



ICICoS 2020

10 – 11 November 2020

Conference Program

**The 4th International Conference
on Informatics and Computational Sciences**



Organized by:

Department of Informatics
Faculty of Science and Mathematics
Universitas Diponegoro

Sponsored by:



CONFERENCE PROGRAM

The 4th International Conference on Informatics and Computational Sciences

(ICICoS 2020)

“Accelerating Informatics and Computational Research for Society 5.0”

VIRTUAL CONFERENCE

Semarang, 10th - 11th November 2020



Organized by
Department of Informatics
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Universitas Diponegoro

Sponsored by



PREFACE

Let us thanks Allah, because with His permission we can held The 4th International Conference on Informatics and Computational Sciences 10th - 11th November 2020. This conference is an annual event organized by the Department of Informatics, Universitas Diponegoro.

We would like to express our gratitude to the honorable keynote speakers for sharing their knowledge in the plenary session of this conference. We are also very grateful to all participants coming from various institutions of various countries. High appreciation is also addressed to all committee members who have worked hard for the success of this conference.

This conference program is designed with the hope that all ICICoS 2020 participants can easily find relevant information related to this conference, such as schedule and paper abstracts in this conference. However, should there be any confusion related to this conference, feel free to approach one of our committee members.

At last, we apologize for any mistakes generated in managing this conference, from paper submission process until the end of the conference.

Semarang, November 2020

ICICoS 2020 Committee

WELCOME SPEECH FROM THE GENERAL CHAIR OF ICICoS 2020



On behalf of the organizing committee, I am delighted to welcome all participants to the 4th International Conference on Informatics and Computational Sciences (ICICoS 2020). This conference is the fourth international conference held by Department of Informatics, Universitas Diponegoro in Semarang from November 10th to November 11th, 2020.

In this conference, the committee decided to choose the following theme: “Accelerating Informatics and Computational Research for Society 5.0”. This topic is in line with the concept of Society 5.0 which was introduced by Japan and inaugurated on January 21, 2019. Society 5.0 is a human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space. This concept was born as a development of the 4.0 industrial revolution which is considered to degrade the role of humans. The aim of the conference is to provide an interactive international forum for sharing and exchanging information on the latest research in the area of computer sciences, informatics, computational science, and related field, which contribute to the society 5.0.

Nearly 110 academicians, researcher, practitioner and presenters from 9 countries (Indonesia, United State of America, France, Austria, Australia, Japan, Timor Leste, Malaysia, and The Netherlands) have gathered in this event. In total, there are 84 active papers submitted to this conference. Each paper has been reviewed with tight criteria from our invited reviewers. Based on the review result, papers have been accepted, which lead to an acceptance rate of 47.6%.

This conference will not be successful without extensive effort from many parties. First, I would like to thank all keynote speakers for allocating their valuable time to share their knowledge with us. I would also like to express my sincere gratitude to all participants who participate in this conference. Special acknowledgement should go to the Technical Program Committee Chairs, Members, and Reviewers for their thorough and timely reviewing of the papers. We would also like to thank our sponsors: IEEE Indonesia Section and Research and Society Service Institution Universitas Diponegoro, who have helped us to keep down the costs of ICICoS 2020 for all participants. Last but not least, recognition should also go to the Local Organizing Committee members who have put enormous effort and support for this conference.

At last, we hope that you have an enjoyable and inspiring moment during our conference. Thank you for your participation on ICICoS 2020.

Dr. Dinar Mutiara Kusumo Nugraheni, ST, M Info Tech(Comp)
General Chair of ICICoS 2020

WELCOME SPEECH FROM THE DEAN OF SCIENCE AND MATHEMATICS FACULTY



Excellency: **Prof. Dr. Yos Johan Utama**, Rector of Universitas Diponegoro.

Honorable Keynote Speakers for the 4th International Conference on Informatics and Computational Sciences,

1. Assoc. Prof Ts. Dr. AbdulRahman Ahmed Al-Sewari, from University Malaysia Pahang
2. Dr. Eng. Sunu Wibirama, from Universitas Gadjah Mada

The distinguished guests (IEEE Indonesia Section), participants and committees of ICICoS 2020.

It is a great honour to welcome you in the International Conference on Informatics and Computational Sciences (ICICoS). ICICoS is an annual conference organized by Department of Informatics, Faculty of Science and Mathematics, Universitas Diponegoro, Indonesia.

Ladies and Gentlemen,

Not long ago, the industrial revolution 4.0 has come to the stage. Now that we have to prepare for another wave of human civilization as a response to it, being society 5.0. In this society, the physical world and the cyber world converge to mingle as a digital twin. What happens in real life will be automatically reflected in virtual one. Computing becomes more pervasive as it permeates almost all aspects of life. Of course, there will always be sort of challenges and opportunities behind. We are encouraged to conduct some excellent research in order to participate in bringing more beneficial human life in the future.

ICICoS 2020 aims to provide a forum for academicians of computing fields, professionals and all interested parties to discuss the design and development of advanced computing technology in order to facilitate the contributions to the industry 4.0 as well as to the society 5.0. The conference invites the scholars and encourages the researchers to submit high quality papers and to conduct scientific discussion within. It is as a medium to exchange ideas and to discuss the advancement in informatics along with related natural sciences, such as computational biology, computational chemistry, and computational physics.

Ladies and Gentlemen,

It is a great pleasure to meet all the outstanding participants of this conference in Semarang. I do hope that this conference will be a valuable forum for computing field scientists to share their precious research. I also hope this event will give significant contribution to the development of computer science and information systems fields. Last but not least, I hope it

will raise the mindfulness among scientific community members in bringing brighter and better future for humanity.

Thank you very much.

Yours Sincerely,

Prof. Dr. Widowati, S.Si, M.Si

Dean of Faculty of Science and Mathematics, Universitas Diponegoro

WELCOME SPEECH FROM RECTOR OF UNIVERSITAS DIPONEGORO



The honorable Keynote Speakers for the 4th International Conference on Informatics and Computational Sciences, Assoc. Prof Ts. Dr. AbdulRahman Ahmed Al-Sewari and Dr. Eng. Sunu Wibirama.

The honorable Dean and Vice Deans of Faculty of Science and Mathematics Universitas Diponegoro.

The distinguished guests (IEEE Indonesia Section), participants and committees of ICICoS 2020.

Assalamu'alaikum Warahmatullahi Wabarakatuh,

First of all, let us praise Allah the Almighty who has bestowed His blessing and grace on all of us, so that we can gather here today, in good and healthy condition, in the 4th International Conference on Informatics and Computational Sciences or ICICoS 2020. The conduct of this conference is one of the routine agendas in Universitas Diponegoro, as a part of Universitas Diponegoro's effort to be one of superior research universities. Universitas Diponegoro aims to be a world class research university that generates discoveries and serves as valuable sources of knowledge for the development of human life in Indonesia and abroad. In order to achieve that purpose, Universitas Diponegoro consistently strives to be at the forefront of scientific progress. Universitas Diponegoro will continue to work with the international partners to build and to develop scientific networks as well as to enhance the contribution of Indonesian researchers in international publications.

Ladies and Gentlemen,

Recent development of Information Technology and Computer Science is extremely rapid and extraordinary. Almost every part of human life is connected to computing devices and softwares. Various technologies have emerged, such as Internet of things, ubiquitous computing, data science, analytics and visualization, artificial intelligence and deep learning. From the trend of industrial revolution 4.0 to society 5.0, all has attempted to enhance the quality of human life. All we can do is coping with the challenges they bring and taking advantage of the opportunities that follow. As scholars, we can contribute for the better future by conducting research. Hence, it is of outmost importance to establish a platform of this kind, so that the results of research in the field of Information Technology and Computer Science can be disseminated and shared, and hopefully it can be more useful for all of us.

Ladies and Gentlemen,

I am extremely proud that in organizing this conference, the committee embraces IEEE as technical sponsor. I hope that, by involving IEEE, it ensures the high quality of the submitted

papers in this conference. In addition, I hope it will be also in-line with Universitas Diponegoro's efforts to achieve its goal, being a sound world class research university.

Ladies and Gentlemen,

I sincerely hope that this conference will serve as a platform for exchanging scientific ideas among reseachers, and will give tremendous benefits to the community.

Finally, I hope you enjoy the rest of the conference program.

Wassamu'alaikum Warahmatullahi Wabarakatuh

Rector of Universitas Diponegoro
Prof. Dr. Yos Johan Utama, S.H., M.Hum

By saying Bismillahirrahmanirrahim, I officially open the 4th International Conference on Informatics and Computational Sciences.

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CONFERENCE INFORMATION

Dates	November 10 th (Tuesday) – November 11 st (Wednesday) 2020
Organizer	Department of Informatics Faculty of Science and Mathematics – Universitas Diponegoro
Venue	Virtual Conference via Webex
Official Language	English
Secretariat	Department of informatics Faculty of Science and Mathematics Universitas Diponegoro Building E, 3rd Floor, Tembalang Semarang, Indonesia 50275 Telp. : (+62) 24 7474754 ext. 5000 Fax. : (+62) 24 76480690 Email : icicos@live.undip.ac.id Website : http://www.if.fsm.undip.ac.id
Conference Website	http://icicos.org

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- W. Sunindyo, Institut Teknologi Bandung, ID
- W. Suwarningsih, Indonesian Institute of Science, ID
- Y. Su, Shu-Te University, TW
- Z. Mekkioui, University of tlemcen, DZ

PROGRAM SCHEDULE

Tuesday, November 10th, 2020

Time	Event	Event Details			
08.00 - 08.30	Participants entering virtual conference room				
08.30 - 08.35	Opening Ceremony	Welcome Speech from the General Chair of ICICoS 2020 (Dr. Dinar Mutiara KN, M. Info. Tech)			
08.35 - 08.40		Welcome Speech from IEEE IS			
08.40 - 08.50		Welcome Speech from the Dean of Faculty of Science and Mathematics, Universitas Diponegoro (Prof. Dr. Widowati, M.Si)			
08.50 - 09.00		Opening Speech from the Rector Universitas Diponegoro (Prof. Dr. Yos Johan Utama, S.H., M.Hum.)			
09.00 - 10.30	Plenary I	<ul style="list-style-type: none"> Keynote Speaker I: Assoc Prof. AbdulRahman A. AlSewari Moderator: Edy Suharto, ST, M.Kom 			
10.30 - 12.00	Plenary II	<ul style="list-style-type: none"> Keynote Speaker II: Dr. Eng. Sunu Wibirama, S.T., M.Eng. Moderator: Fajar Nugroho, S.Kom, M.Cs 			
12.00 - 13.00	Break				
13.00 - 14.30	Parallel Session I				
	Room 1 Information System	Room 2 Software Engineering, Network and Data Mining	Room 3 Machine Learning and It's Applications 1	Room 4 Machine Learning and It's Applications 2	
14.30 - 15.00	Break				

Parallel Session II				
	Room 1	Room 2	Room 3	Room 4
15.00 - 16.15	Information System	Software Engineering, Network and Data Mining	Machine Learning and It's Applications 1	Machine Learning and It's Applications 2
16.15 - 16.30	Closing Ceremony			

Wednesday, November 11th, 2020

- Workshop

PROGRAM SCHEDULE - Parallel Session Schedule

Parallel Session - Room 1 Information System				
Session	Time	Paper ID	Author	Title
Parallel Session 1	13.00 - 13.15	1570657493	Meyliana Meyliana, Henry Widjaja, Stephen Santoso, Surjandy Surjandy, Erick Fernando, Andreas Raharto Condrobimo	Improving the Quality of Learning Management System (LMS) based on Student Perspectives Using UTAUT2 and Trust Model
	13.15 - 13.30	1570660660	Aulia-Absari Khalil, Meyliana, Achmad Nizar Hidayanto, Harjanto Prabowo	Identification of Factor Affecting Continuance Usage Intention of mHealth Application
	13.30 - 13.45	1570669017	Julius Galih Prima Negara, Djoko Budiyanto Setyohadi, Pranowo	Uncertainty Avoidance and Individualism Collectivism on Acceptance of Smart City Mobile Applications
	13.45 - 14.00	1570670167	Zerlita Fahdha Pusediktasari, Rahma Fitriani, Eni Sumarminingsih	The Outlierness Degree of Spatial Observations in the Presence of Spatial Outliers, Simulation Study using Average Difference Algorithm
	14.00 - 14.15	1570670570	Ragil Saputra, Tusta Rayana, Satriyo Adhy, Nurdin Bahtiar, Melnyi Timu	Success Factor Affecting M-Learning Implementation: Perspective of Students
	14.15 - 14.30	1570671361	Aang Kisnu Darmawan, Daniel Siahaan, Tony Dwi Susanto, Hoiriyah Hoiriyah, Busro Umam Achmad Nizar Hidayanto, A'ang Subiyakto, Miftahul Walid, Iwan Santosa	Hien's Framework for Examining Information System Quality of Mobile-based Smart Regency Service in Madura Island Districts
	14.30 - 15.00	COFFEE BREAK		
Parallel Session 2	15.00 - 15.15	1570674375	Dinar Mutiara Kusumo Nugraheni, Amabel Hadisoewono, Beta Noranita	Continuance Intention to Use (CIU) on Technology Acceptance Model (TAM) for m-payment (case study: TIX ID)
	15.15 - 15.30	1570677311	Ragil Saputra, Satriyo Adhy, Nurdin Bahtiar, Nauli Isnaini, Zaenal Abidin, Edy Suharto	Factors Influencing Student's Adoption of E-Learning in Indonesian Secondary Schools
	15.30 - 15.45	1570677382	Indra Waspada, Riyanarto Sarno	An Improved Method of Graph Edit Distance for Business Process Model Similarity Measurement

Parallel Session - Room 2				
Software Engineering, Network and Data Mining				
Session	Time	Paper ID	Author	Title
Parallel Session 1	13.00 - 13.15	1570655432	Zharfan Akbar Andriawan, Satriawan Rasyid Purnama, Ricko Ricko, Adam Sukma Darmawan, Adi Wibowo, Aris Sugiharto, Feri Wijayanto	Prediction of Hotel Booking Cancellation using CRISP-DM
	13.15 - 13.30	1570666102	Dhiyaussalam, Adi Wibowo, Fajar Agung Nugroho, Eko Adi Sarwoko, I Made Agus Setiawan	Classification of Headache Disorder Using Random Forest Algorithm
	13.30 - 13.45	1570669271	Suryo Santoso, Satriyo Adhy, Nurdin Bahtiar, Indra Waspada	Development of The Smart Chicken Eggs Incubator Based on Internet of Things Using The Object Oriented Analysis and Design Method
	13.45 - 14.00	1570669787	Khadijah, Amazona Adorada, Panji Wisnu Wirawan, Kabul Kurniawan	The Comparison of Feature Selection Methods in Software Defect Prediction
	14.00 - 14.15	1570670150	Zharfan Akbar Andriawan, Ramadhan Pratama, Khadijah	Usability Testing of Multifinance Mobile Application for End-Customer Case Study: PT. XYZ
	14.15 - 14.30	1570670259	Ahmad Saikhu, Agung Teguh Setyadi, Yudhi Purwananto, Arya Yudhi Wijaya	Spatio-Temporal Recurrent Neural Networks Modeling for Number of Users Prediction on Wireless Traffic Networks
14.30 - 15.00	COFFEE BREAK			
Parallel Session 2	15.00 - 15.15	1570673406	Busro Umam, Aang Kisnu Darmawan, Anwari Anwari, Iwan Santosa, Miftahul Walid, Achmad Nizar Hidayanto	Mobile-based Smart Regency Adoption with TOE framework: An empirical inquiry from Madura Island Districts
	15.15 - 15.30	1570677016	Amarudin Amarudin, Ridi Ferdiana, Widy Widyanawan	A Systematic Literature Review of Intrusion Detection System for Network Security: Research Trends, Datasets and Methods
	15.30 - 15.45	1570677148	Muhamad Aldy Bintang, Ruki Harwahyu, Riri Fitri Sari	SMARIoT: Augmented Reality for Monitoring System of Internet of Things using EasyAR
	15.45 - 16.00	1570677427	Flora Poecze, A Min Tjoa	Meta-analytical considerations for gamification in higher education: existing approaches and future research agenda

Parallel Session – Room 3 Machine Learning and Its Applications 1				
Session	Time	Paper ID	Author	Title
Parallel Session 1	13.00 - 13.15	1570660735	Deevi Sarwinda, Alhadi Bustaman, Radifa H. Paradisa, Terry Argyadiva, Wibowo Mangunwardoyo	Analysis of Deep Feature Extraction for Colorectal Cancer Detection
	13.15 - 13.30	1570670088	Agus Subhan Akbar, Chastine Fatichah, Nanik Suciati	Simple MyUnet3D for BraTS Segmentation
	13.30 - 13.45	1570673146	Suherwin, Zahir Zainuddin, Amil Ahmad Ilham	The Performance of Face Recognition Using the Combination of Viola-Jones, Local Binary Pattern Histogram and Euclidean Distance
	13.45 - 14.00	1570674176	Eko Prasetyo, Nanik Suciati, Chastine Fatichah	A Comparison of YOLO and Mask R-CNN for Segmenting Head and Tail of Fish
	14.00 - 14.15	1570674320	Puteri Khatya Fahira Ari, Zulia Putri Rahmadhani, Petrus Mursanto, Ari Wibisono, Hanif Arief Wisesa	Classical Machine Learning Classification for Javanese Traditional Food Image
	14.15 - 14.30	1570676401	Daffa Muammar, Priyo Sidik Sasongko, Sukmawati Nur Endah, Retno Kusumaningrum, Rismiyati, Khadijah, Lestari Handayani	Garbage Image Segmentation Using Combination of Thresholding Algorithms and Pyramid Scene Parsing Network
14.30 - 15.00	COFFEE BREAK			
Parallel Session 2	15.00 - 15.15	1570676489	I Wayan Agus Surya Darma, Nanik Suciati, Daniel Siahaan	Balinese Carving Recognition using Pre-Trained Convolutional Neural Network
	15.15 - 15.30	1570676888	Ni Putu Sutramiani, Nanik Suciati, Daniel Siahaan	Transfer Learning on Balinese Character Recognition of Lontar Manuscript Using MobileNet
	15.30 - 15.45	1570677274	Urratul Aqyuni, Rismiyati, Sukmawati Nur Endah, Priyo Sidik Sasongko, Retno Kusumaningrum, Khadijah, Hanif Rasyidi	Waste Image Segmentation Using Convolutional Neural Network Encoder-Decoder with SegNet Architecture
	15.45 - 16.00	1570677290	Tiani Tiara Putri, Ema Rachmawati, Febryanti Sthevanie	Indonesian Ethnicity Recognition Based on Face Image Using Uniform Local Binary Pattern (ULBP) and Color Histogram
	16.00 - 16.15	1570677356	Adita Putri Puspaningrum, Retno Kusumaningrum, Sukmawati Nur Endah, Khadijah, Rismiyati, Priyo Sidik Sasongko, Ferda Ernawan	Waste Classification Using Support Vector Machine with SIFT-PCA Feature Extraction

Parallel Session - Room 4				
Machine Learning and Its Applications 2				
Session	Time	Paper ID	Author	Title
Parallel Session 1	13.00 - 13.15	1570666720	Cuk Tho, Harco Leslie Hendric Spits Warnars, Benfano Soewito, Ford Lumban Gaol	Code-mixed Sentiment Analysis using Machine Learning Approach - A Systematic Literature Review
	13.15 - 13.30	1570670508	Muhammad Rizky Ramadhan, Sukmawati Nur Endah, Aprinaldi Bin Jasa Mantau	Implementation of Textrank Algorithm in Product Review Summarization
	13.30 - 13.45	1570674565	Moh Abdul Latief, Alhadi Bustamam, Titin Siswantining	Performance Evaluation XGBoost in Handling Missing Value on Classification of Hepatocellular Carcinoma Gene Expression Data
	13.45 - 14.00	1570674664	Ika Marta Sari, Saskya Soemartojo, Titin Siswantining, Devvi Sarwinda	Mining Biological Information from 3D Medulloblastoma Cancerous Gene Expression Data Using TimesVector Triclustering Method
	14.00 - 14.15	1570674674	Dea Siska, Titin Siswantining, Devvi Sarwinda, Saskya Soemartojo	Triclustering Algorithm for 3D Gene Expression Data Analysis using Order Preserving Triclustering (OPTricluster)
	14.15 - 14.30	1570676322	Agung Wiratmo, Chastine Fatichah	Assessment of Indonesian Short Essay using Transfer Learning Siamese Dependency Tree-LSTM
	14.30 - 15.00	COFFEE BREAK		
Parallel Session 2	15.00 - 15.15	1570676889	Sayyidah Hanifah Putri, Adhi Harmoko Saputro	Design of Convolutional Neural Network Modeling for Low-Density Lipoprotein (LDL) Levels Measurement Based on Iridology
	15.15 - 15.30	1570676890	Dyla Velia, Adhi Harmoko Saputro	Designing Diabetes Mellitus Detection System Based on Iridology with Convolutional Neural Network Modeling
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	15.45 - 16.00	1570677362	Sutikno Sutikno, Khairul Anam, Azmi Saleh	Voice controlled wheelchair for disabled patients based on CNN & LSTM

PLENARY I

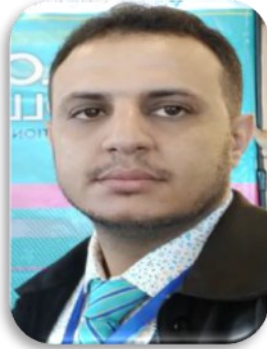
Nomadic People Optimization Algorithm and its Applications

Associate Professor Ts. Dr. AbdulRahman Ahmed Al-Sewari
University Malaysia Pahang

Abstract

Many metaheuristic algorithms and their variants have been introduced and implemented to solve several optimization problems. Most of these algorithms were inspired by nature or the behavior of a human or certain animals such as birds, wolves, ants, bees, bats, and etc. These algorithms faced several issues, such as the balancing between the exploration and exploitation capabilities. A novel swarm-based metaheuristic algorithm which depends on the behavior of nomadic people called “Nomadic People Optimizer (NPO)” will be presented. NPO simulates the nature of these people in their movement and searches for sources of life (such as water or grass for grazing), and how they have lived hundreds of years, continuously migrating to the most comfortable and suitable places to live. The NPO algorithm was primarily designed based on the Multi-Swarm approach, consisting of several clans and each clan looking for the best place, in other words, for the best solution depending on the position of their leader. The NPO algorithm has been implemented to solve several optimization problems such as Engineering problems, combinatorial Testing problems, and etc.

PROFILE KEYNOTE SPEAKER I



Combinatorial Testing, Optimization Algorithm, Software Testing
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AbdulRahman A. AlSewari, Ph.D is an Associate Professor, Software Engineering Department, Faculty of Computing, Universiti Malaysia Pahang, Malaysia. He supervise several student from undergraduate until Ph.D and hold at least 35 award on his career. He holds several copyrights and a patent about “Nomadic People Optimizer for Solving Engineering Problems” that wait for the final stage to receive the patent certificate. He writes at least 3 books and chapters which talk about software testing. His publication on International Journal at least 31 articles from 2011 until 2020 and at least 27 articles on conference proceedings. AbdulRahman A. AlSewari, Ph.D is also a member of several professional organization such as Web of Science, Scopus, Orcid, IEEE Senior member, Board of Engineers Malaysia, as Professional Technologist member of Malaysia Board of Technologist (MBOT) and also ACM member.

PLENARY II

**Uncalibrated Gaze-Based Interaction:
A Human-Centered Natural Interface Towards Society 5.0**

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Abstract

Looking back on our history, human being has undergone several stages of society. Society 1.0 was denoted by behaviour of hunting and gathering while living in harmony with nature. Society 2.0 formed an agricultural cultivation-based civilization, progressing towards community development. Society 3.0 promoted mass production through industrialization. Society 4.0 was based on invention of computers and internet, allowing distribution of mass information without borders. Now, we are living in Society 5.0 where IoT, artificial intelligence, robotics, and big data are utilized to establish smart societies across the globe. One particular technology commonly found in a smart society is public display. In the post-pandemic era, public display plays an important role to control Covid-19 by presenting educational information in hospitals, health centers, supermarkets, airports, and other public facilities. Developing an informative public display while maintaining high standards of sanitation to avoid spreading of Covid-19 poses a challenging interaction circumstances. In this keynote lecture, we provide a case study on implementing artificial intelligence and smart sensor to develop a touchless smart public display. We have implemented uncalibrated eye tracking technique for spontaneous interaction – without direct interaction with high contact surface of the display. Our technology provides an alternative interaction modality to support future smart societies.

PROFILE KEYNOTE SPEAKER II

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Dr. Sunu Wibirama is a renowned academician and practitioners of eye tracking, usability of digital products, and user experience in South East Asia. He obtained B.Eng. (Bachelor of Engineering) from Universitas Gadjah Mada Indonesia, M.Eng. (Master of Engineering) from King Mongkut's Institute of Technology Ladkrabang Thailand, and Dr.Eng. (Doctor of Engineering) from Tokai University Japan. Dr. Sunu Wibirama has conducted an eye-tracking-based customer experience research for more than **60 national and international brands** of South East Asian, US, Japanese, and Europeans companies with more than **500 participants**. He has been invited to investigate visibility of digital media for various business, including transportation, cosmetics, health, kids products, food and drinks, telecommunication, and e-commerce.

Dr. Sunu Wibirama is also an assistant professor at the Department of Electrical Engineering and Information Technology, Universitas Gadjah Mada, Indonesia and the Chair of IEEE Systems, Man, and Cybernetics Indonesia Chapter. As an academician, Dr. Sunu Wibirama has been recognized as the first expert in Indonesia that dedicates more than 10 years of his academic career to work on intelligent user experience engineering field where he investigates and develops various intelligent systems based on eye tracking technology and machine learning. He has been invited in more than **100 national and international forums** to give various lectures about **fundamental of visual behavior and its implications in marketing, basic eye tracking research and methodology, applied computer vision and artificial intelligence, human factors and ergonomics in digital products, user experience and business, and starting up an academic research**. He was a visiting researcher in Tampere Unit for Computer-Human Interaction, University of Tampere Finland, Department of Electrical and Electronics Engineering, Anadolu University Turkey, and Department of Information Science and Engineering, Shibaura Institute of Technology Japan. He holds **two national intellectual property rights** for eye tracking softwares for diagnosis and assistive technology. He has published more than **60 scientific articles** about eye tracking, user experience, and applied artificial intelligence in international conferences and international journals with impact factors.



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Hien's Framework for Examining Information System Quality of Mobile-based Smart Regency Service in Madura Island Districts

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Abstract— Today, almost every nation strives to incorporate city governance with the idea of smart cities. Several previous studies have developed various models to assess the efficiency of ISS. During the past, numerous studies evaluated the quality of service and experience of smart city applications. But very few research also explores the Smart District model's performance of services, which differs substantially from the general concept of a smart city. This study aims to examine the quality of service through the usage of the region or district with mobile devices. The model and approach used is the Hien's Framework, a development framework of the Technology Acceptance Model and the Delone McLean IS Success Model to measure the quality of information system services. The online survey form, data processing using AMOS 24.0 software, was used to collect data from two hundred and seventeen interviewees. The research findings show that the variables introduced by the Hien Framework have a significant and positive impact on the quality assessment of smart district services. This work helps to explain the performance model of a smart district information system based on mobile devices. This research recommends that local governments and politicians take better concern for critical problems affecting the quality of mobile services.

Keywords - information system quality, smart city, smart regency, Hien's framework, mobile-based application

Waste Classification Using Support Vector Machine with SIFT-PCA Feature Extraction

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Abstract — Population growth and changes in public consumption patterns cause increases in the volume, types and characteristics of the waste. This increase requires waste management effort. One of the efforts that can be performed is by separating waste into several types. Upon waste separation, the waste can be proceeded to the waste recycling process. Current technological advances have supported automatic waste sorting so that the waste sorting process is easier and faster to do. This research proposes waste image classification to support automatic waste sorting using Support Vector Machine (SVM) classification algorithm and SIFT-PCA (Scale Invariant Feature Transform - Principal Component Analysis) feature extraction. SIFT-PCA is a combination of SIFT to extract feature data and PCA to reduce the dimensionality of the resulting feature data. The data used in this research is Trashnet datasets. The performance of the SVM classification using SIFT feature is compared with the similar algorithm with SIFT-PCA combined feature. The experimental results show that classification using SIFT feature extraction achieve accuracy of 62%. This accuracy is higher than experiment with using SIFT-PCA feature extraction.

Keywords—image classification, waste, SVM, SIFT-PCA, Trashnet, dimensional reduction

Assessment of Indonesian Short Essay using Transfer Learning Siamese Dependency Tree-LSTM

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Abstract—The automatic short essay assessment is considering many aspects, not only the student's answer, but also the teacher marking rubrics for getting precise answers. Sometimes the marking rubrics are not used, instead, the teacher only used a single precise answer so that condition raises scoring ambiguity. This paper presents some precise answers for a fair assessment and discovers the important representation of the answer using grammatical dependency. Grammatical used to overcome uncertainty relation word in answer. The precise answers as the correct answer tolerance and student answers are used as the new input pair. Due to the Indonesian short essay is a lack, transfer learning is carried out. In this paper, we present a transfer learning using Siamese dependency tree-LSTM for obtaining the assessment score. The evaluation of the proposed method using Quadratic Weighted Kappa and accuracy that is 85.74% and 70.80%, respectively.

Keywords—Automatic assesment; Short essay assessment; Transfer learning; Siamese dependency tree-LSTM

Simple MyUnet3D for BraTS Segmentation

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Abstract—The deep learning architectures that have been used for brain tumor segmentation in the BraTS challenge have performed well for the WT, TC, and ET segmentations. However, these architectures generally have many parameters and require large storage capacity for the model. In this paper, we propose a Simple MyUnet3D to do segmentation on BraTS 2018 dataset. This proposed architecture was inspired by 2D UNet and modified to do 3D image segmentation. Dataset divides into 2 parts, one part of training and the other for validation. From 285 data, 213 for training, and 72 for validating the model. The segmentation consists of 3 parts, whole tumor(WT), tumor core(TC), and enhanced tumor(ET). Even its simplicity, it produces a dice coefficient of 0.8269 at segmenting the whole tumor. Nevertheless, its performance in tumor core and enhanced tumor need to be developed. The simplicity and its result in segmenting the whole tumor have great potential to be better developed.

Keywords—2D U-Net, 3D Image Segmentation, BraTS 2018, BraTS Dataset, Brain Tumor Segmentation

Spatio-Temporal Recurrent Neural Networks Modeling for Number of Users Prediction on Wireless Traffic Networks

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Abstract— Wireless network traffic modeling is very important for planning, managing, and optimizing computer networks. The dynamic, chaotic, and non-linear nature of network traffic makes an accurate network traffic prediction model very important. The behavior of network traffic which is time series in nature and the existence of location dependencies as well as the linkages between features causes complexity modeling. Therefore, the Spatio-Temporal correlation approach through the Detrended Partial Cross-Correlation Analysis method for feature extraction and Recurrent Neural Networks method is proposed to forecasting a wireless traffic model. The case study for this modeling is to forecast the number of users at three base-stations based on the predictor packets and Bytes variables taking into account the Space-Time effect. The result of the proposed method to forecast the number of users at the three base-stations is that it has a forecasting accuracy of 81%, much higher than the Generalized Spatio-Temporal Auto Regressive of 6.02%.

Keywords—Spatio-Temporal; wireless networks; Number of users; recurrent neural networks; GSTAR

A Systematic Literature Review of Intrusion Detection System for Network Security: Research Trends, Datasets and Methods

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Abstract— Code-mixed language is ubiquitous. Having been commonly practiced among bilingual communities, code-mixed language has emerged as a common language among social media users. Despite its popularity, the analysis of a code-mixed text is challenging as the text typically does not comply with the monolingual grammar. Therefore, the popularity of social media in the past ten years has raised wide attention to develop methods for analyzing code-mixed text such as extracting polarity sentiment from the text. This paper presents the review findings of sentiment analysts of code-mixed English and other languages such as Indian, Indonesian, and Malaysian languages. The focus of this paper is to compare the result between machine learning classifiers against the mixed code sentiment analysis and to know what would be the variables that influence the accuracy of the classifiers. Prisma Methodology was used in this paper, extracting from 230 papers to 12 papers that meet the requirements. The result of the 12 papers that the most common classifiers are Support Vector Machine, Naïve Bayes, and Linear Regression. The best performance of Support Vector Machine is 43% from 3 out of 7 papers, slightly higher than Naïve Bayes and Linear Regression with 40% from 2 out of 5 paper.

Identification of Factor Affecting Continuance Usage Intention of mHealth Application

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Abstract— Nowadays, there were over 300.000 health applications in the market and continues to grow. Approximately 40 percent of smartphone owners use mHealth apps. Due to the current COVID-19 pandemic situation, the existence of mHealth become much more important. But, approximately more than 30 percent mHealth applications were uninstalled within a month of download. The impact of uninstalled app is quite significant both for users and company. Uninstalled app can cause more than \$30,000 monthly potential loss to the company. Also, without using mHealth continuously users won't be able to achieve their ultimate goal, which is improving the quality of life. An increasing amount of research has been conducted to learn about the continuance usage intention of mHealth, and we rarely find an extensive article review on mHealth continuance usage intention. Therefore, this paper aim to identify factors affecting continuance usage intention of mHealth application using a systematic literature review approach to papers published in 2010-2020. According to the findings there are 39 factors that affecting continuance usage intention of mHealth application, with the most frequent factors are Satisfaction, Perceived usefulness, Perceived service quality, Perceived trust, and Perceived ease of use. From that factors we can see that user will continuously use the app if the app can accommodate their expectation and satisfy them. To achieve that, the app not only need to be easy to use but also must have a good service quality, and trustworthy.

Keywords— mHealth; Continuance Usage Intention; COVID-19

Mobile-based Smart Regency Adoption with TOE framework: An empirical inquiry from Madura Island Districts

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Abstract— Currently, nearly all countries try to combine city government and a smart city idea. A few previous studies have developed different ISS efficiency modeling techniques. Many studies have previously analyzed the quality of service and experience of smart - city applications. However, very few studies have studied the Smart District model efficiency of the organization, which is significantly different from a smart city's general definition. The objective of this study is to verify the level of service by using mobile devices in areas or districts. The TOE frame is the model and methodology used to define service adoption of the information system, which combines aspects of technology, organization, and a supportive environment. To collect data from a hundred ninety-two stakeholders, the online survey method, which is the data processing by AMOS 24.0 software. The findings of this research confirm that there is a significant and constructive impact on quality assessment of smart district services on the dimensions adopted by the TOE Framework. This paper explains the performance model of a smart, mobile-based district information system. This study recommends that local authorities and governments focus more on critical issues affecting the quality of cellular services.

Keywords— information system adoption, smart city, smart regency, TOE framework, mobile-based application

Code-mixed Sentiment Analysis using Machine Learning Approach - A Systematic Literature Review

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Abstract— The deep learning architectures that have been used for brain tumor segmentation in the BraTS challenge have performed well for the WT, TC, and ET segmentations. However, these architectures generally have many parameters and require large storage capacity for the model. In this paper, we propose a Simple MyUnet3D to do segmentation on BraTS 2018 dataset. This proposed architecture was inspired by 2D U-Net and modified to do 3D image segmentation. Dataset divides into 2 parts, one part of training and the other for validation. From 285 data, 213 for training, and 72 for validating the model. The segmentation consists of 3 parts, whole tumor(WT), tumor core(TC), and enhanced tumor(ET). Even its simplicity, it produces a dice coefficient of 0.8269 at segmenting the whole tumor. Nevertheless, its performance in tumor core and enhanced tumor need to be developed. The simplicity and its result in segmenting the whole tumor have great potential to be better developed.

Garbage Image Segmentation Using Combination of Thresholding Algorithms and Pyramid Scene Parsing Network

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Abstract— Garbage is one of the biggest problems in Indonesia, even most of country in the world. The amount of garbage increases every year, therefore a reliable garbage management system is needed to prevent the contamination of garbage on environment. Garbage sorting (based on its material) is an important part of garbage management system. Since the amount of garbage is really high, a fast and accurate garbage sorting process is needed to improve the overall garbage management system. One of the most important tasks in garbage sorting process is garbage image segmentation. This research proposes garbage image segmentation process by using Pyramid Scene Parsing Network (PSPNet) and three binary images from the combination of thresholding algorithms as the input for the network. Then it is compared with PSPNet that uses a RGB image as an input. The results show that when using PSPNet, RGB image is better than the image from combination of thresholding algorithms as an input for PSPNet with the maximum F1 Score is up to 98%. However, the results of this comparison are competitive where the difference of F1 score between the proposed method and PSPNet with RGB image is less than 0.02.

Keywords— Pspnet; Garbage image; Image segmentation

Triclustering Algorithm for 3D Gene Expression Data Analysis using Order Preserving Triclustering (OPTricluster)

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Abstract— Triclustering is the expansion of clustering and biclustering methods that works on three-dimensional (3D) data. This method is generally implemented in the analysis of 3D gene expression data to find gene expression profiles. This data consists of three dimensions: genes, experimental conditions, and time points. Triclustering can group these dimensions simultaneously and form a 3D cluster called a tricluster. Order Preserving Triclustering (OPTricluster) is a triclustering algorithm that uses a pattern-based approach and is used to analyze short time-series data (3-8 time points). The OPTricluster forms the tricluster by identifying genes with the same pattern of change in expression across time points under several experimental conditions. In contrast to most triclustering algorithms that only focus on similarities between experimental conditions, OPTricluster considers the similarities and differences between them. In this study, OPTricluster was implemented with several scenarios in gene expression data of yellow fever patients after vaccination. The lowest average Tricluster Diffusion (TD) score indicates the scenario with the best triclustering result. For this case, we found that the scenario with threshold of 1.6 is the scenario that produced triclusters with better quality (lowest average TD score) than the other scenarios. These triclusters represent gene expression profiles that show the biological relationship among those patients, including anomalies found in patients.

Keywords— 3D Gene expression data; Order preserving; Short time series; Triclustering; Tricluster diffusion

Analysis of Deep Feature Extraction for Colorectal Cancer Detection

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Abstract— Colorectal cancer is the third most common cancer worldwide. Detection of colon cancer is an essential task for the histopathologist as they have to analyze the morphology of the images at different magnifications. In this study, we classified benign and adenocarcinoma using 10000 images of benign colon tissue. We proposed a feature extraction method by the deep convolutional neural network. First, we learn the features of data from ResNet-50 and DenseNet-121. Then, we conduct colon cancer classification by popular classifiers such as SVM, Random Forest, K-Nearest Neighbor, and XGBoost. We evaluated our models on two kinds of testing data (25% and 15% of the whole dataset). In this research, the data was conducted on the Kaggle colon tissue dataset. The experimental results show that the deep feature extraction based on DenseNet-121 architecture leads to higher accuracy, sensitivity, and specificity than ResNet-50 architecture for all classifiers. DenseNet-121 gets about 98.53% and 98.63% with KNN classifier for accuracy and sensitivity, respectively.

Keywords—Colon cancer, Convolutional Neural Network, ResNet, DenseNet, Deep Feature Extraction

Classification of Headache Disorder Using Random Forest Algorithm

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Abstract— Internet technology led to the emergence of Web 2.0 which increase the number of User Generated Content (UGC) on the network. Online product review is a form of UGC. The case study in this research is a review of handphone products. The large number of reviews will take long time to read and compare between existing product reviews, so we need a technique that online product review can be read quickly without losing of its important information. The technique that can be used is the text summarizing technique. Text summarization techniques produce simplified versions of texts. In general, text summarization can be divided into two types, namely extractive and abstractive summaries. This research used extractive summaries. One important component in the process of obtaining an extractive summary is sentence extraction. In this study, the algorithm used for sentence extraction is TextRank. The purpose of this study was to determine the performance of the TextRank algorithm with handphone product reviews data by implementing it in different data conditions based on the presence or absence of a stopword and typo. These data conditions are used to formulate test scenarios. Testing is done by calculating the Rouge-1 value which compares the summary of system and experts. Expert who involved in this study are 2. Expert 1 is a person with expertise in Indonesian and Expert 2 is someone who has the knowledge and understanding of mobile phones with various types and characteristics. From the test results obtained, Expert 1 gets the best results for scenario 2 where data conditions are there is typo and no stopword with an average value of Rouge-1 of 42.29% and Expert 2 gets the best results for scenario 3 where data conditions are no typo and there is stopword with an average value of Rouge-1 is 46.71%. The results shows that the TextRank algorithm is not able to produce a good summary for handphone product review dataset.

Continuance Intention to Use (CIU) on Technology Acceptance Model (TAM) for m-payment (case study: TIX ID)

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Abstract— Purchasing and paying using electronic gadget is become common among youngster. For instances such as purchasing movie ticket using a mobile phone. Therefore, this study aims to seek factors that affect the continuance intention to use (CIU) m-payment on Technology Acceptance Model (TAM). This study selected a study of TIX ID that become popular among youngster to buy movie ticket. This study distributed questionnaire and have been responded by 359 respondents. The results show that factors that influenced the Continuance Intention to Use for m-payment (on TIX ID) is Ease of Use (EOU), Usefulness and Subjective Norm. Therefore, it can be concluded that EOU, usefulness of the system and subjective norm is influenced the continuance intention to use (CIU) the application of m-payment.

Keywords— m-payment, continuance intention to use, technology acceptance model

Designing Diabetes Mellitus Detection System Based on Iridology with Convolutional Neural Network Modeling

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Abstract— Today, almost every nation strives to incorporate city governance with the idea of smart cities. Several previous studies have developed various models to assess the efficiency of ISS. During the past, numerous studies evaluated the quality of service and experience of smart city applications. But very few research also explores the Smart District model's performance of services, which differs substantially from the general concept of a smart city. This study aims to examine the quality of service through the usage of the region or district with mobile devices. The model and approach used is the Hien's Framework, a development framework of the Technology Acceptance Model and the Delone McLean IS Success Model to measure the quality of information system services. The online survey form, data processing using AMOS 24.0 software, was used to collect data from two hundred and seventeen interviewees. The research findings show that the variables introduced by the Hien Framework have a significant and positive impact on the quality assessment of smart district services. This work helps to explain the performance model of a smart district information system based on mobile devices. This research recommends that local governments and politicians take better concern for critical problems affecting the quality of mobile services.

A Comparison of YOLO and Mask R-CNN for Segmenting Head and Tail of Fish

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Abstract— The visual appearance of the fish's head and tail can be used to identify its freshness. A segmentation method that can well isolate those certain parts from a fish body is required for further analysis in a system for detecting fish freshness automatically. In this research, we investigated the performance of two CNN-based segmentation methods, namely YOLO and Mask R-CNN, for separating the head and tail of fish. We retrained the YOLO and Mask R-CNN pre-trained models on the Fish-gres dataset consisting of images with high variability in the background, illumination, and overlapping objects. The experiment on 200 images containing 724 heads and 585 tails annotated manually indicated that both models work optimally. YOLO's performance was slightly better than Mask R-CNN, shown by 98.96% and 96.73% precision, and 80.93% and 75.43% recall, respectively. The experimental result also revealed that YOLO outperforms Mask R-CNN with mAP of 80.12% and 73.39%, respectively.

Keywords— segmentation, object detection, YOLO, Mask RCNN, fish freshness, head and tail of fish

Meta-analytical considerations for gamification in higher education: existing approaches and future research agenda

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Abstract— Currently, nearly all countries try to combine city government and a smart city idea. A few previous studies have developed different ISS efficiency modeling techniques. Many studies have previously analyzed the quality of service and experience of smart - city applications. However, very few studies have studied the Smart District model efficiency of the organization, which is significantly different from a smart city's general definition. The objective of this study is to verify the level of service by using mobile devices in areas or districts. The TOE frame is the model and methodology used to define service adoption of the information system, which combines aspects of technology, organization, and a supportive environment. To collect data from a hundred ninety-two stakeholders, the online survey method, which is the data processing by AMOS 24.0 software. The findings of this research confirm that there is a significant and constructive impact on quality assessment of smart district services on the dimensions adopted by the TOE Framework. This paper explains the performance model of a smart, mobile-based district information system. This study recommends that local authorities and governments focus more on critical issues affecting the quality of cellular services

Balinese Carving Recognition using Pre-Trained Convolutional Neural Network

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Abstract— The preservation of Balinese carvings in traditional buildings is needed to preserve by collecting Balinese carving data. Balinese carving data collection is an attempt to save important patterns in Balinese carvings to become a reference for repair Balinese carvings that are beginning to erode by age. Balinese carving recognition is the first step to preserve cultural heritage by collecting Balinese carving motifs on traditional sacred buildings. In this study, we compare the performance of Convolutional Neural Network pre-trained models for Balinese carving recognition. We use transfer learning using four pre-trained models, i.e., MobileNet, Inception-v3, VGG16, and VGG19, to train the recognition model. In the model training process, we fine-tuned the number of parameters trained on each pre-trained model to produce the best performing model. Based on eight experimental scenarios, the VGG19 can produce the best performance with a recognition accuracy of 87.50%.

Keywords— Balinese Carving; Convolutional Neural Network; Fine Tuning; Pre-Trained Model

Mining Biological Information from 3D Medulloblastoma Cancerous Gene Expression Data Using TimesVector Triclustering Method

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Abstract— Triclustering analysis is the development of clustering analysis and biclustering analysis. The purpose of triclustering study is to group three-dimensional data simultaneously. The three-dimensional data can be in the form of observations, attributes, and context. One of the approaches used in tricluster analysis, namely an approach based on sample patterns, is the TimesVector method. The TimesVector method aims to group data matrices that show the same or different patterns in three-dimensional data. The TimesVector method has a work step that starts with reducing the three-dimensional data matrix to a two-dimensional data matrix to minimize complexity in the grouping. In this method, the Spherical Kmeans algorithm will be used in cluster it. The next step is to identify the pattern of the groups generated in the Spherical Kmeans. The pattern referred to consists of three types, namely DEP (Differentiated Patterns), ODEP (Differentiated Patterns), and SEP (Differentiated Patterns). The TimesVector method was applied on gene expression data, namely medulloblastoma cancerous data carried out in 6 scenarios. Each scenario uses the same many clusters but different threshold values. The six scenarios' results will be validated using the coverage value and the tricluster diffusion (TD) value. The application of the TimesVector method shows that using a threshold of 1.5 gives the most optimal results because it has a high coverage value and a low TD value. High-value coverage indicates the method's ability to extract data, and a low TD value suggests that the resulting tricluster has a large volume and high coherence. The best tricluster results can be used by medical experts to perform further actions on medulloblastoma cancerous patients.

Keywords— Gene expression data; Pattern-based; TimesVector; Triclustering

An Improved Method of Graph Edit Distance for Business Process Model Similarity Measurement

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Abstract— Graph Edit Distance (GED) is widely used in measuring the similarity of the business process model. The GED method is based on a Process Graph abstraction that represents a business process model in graph notation. There are difficulties in representing the gateway semantics in the process graph. One approach is to ignore the gateway, but this method causes the measurement of similarity between process models to be less accurate. The second approach takes into account the gateways as nodes. This approach causes the required edit distance to be too high and can also have an impact on the incorrect similarity measurement. A third approach to calculating the gateway is to represent the semantics of the gateway as an attribute for the edges. However, no method has been proposed that is accurate in adopting the latter approach to GED. To answer the problem, this paper proposes three contributions. The first is the modification of the graphical representation of the business process model by adding together the relation types (sequence, XOR_split, XOR_join, AND_split, AND_join, OR_split, OR_join) and weight (based on execution probability) as an edge attributes. The second contribution proposes a novel formula for assigning the weight. The third contribution is to propose GED modification, namely the enhanced Graph Edit Distance (eGED). Comparisons were made to the state of the art methods, namely GED_Dijkman and GED_Montani, resulting in GED_Dijkman unable to detect gateways and GED_Montani was able to detect them but could not distinguish between XOR, AND, and OR, while our proposed method, eGED, succeeds in recognizing and differentiate XOR, AND, and OR gateways based on their probability execution semantics. Thus, eGED is superior to be used in measuring the similarity of graph-based business process models.

Keywords—Business Process Model; Graph Edit Distance; Similarity

Uncertainty Avoidance and Individualism/Collectivism on Acceptance of Smart City Mobile Applications

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Abstract— The issue of e-government development and the concept of the smart city as an answer the government service challenges have emerged before. Cellular communication technology, communication networks, are developing rapidly and provide opportunities to play a role in the development of government areas. The emergence of smart city mobile applications can play a role in solving the challenges of shortening time, cutting distances, and disclosure of information. A technology acceptance survey has been carried out combined with cultural moderators. The survey data in Yogyakarta, Indonesia, is processed using Smart PLS 3.2 with Sequential Equation Modeling. It is unique to be discussed because the p-values of Uncertainty Avoidance (UC) 0,013 which means this is most significant, but Individual/Collectivism (IC) is more than 0.05, which means IC is not significant, it does not moderate the behavior of users of this technology. In this paper, we describe the findings of IC research that do not moderate behavioral intentions. One of our findings is that users use this application due to government service needs, so aspects of individualism and collectivism have no significant effect. We review other findings in the IC moderator in-depth about why they do not affect.

Keywords—individualism, collectivism, smart city, mobile applications, acceptance

The Comparison of Feature Selection Methods in Software Defect Prediction

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Abstract— Triclustering analysis is the development of clustering analysis and biclustering analysis. The purpose of triclustering study is to group three-dimensional data simultaneously. The three-dimensional data can be in the form of observations, attributes, and context. One of the approaches used in tricluster analysis, namely an approach based on sample patterns, is the TimesVector method. The TimesVector method aims to group data matrices that show the same or different patterns in three-dimensional data. The TimesVector method has a work step that starts with reducing the three-dimensional data matrix to a two-dimensional data matrix to minimize complexity in the grouping. In this method, the Spherical K-means algorithm will be used in cluster it. The next step is to identify the pattern of the groups generated in the Spherical K-means. The pattern referred to consists of three types, namely DEP (Differentiated Patterns), ODEP (Differentiated Patterns), and SEP (Differentiated Patterns). The TimesVector method was applied on gene expression data, namely medulloblastoma cancerous data carried out in 6 scenarios. Each scenario uses the same many clusters but different threshold values. The six scenarios' results will be validated using the coverage value and the tricluster diffusion (TD) value. The application of the TimesVector method shows that using a threshold of 1.5 gives the most optimal results because it has a high coverage value and a low TD value. High-value coverage indicates the method's ability to extract data, and a low TD value suggests that the resulting tricluster has a large volume and high coherence. The best tricluster results can be used by medical experts to perform further actions on medulloblastoma cancerous patients.

Improving the Quality of Learning Management System (LMS) based on Student Perspectives Using UTAUT2 and Trust Model

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Abstract— Triclustering is the expansion of clustering and biclustering methods that works on three-dimensional (3D) data. This method is generally implemented in the analysis of 3D gene expression data to find gene expression profiles. This data consists of three dimensions: genes, experimental conditions, and time points. Triclustering can group these dimensions simultaneously and form a 3D cluster called a tricluster. Order Preserving Triclustering (OPTricluster) is a triclustering algorithm that uses a pattern-based approach and is used to analyze short time-series data (3-8 time points). The OPTricluster forms the tricluster by identifying genes with the same pattern of change in expression across time points under several experimental conditions. In contrast to most triclustering algorithms that only focus on similarities between experimental conditions, OPTricluster considers the similarities and differences between them. In this study, OPTricluster was implemented with several scenarios in gene expression data of yellow fever patients after vaccination. The lowest average Tricluster Diffusion score indicates the scenario with the best triclustering result. These triclusters represent gene expression profiles that show the biological relationship among those patients, including anomalies found in patients.

Performance Evaluation XGBoost in Handling Missing Value on Classification of Hepatocellular Carcinoma Gene Expression Data

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Abstract— Missing values are a condition where there is no value in the observation, which results in loss of information. One of the steps in dealing with missing values is by deleting observations that have missing values. Still, for data that has small missing values, it can reduce important information from the data. This study analyzed the performance evaluation of the XGBoost method in dealing with missing values for classification problems in Hepatocellular Carcinoma gene expression data. This study used Hepatocellular Carcinoma gene expression data with 40 observations and 54675 features obtained from the National Center for Biotechnology Information website. The researchers randomly eliminated 5%, 10%, 15%, and 20% of the total data to compare the model's performance evaluation with the imputation method and without using Imputation. The imputation method used is the mean and k-nearest neighbor method. Measurement of model performance using cross-validation and confusion matrix evaluation procedures. In finding the best parameter, tuning hyperparameter using grid search. In general, the handling of missing values with the mean's Imputation is better in performance evaluation than the handling of missing values with the KNN imputation and without the imputation process for classifying Hepatocellular Carcinoma gene expression data. From the results of the above research, the value of missing 20% using the mean imputation method produces the highest evaluation performance value with 100% specificity, 100% sensitivity, 100% accuracy, 100% precision, and 100% MCC in training and testing data, and sensitivity 88%, 100% specificity, 100% precision, 94% accuracy, and 89% MCC. The XGBoost Machine learning model can handle missing values in a dataset without Imputation, but with the imputation method can improve performance evaluation on classification Hepatocellular Carcinoma Gene Expression Data.

Keywords— cross-validation, grid search, KNN imputation mean imputation, XGBoost

SMARIoT: Augmented Reality for Monitoring System of Internet of Things using EasyAR

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Abstract— Garbage is one of the biggest problems in Indonesia, even most of country in the world. The amount of garbage increases every year, therefore a reliable garbage management system is needed to prevent the contamination of garbage on environment. Garbage sorting (based on its material) is an important part of garbage management system. Since the amount of garbage is really high, a fast and accurate garbage sorting process is needed to improve the overall garbage management system. One of the most important tasks in garbage sorting process is garbage image segmentation. This research proposes garbage image segmentation process by using Pyramid Scene Parsing Network (PSPNet) and three binary images from the combination of thresholding algorithms as the input for the network. Then it is compared with PSPNet that uses a RGB image as an input. The results show that when using PSPNet, RGB image is better than the image from combination of thresholding algorithms as an input for PSPNet with the maximum F1 Score is up to 98%. However, the results of this comparison are competitive where the difference of F1 score between the proposed method and PSPNet with RGB image is less than 0.02.

Implementation of Textrank Algorithm in Product Review Summarization

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Abstract— Internet technology led to the emergence of Web 2.0 which increase the number of User Generated Content (UGC) on the network. Online product review is a form of UGC. The case study in this research is a review of handphone products. The large number of reviews will take long time to read and compare between existing product reviews, so we need a technique that online product review can be read quickly without losing of its important information. The technique that can be used is the text summarizing technique. Text summarization techniques produce simplified versions of texts. In general, text summarization can be divided into two types, namely extractive and abstractive summaries. This research used extractive summaries. One important component in the process of obtaining an extractive summary is sentence extraction. In this study, the algorithm used for sentence extraction is TextRank. The purpose of this study was to determine the performance of the TextRank algorithm with handphone product reviews data by implementing it in different data conditions based on the presence or absence of a stopword and typo. These data conditions are used to formulate test scenarios. Testing is done by calculating the Rouge-1 value which compares the summary of system and experts. Expert who involved in this study are 2. Expert 1 is a person with expertise in Indonesian and Expert 2 is someone who has the knowledge and understanding of mobile phones with various types and characteristics. From the test results obtained, Expert 1 gets the best results for scenario 2 where data conditions are there is typo and no stopword with an average value of Rouge-1 of 42.29% and Expert 2 gets the best results for scenario 3 where data conditions are no typo and there is stopword with an average value of Rouge-1 is 46.71%. The results shows that the TextRank algorithm is not able to produce a good summary for handphone product review dataset.

Keywords — product review summarization; TextRank, extractive summary

Transfer Learning on Balinese Character Recognition of Lontar Manuscript Using MobileNet

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Abstract— The Balinese *lontar* manuscripts are cultural heritage written using Balinese characters on dried palm leaves. The conservation of the *lontar* manuscript is carried out by understanding the meaning contained in it. This research is the first step in the conservation of the *lontar* manuscript by recognizing Balinese characters. In this study, we recognized Balinese characters on *lontar* using a transfer learning approach. Transfer learning is done by fine-tuning the number of parameters of the pre-trained model to speed up the model convergence by modifying the number of trainable parameters on the pre-trained model. We modified the number of MobileNet architecture parameters with varying the number of trainable parameters and three optimizers to produce the best performance model. Based on the experimental result, the best recognition model yields 86.23% accuracy with a combination of SGD optimizer and 60% trainable parameters.

Keywords— Balinese Character, Lontar Manuscript, MobileNet, Optimizers, Transfer Learning.

Classical Machine Learning Classification for Javanese Traditional Food Image

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Abstract— The issue of e-government development and the concept of the smart city as an answer the government service challenges have emerged before. Cellular communication technology, communication networks, are developing rapidly and provide opportunities to play a role in the development of government areas. The emergence of smart city mobile applications can play a role in solving the challenges of shortening time, cutting distances, and disclosure of information. A technology acceptance survey has been carried out combined with cultural moderators. The survey data in Yogyakarta, Indonesia, is processed using Smart PLS 3.2 with Sequential Equation Modeling. It is unique to be discussed because the p-values of Uncertainty Avoidance (UC) 0,013 which means this is most significant, but Individual/Collectivism (IC) is more than 0.05, which means IC is not significant, it does not moderate the behavior of users of this technology. In this paper, we describe the findings of IC research that do not moderate behavioral intentions. One of our findings is that users use this application due to government service needs, so aspects of individualism and collectivism have no significant effect. We review other findings in the IC moderator in-depth about why they do not affect.

Factors Influencing Student's Adoption of E-Learning in Indonesian Secondary Schools

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Abstract—E-learning is one type of educational service created to facilitate the learning process for all groups. They can do teaching and learning activities only through the smartphone or laptop/ computer they have. The acceptance of this technology is analyzed through suitability between e-learning technology and current technology, and satisfaction of users' e-learning. To examine correlation between latent variables or variable indicator, this study uses Partial Least Square (PLS) as a conceptual test equipment. This study uses the integration model of the unified of acceptance and usage of technology 2 (UTAUT 2) and expectation confirmation model (ECM). The results showed that students were less interested in digital learning. The results showed that electronic devices such as computers, laptops, yet stole great interest from Indonesian students to support their learning process. A high e-learning cost is also a factor that reduces students' interest in continuing to use e-learning. The use of appropriate media and equitable distribution of internet use play an important role in the adoption of e-learning systems among students. The factors that exist in the two models used in this study are considered important in explaining the adoption of e-learning technology, but as far as the author's knowledge there has been no research that integrates the two models to explain technological adaptation to e-learning. Therefore, this study will contribute to the literature on technology adoption for e-learning by integrating the factors of both models and testing models in developing country contexts exemplified in this study by Indonesia.

Keywords— e-learning, UTAUT 2, ECM, technology acceptance

Success Factor Affecting M-Learning Implementation: Perspective of Students

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Abstract— M-learning is one of the educational services designed to facilitate learning processes. This article analyzed successful acceptance of m-learning technology to find out the factors affecting the success of m-learning application among students in Indonesia. This research proposed a model which integrated the Technology Acceptance Model (TAM) and IS Success Model. This study was carried out in one month, starting from June 21 to July 18, 2020. The data were collected from 152 respondents. The relationship between variables and their indicators can be determined using Partial Least Square - Structural Equation Modeling (PLS-SEM). The results showed that the variables of education quality and service quality in IS Success Model had significant positive effect on user satisfaction of using m-learning. Besides, perceived usefulness variable in the TAM had significant positive effect on the intention to use of m-learning. On the other hand, perceived ease of use variable in the TAM model did not have significant effect on the intention to use variable. Meanwhile, both user satisfaction and intention to use variables had significant positive effect on learning effectiveness of m-learning users.

Keywords—m-learning, TAM, IS Success Model, PLS-SEM

Xception Architecture Transfer Learning for Garbage Classification

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Abstract— Solid waste management issue is main problem especially in developing countries, including Indonesia. Several efforts are made to solve waste management problem. Indonesia government has launched movement to sort different type of garbage on September 2019. Automatic garbage sortation is able to help this program. In order to be able to perform this task, the computer needs to differentiate each type of garbage. This process can be done by using machine learning method to differentiate garbage type. In this research, Transfer learning is used to perform classification task on TrashNet dataset. The models used in this research are ImageNet pretrained VGG16, ResNet-50 and Xception. The experiment result shows that Xception model is able to achieve highest accuracy of 88%, average precision of 84%, and average recall of 84%

Keywords—waste, garbage, transfer learning, Xception, ResNet

Design of Convolutional Neural Network Modeling for Low-Density Lipoprotein (LDL) Levels Measurement Based on Iridology

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Abstract— Cholesterol is a waxy substance that contains fat required to produce hormones and other substances in the body. The excessive cholesterol in the blood vessel can be mixed with other substances and called Low-Density Lipoprotein (LDL). LDL can clog the blood vessel and caused heart disease and stroke. Measuring LDL levels is generally done by taking blood samples (invasive) with the lipid profile test method. This research focused on developing a non-invasive detection system for LDL levels status prediction based on eye image using Convolutional Neural Network (CNN) as a classification model. One indicator of excess LDL levels is a greyish-white ring that surrounds the iris called the corneal arcus. The image processing used the Circular Hough Transform (CHT) algorithm for the localization process and Rubber-Sheet Normalization to normalize the iris region. This LDL level status prediction system used CNN as a classification model with 5-fold cross-validation results in an accuracy of 97.14%.

Keywords—Cholesterol, Low-Density Lipoprotein, Iridology, Corneal arcus, Convolutional neural network

The Performance of Face Recognition Using the Combination of Viola-Jones, Local Binary Pattern Histogram and Euclidean Distance

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Abstract— Achieving low recognition time and high accuracy in real-time face recognition is challenging. This study implements Viola-Jones, Local Binary Pattern Histogram, and Euclidean Distance for realtime face recognition and calculates the face detection time. The face image is detected using the Viola-Jones method; its features are extracted using the Local Binary Pattern Histogram, and the face is recognized using Euclidean Distance. This study processes sample images from 1013 students as training data, with 20 images represent each student. The experiments show that 268 of 342 testing data are recognized correctly, resulting in an accuracy of 78.4%, with average realtime recognition time of 0.93 seconds.

Keywords— Face Detection, Viola-Jones, Face Recognition, Local Binary Pattern Histogram, Euclidean Distance.

Development of The Smart Chicken Eggs Incubator Based on Internet of Things Using The Object Oriented Analysis and Design Method

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Abstract— Ethnicity is one of identity every human has and can be used to categorize individuals in populations or large groups. We presented an Indonesian ethnicity recognition based on facial images using Uniform Local Binary Pattern (ULBP) and Color Histogram as a feature extraction method. We used the five largest ethnic groups in Indonesia, namely Sundanese, Javanese, Banjar, Buginese, and Malay. In the experiment, we used Random Forest as a classification method. The research obtained a performance accuracy of 98.25% using 2290 facial images.

Voice Controlled Wheelchair for Disabled Patients Based on CNN & LSTM

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Abstract—Disabled patients with reduced mobility due to health problems such as disability, injury, paralysis, or other factors will experience difficulty in movement. They need tools that can help them, in which the most widely used is a wheelchair. The main objective of this research is to control wheelchair motion with voice commands. There are five commands for wheelchair control: forward, backward, right, left, and stop. Voice data is obtained from recording several subjects using Sound Recorder Pro and Sox Sound Exchange. The voice commands for wheelchair navigation were identified using Convolutional Neural Network (CNN) and Long ShortTerm Memory (LSTM) combination embedded in Raspberry Pi 3. Voice data is first converted to spectrogram images before being fed into CNN using Mel-Frequency Cepstrum Coefficients (MFCC). This system can be controlled by simple voice commands given by the user. This method is proven to be useful in speech recognition with an accuracy level using CNN-LSTM above 97.80 %. Preliminary experimental results indicate that voice commands in wheelchairs using the CNN-LSTM can be recognized well.

Keywords—disability, wheelchair, MFCC, CNN, LSTM

Indonesian Ethnicity Recognition Based on Face Image Using Uniform Local Binary Pattern (ULBP) and Color Histogram

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Abstract—Ethnicity is one of identity every human has and can be used to categorize individuals in populations or large groups. We presented an Indonesian ethnicity recognition based on facial images using Uniform Local Binary Pattern (ULBP) and Color Histogram as a feature extraction method. We used the five largest ethnic groups in Indonesia, namely Sundanese, Javanese, Banjar, Buginese, and Malay. In the experiment, we used Random Forest as a classification method. The research obtained a performance accuracy of 98.25% using 2290 facial images.

Keywords— Ethnic, Uniform Local Binary Pattern (ULBP), Color Histogram. Random Forest

Waste Image Segmentation Using Convolutional Neural Network Encoder-Decoder with SegNet Architecture

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Abstract—Waste problem has become a national problem and a great concern. Waste can cause negative impacts on the human health and environment if it is not properly managed. Various strategies have been made to reduce the amount of waste generation. One of them is waste recycling. The sorting process in waste recycling is usually done manually by handpicking. Therefore, a system that can recognize waste automatically is needed so that the waste sorting process can be done more quickly and accurately. One of the important steps in waste recognition is waste object image segmentation. This reserach proposes image segmentation of waste objects using Convolutional Neural Network Encoder-Decoder SegNet architecture. We compare the SegNet architecture which has different number of filters in each convolution layer, and the SegNet architecture which has the same number of filters in each convolution layer. The segmentation process has been tested using the TrashNet, benchmark public dataset of waste images. The results show that the SegNet architecture with a different number of filters in each convolution layer is able to achieve higher intersection over union (IoU) value, which is 82.95%.

Keywords—Convolutional Neural Network, Encoder-Decoder, SegNet, waste, image segmentation

The Outlierness Degree of Spatial Observations in the Presence of Spatial Outliers, Simulation Study using Average Difference Algorithm

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Abstract—Attribute values are the main elements in calculating degree of outlierness of spatial objects. The problem arises when the spatial outliers with extreme values are the nearest neighbors of a central object. In this study, several scenarios are simulated to verify the effect of spatial outliers' extreme values to the degree of outlierness of its nearest neighbors, based on Average Difference Algorithm. The results confirmed the effect can lead to falsely detected spatial outliers. The algorithm detect the true spatial outliers correctly if their values are three sigma away from the mean attribute values of its nearest neighbors.

Keywords—spatial outliers, Average Difference algorithm, economic growth

Usability Testing of Multifinance Mobile Application for End-Customer Case Study: PT. XYZ

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Abstract— Population growth in Indonesia must be accompanied by an increased level of public consumption. With the high level of public consumption, people also need facilities to meet their lifestyle, one of which is vehicle financing or credit facility. One company that can provide this facility is PT. XYZ. To facilitate customers in knowing information related to services provided, PT. XYZ has a mobile application that contains credit simulations, credit application information, etc. In order to ensure that the application is usable for end user, this study conducted usability testing on PT.XYZ mobile application. There are three aspects evaluated in usability testing, that is effectiveness, efficiency, and satisfaction. The first two aspects are measured by Performance-based evaluation, while the third aspect is measured by Questionnaire-based assesment. Usability testing results in this study acquired an application effectiveness score of 95% and efficiency score of 81.51%. It was also acquired that the satisfaction score was 6.28 on a likert scale of 7 so we can say that respondent satisfied when using PT. XYZ mobile application.

Prediction of Hotel Booking Cancellation using CRISP-DM

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Abstract— Online travel sales continue to increase every year. Recorded in 2019, digital transactions related to online travel reached USD 755.4 billion. One of the supports of the travel business is the tourism and hospitality industry. The online reservation system is one of the most attractive solutions in the hospitality industry. Cancellation of hotel bookings or reservations through the online system is currently one of the problems in the hotel management system. When the reservation has been canceled, the hotel will be harmed. Therefore, predicting whether a booking will be canceled or not using the help of data science is needed so that the hotel can minimize lost profits. Therefore, by using datasets related to hotel booking requests, a predictive analysis using the CRISP-DM framework is conducted. By first performing some data preparation processes, this study uses a tree-based algorithm to perform the prediction. The experiment produced that Random Forest model has the best value with an accuracy value of 0.866 and it is found that the time difference between booking is made and arrival time is the most influential feature in predicting the level of cancellation.

Keywords— gamification; game mechanics; AHP; TOPSIS; uses and gratification



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