorithm (90.02%).

Classification on Participants Renewal Process in Insurance Company: Case Study PT XYZ

Deddy Utomo, Noperida Damanik, Indra Budi

Insurance is a form of risk management and one of the fastest-growing business. PT XYZ is a company that focuses on health and life insurance. One excellent product owned by PT XYZ is Managed Care (MC) Insurance and it dominate 64.5% of the company's premium income. However, MC has a high claim ratio value. Proven by there were 363 companies that have a claim ratio of more than 76% in 2020. The increasing of total claim ratio is due to the company has not been able to predict the claim ratio when the renewal company apply for an insurance participant. This study focuses on classifying participants on insurance renewal process so that company can be more selective to approve the participants. Participant selection can help company to reduce claim ratio. Proposed method is doing classification on insurance participants data using 3803 datasets with 4 attributes and five algorithms and find significant features when generating the model. The models will be validated using k-folds cross-validation with k=10, evaluation results show the accuracy of each algorithm as following, Naive Bayes 70.00%, Support Vector Machines 67.00%, Decision Tree 95.40%, Logistic Regression 90.20%, and Neural Networks 79.30%. The results of the study recommend Decision Tree algorithm with an accuracy of 95.40% for the classification of renewal company that will join as insurance participants

because it has a better accuracy value than other algorithms. Decision Tree shows that the most significant features in defining prospective company assessment is the average of age.

Hybrid Space-Time Model and Machine Learning for Forecasting Multivariate Spatio-Temporal Data

Hendri Prabowo, Dedy Dwi Prastyo, Setiawan

The purpose of this study is to propose a hybrid model by combining statistical methods, namely Time Series Regression (TSR), Multivariate Generalized Space-Time Autoregressive (MGSTAR) as a space-time model, and Machine Learning (ML) to forecast multivariate Spatio-temporal data simultaneously. The linear model, namely TSR is used to capture trends and double seasonal patterns. MGSTAR is a model for capturing dependencies between locations. Meanwhile, capturing nonlinear patterns used the ML model. In this study, three types of ML model is used, i.e., Deep Learning Neural Network (DLNN), Feed Forward Neural Network (FFNN), and Long Short-Term Memory (LSTM). We apply this proposed method to simulated data. Based on the Root Mean Square Error (RMSE) value, the proposed hybrid methods, namely TSR-MGSTAR-DLNN, TSR-MGSTAR-FFNN, and TSR-MGSTAR-LSTM, outperform other models such as TSR, MGSTAR, MGSTAR-DLNN, MGSTAR-FFNN, MGSTAR-LSTM, and TSR-MGSTAR, especially when the data contain nonlinear noise components. The results also show that the proposed hybrid model can tackle complex patterns on Spatio-temporal data containing trends, double seasonal, linear noise, nonlinear noise, and dependencies between locations.

Comparative Study of Covid-19 Tweets Sentiment Classification Methods

Untari N. Wisesty, Rita Rismala, Wira Mungguna, Ayu Purwarianti

Covid-19 is a disease caused by a virus and has become a pandemic in many countries around the world. The disease not only affects public health, but also affects other aspects of life. People tend to write comments about things happening during the pandemic on social media, one of which is Twitter. Sentiment analysis on Twitter data is not an easy task due to the characteristics of the tweeter text which is user generated content. Therefore, in this paper, a sentiment analysis study is carried out on Twitter data using three schemes, namely the vector space model (Bag of Words and TF-IDF) with Support Vector Machine, word embedding (word2vec and Glove) with Long Short-Term Memory, and BERT (Bidirectional Encoder Representations from Transformers). Based on the conducted experiments, BERT achieved the best performance compared to the other two schemes, reaching 0.85 (weighted F1-score) and 0.83 (macro F1-score) for the classification of three sentiment classes on Kaggle competition data (Coronavirus tweets NLP - Text Classification).

ABSTRACT

SESSION 5C: Data Science

Count Data Forecasting using Poisson Autoregression for COVID-19 Case Prediction in Jakarta

Bahrul Ilmi Nasution, Yudhistira Nugraha, Juan Kanggrawan, Alex Lukmanto Suherman

COVID-19 is currently become the global problem, including in Jakarta, Indonesia. There have been many approaches to predicting the COVID-19 occurrence. One of the occurrences is using forecasting approach. The traditional forecasting method, particularly machine learning, often does not consider the condition of the data, although it has forms of the count, such as the number of cases. This study aims to employ an autoregression model using Poisson distribution in predicting the COVID-19 future cases, namely the positive and recovery number. We compare the Poisson Autoregression with several well-known forecasting methods. This study found that Poisson Autoregression could create an accurate prediction and tend to follows the real data for the next 8 to 14 days to the future. This approach can be used to forecast the future cases of COVID-19, and other cases that use count data.

Optimization of Crops Allocation Planning in Cianjur Involving Water Cost Constraints Using Genetic Algorithm

Bambang Wahyudi, Irma Palupi, Siti Sa'adah

To become urban agriculture, Cianjur needs to create land-use planning base on its agricultural situation. In this work, an optimization model to compute optimal crop allocations for each sub-district is proposed and solved by a genetic algorithm (GA) to find the best solutions. The land utility is formulated as the margin between the possible cost and revenue base on the data collected from the Indonesian Central Bureau of Statistics data. The result analysis can support decision-making for allocation crop production planning in practice to increase agricultural revenue in the Cianjur regency. A genetic algorithm is used to find the optimal solution that maximizes the margin function with some realistic conditions obtained from the government's allowed land restriction. The computation results show that the highest optimal value is 30.65 on the log scale. The fitness constant to this asymptotic rise is after 17 generations, so that it converges quickly for some experimental GA parameter setting. In the optimal allocation results, the sweet potato gains the smallest portion, followed by cassava that is only around 2% of the total plantation area. Meanwhile, the largest portion of land allocation is suggested to be corn, based on the optimal solution returning the maximum profit margin. For all crops, the Cidaun sub-district appears to be the most expansive land area in Cianjur.

Fake News Detection with Hybrid CNN-LSTM

Kian Long Tan, Chin Poo Lee, Kian Ming Lim

In the past decades, information and communication technology has developed rapidly. Therefore, social media has become the main platform for people to share and spread information to others. Although social media has brought a lot of convenience to people, fake news also spread more rapidly than before. This situation has brought a destructive impact to people. In view of this, we propose a hybrid model of Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) for fake news detection. The CNN model plays the role of extracting representative high-level sequence features whereas the LSTM model encodes the long-term dependencies of the sequence features. Two regularization techniques are applied to reduce the model complexity and to mitigate the overfitting problem. The empirical results demonstrate that the proposed CNN-LSTM model yields the highest F1-score on four fake news datasets.

Aspect Based Sentiment Analysis With Combination Feature Extraction LDA and Word2vec

Rizka Vio Octriany Inggit Sudiro, Sri Suryani, Yuliant Sibaroni

A product review is needed by a customer before he buys a product. Currently, several platforms can be used to provide product reviews, one of which is the beauty product. Every customer can read beauty product reviews, not only from one aspect of the review but it can be from several aspects of the review. It is difficult for consumers to find all the reviews from various aspects quickly. Therefore, in this study, a combination of LDA modeling methods and Word Embedding Word2vec were used, to obtain sentiments from each of the predetermined aspects of the review. In this study, the accuracy of the combination of LDA will be compared with the Word2vec Skip-gram and Continuous-bag-of-words (CBOW) models. From the two combinations, it is found that the combination accuracy of LDA and Word2vec Skip gram is 80.36%, and for CBOW is only 74.37%. Meanwhile, the SVM and K-Fold Cross-Validation algorithms are used to find the accuracy of sentiment predictions on the aspects of price, packaging, and fragrances. Compared to the other two aspects, the packaging aspect has the highest accuracy at 89.71%.

Sentiment Analysis on Beauty Product Reviews using LSTM Method

Muhammad Rafii Danendra, Yuliant Sibaroni

A review is an opinion that contains value on the job or event being reviewed. Many sites provide reviews of products or goods in the modern era to users, such as the femaledaily.com site, which provides a platform for users to review products purchased. The sentiments contained in these reviews are valuable information for business owners. Thanks to product reviews, business owners get insights and data related to the products they sell to improve their products' quality. However, getting opinion information from an unstructured review text is quite difficult. This study aims to classify these reviews as "positive" or "negative". The model proposed for classification is LSTM. Long Short-Term Memory (LSTM) was used in the previously trained model to classify this review. The model designed for the model focuses on preprocessing reviews as follows: data cleansing, case folding, normalization, tokenization, stopword, and stemming. Once classified, this review is visualized as a graph. The best-case scenario results with an accuracy of 95,10% on the sentiment towards the price aspect.

ABSTRACT

SESSION 5D: Data Science

Indonesian ID Card Extractor Using Optical Character Recognition and Natural Language Post-Processing

Firhan Maulana Rusli, Kevin Akbar Adhiguna, Hendy Irawan

The development of information technology has been increasingly changing the means of information exchange leading to the need of digitizing print documents. In the present era, there is a lot of fraud that often occur. For example is account fraud, to avoid account fraud there was verification using ID card extraction using OCR and NLP. Optical Character Recognition (OCR) is technology that used to generate text from image. With OCR we can extract Indonesian ID card or *{kartu tanda penduduk}* (KTP) into text using 3 different OCR library, PyOCR, Pytesseract, and TesseOCR. To improved the accuracy we made text correction using Natural language Processing (NLP) basic tools to fixing the text. With 50 Indonesian ID card image we compared the performance with three different OCR library. The result of our experiment show that Pytesseract had the best performance with 0.78 F-score and 4510 milliseconds to extract per ID card.

Analysis of Records Management Maturity Level for Data Collection of Network Assets in Indonesian Telecommunication Industry

Rizky A. C. Eka Putri, Achmad Hidayanto

PT.XYZ is a state-owned company in telecommunications and information technology. In developing its business, PT.XYZ has served more than 2.200 corporate customers and 22.760 retail customers by having a lot of network assets. The large number of network assets owned means that the company must be able to carry out good data collection to find out information on the distribution and capacity of assets that are still available. The most common problems encountered at PT.XYZ is about data records management of network assets. PT.XYZ already has a system for data collection of network assets, but it's still not running well. This occurs because there are no procedures and clarity of accountability related to records management, so there were many data collection processes that were still manually. Based on the problem, the purpose of this study is to conduct an assessment of records management level at PT.XYZ and provide recommendations to increase the level. The assessment process and recommendations will be based on ARMA GARP Framework. This was chosen because it's a comprehensive approach that widely used in managing the information assets of companies or organizations. The results of maturity level assessment of this study are at level 2 for accountability, transparency, compliance, availability, retention, and also level 1 for integrity, protection, and disposition. These results also indicate that the company needs to improve several processes in the GAPR Principles of Integrity, Protection, and Disposition because there is a large gap between the current level and the expected target level.

Data Acquisition Guide for Forest Fire Risk Modelling in Malaysia

Yee Jian Chew, Shih Yin Ooi, Ying Han Pang

Availability of remote sensing data (i.e., information captured from satellite) in conjunction with the usage of Geographic Information System (GIS) has made it feasible to deliver a fire model capable to segregate the area into a higher or lower risk fire region. The advancement of technologies has also inaugurated the possibility to incorporate remote sensing information and other ground data (e.g., meteorological data, distance to road data, etc.) by utilizing machine learning classifiers or deep learning algorithm to predict the forest fire occurrence. However, it should be highlighted that the

data acquisition procedure may vary depending on the vicinity of the study area since some data are only obtainable from the specific government authority. In this paper, we will be disclosing some of the publicly accessible remote sensing data and some of the valuable data attainable from the Malaysian government that is useful for detecting forest fire in Malaysia. Additionally, previous studies and works that have employed the data source to map forest fire are also deliberated in this paper. Only the data that had been exploited in the past for Malaysia are discussed.

Implementation of Hidden Markov Model (HMM) to Predict Financial Market Regime

Bambang Wahyudi, Irma Palupi, Agung Putra

This work performs how to implement the concept of Hidden Markov Model (HMM) to find financial market trend for given only the observed state obtained from the stock price. The considered market trend is set as a hidden state, that in the financial technical analysis known as Bearish, Bullish, and Sideway, which are important for decision making of stock trading in order to recognize the good moment to sell, to buy or to just hold the shares. In order to obtain the most likely sequence of hidden states through HMM, which is computationally can be a dynamic programming problem, we explain how the Viterbi algorithm work for the case in this study. To get the stock price prediction as observation states, the ARIMA model is used based on experimental trial of fitting model, then use the result as a predicted observed states that be the input to predict the market trend using HMM for the short period of future time. Several interesting results of hidden market trend and its study are also provided, including the accuracy, precision, recall and the consistency of the model to the given data set.

Prediction of Graduation with Naïve Bayes Algorithm and Principal Component Analysis (PCA) on Time Series Data

Wishnu Dwi Herlambang, Kusuma Ayu Laksitowening, Ibnu Asror

On-time graduation is an achievement for both students and university. For university, especially study program, the percentage of graduation on-time is a crucial point for accreditation. Therefore, it requires a good strategy. The percentage of graduation on time in college can be predicted with data mining and machine learning. The objective of this research is to provide earlier information regarding students who are at risk on not graduating on time. Thus, the study program can take appropriate action before it is too late. There are several classification methods that can be used for prediction. Our research combines Naïve Bayes with Principal Component Analysis (PCA). PCA is used to simplify the complex academic data. The PCA result that has simpler structure then to be processed using Naive Bayes classification. This research uses data obtained from four batch of student academic performance data in Informatics Study Program, Telkom University. The dataset is partitioned by academic year to obtain time series data of each student. The combination of PCA and Naïve Bayes algorithms obtained better result compared to classification using Naïve Bayes only, with in average 3.65% higher accuracy.

ABSTRACT

SESSION 5E: Data Science

Comparative Analysis of Support Vector Machine (SVM) and Random Forest (RF) Classification for Cancer Detection using Microarray

Irawansyah, Adiwijaya, Widi Astuti

Cancer is the second leading cause of death globally. According to the World Health Organization (WHO) in 2018, approximately 9.6 million deaths were caused by cancer. Globally, about 1 in 6 deaths are caused by cancer. One way to detect cancer is to use microarray data classification. Microarray technology is used to detect the expression of thousands of genes at the same time to analyze and diagnose cancer. However, microarray data has high dimensions because of its large number of features and low data distribution, which means that it has a small number of data samples, which causes low performance. To overcome this problem, dimension reduction is needed. Therefore, it is necessary to reduce the dimensions of microarray data with Random Projection (RP) to reduce the high dimensions and use the Support Vector Machine (SVM) and Random Forest (RF) as classification methods. The classification method will be compared and analyzed to determine which classification method produces the best performance by using Random Projection (RP) as a dimensional reduction method. Based on the system that has been built, the best accuracy for colon tumor data is 69.23% with Random Projection (RP)-SVM, Lung Cancer is 100% for both methods classification, Ovarian Cancer is 100% for both methods classification, the prostate tumor is 95.12% for both methods classification and 66.66% for both methods classification.

Evaluating the BPPT Medical Speech Corpus for An ASR Medical Record Transcription System

Elvira Nurfadhilah, Asril Jarin, Lyla Ruslana Aini, Siska Pebiana, Agung Santosa, Muhammad Teduh Uliniansyah, Eduward Butarbutar, Desiani, Gunarso

In joint research funded by LPDP, BPPT is collaborating with Solusi247 and Harapan Kita National Heart and Vascular Hospital to develop a speech corpus named BPPT Medical Speech Corpus for building a medical ASR (automatic speech recognition) system. The corpus was produced by recording 100 speakers for 81.68 hours. The corpus has 600 unique sentences containing medical terms. Previously, BPPT has developed a speech corpus for the general named BPPT General Speech Corpus. A third speech corpus named BPPT Combined Speech Corpus was created by combining the medical and general corpus, and each corpus was trained using PyChain to build an ASR model. Based on the experiments we conducted, the ASR model built from the combined speech corpus has the best WER of 6.10%.

Implementation of Simulated Annealing-Support Vector Machine on QSAR Study of Indenopyrazole Derivative as Anti-Cancer Agent

Muhammad Fajar Rizqi, Reza Rendian Septiawan, Isman Kurniawan

Cancer is a disease that occurs due to the uncontrolled growth of abnormal cells causing body tissue damage. This disease is considered as a deadly disease. In 2019, 1700 deaths occur every day due to cancer. Some effective anticancer agents are known to cause temporary to chronic toxic effects. There are several compounds that have the potential to become anticancer drugs, one of them is indenopyrazole. The goal of this research is to implement simulated annealing and support vector machine method in the QSAR study to predict the activity of indenopyrazole derivatives as anticancer drugs. Simulated annealing is used for feature selection and support vector machine is used for model development. In this research, we used three kernel models for SVM, namely SVM with RBF kernel,

SVM with linear kernel, and SVM with the polynomial kernel. From three models that were regressed, SVM with RBF kernel has parameter $C=10$, $\gamma=scale$ and $\epsilon=0.1$ produce R2 score train and test 0.79 and 0.60, respectively. SVM with linear kernel has parameter $C=1000$, $degree=1$ and $\epsilon=0.1$ produce R2 score train and test 0.61 and 0.63, respectively. SVM with polynomial kernel has parameter $C=1000$, $degree=2$ and $\epsilon=0.1$ produce R2 score train and test 0.72 and 0.50, respectively. Based on the validation results, only model with RBF kernel which parameters satisfy all the criteria. From the result we can conclude that the model with RBF kernel is the best model and acceptable.

Ransomware Detection on Bitcoin Transactions Using Artificial Neural Network Methods

Hairil, Niken Cahyani, Hilal H. Nuha

The use of digital currency or cryptocurrency in various virtual transactions is common due to its easiness. Cryptocurrency is a digital currency that is used for virtual transactions on the internet network. The most common types of cryptocurrencies include Litecoin, Ethereum, Monero, Ripple, and Bitcoin. Even though cryptocurrencies have secret codes that are quite complicated and complex that serve to protect and maintain the security of digital currencies, it is possible to be hacked by skilled hackers. Cryptocurrency-related hacking is a type of digital crime that is very harmful and dangerous. For example, in recent years, cases of hacking on bitcoin transactions using ransomware have been on the rise. Ransomware is malicious software that secretly infects a victim's device, and suddenly asks for a ransom to decrypt encrypted data. As the name implies, ransom which means ransom, this type of malware aims to blackmail a victim whose computer is infected with ransomware by asking for a certain amount of money as a ransom. Therefore, a design was built in the form of a ransomware detection system based on available bitcoin heist data so as to minimize hacking attacks against cryptocurrency in the future. The ransomware detection system was built using the backpropagation artificial neural network method using Weka software. The best results in data testing are using the parameter number of hidden layer with 9 neurons; learning rate 0.1; and the number of iterations of 5000 yields an accuracy rate of 97%.

Emotional Context Detection on Conversation Text with Deep Learning Method Using Long Short-Term Memory and Attention Networks

Afrida Helen, Mira Suryani, Hidayatul Fakhri

The conversation in the text is an interesting research on Natural Language Processing. One of the text conversation tasks is to know the emotions of the people involved in the conversation. The conversation in social media like Twitter, Instagram, short message service, WhatsApp, and so on, often involves emotion. Somehow the comments are impulsive sentences that can stimulate emotions. Expressing emotions using text is rarely done and uncomfortable. However, with natural language technology development, expressing emotions using text can be succeeded with specific symbols. We call the specific symbols emojis. So many emojis can express emotions. This research proposes the emoji symbol as a character feature. We introduce the Emoji2Vec method and Long Short-term Memory with Attention. The Attention that is used has a complex topology. We compared the results of this study with the baseline model. The method we propose is better than the baseline model.



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