

## **Welcome to the 1st ICOIACT 2018**

The emergence of Intelligent Systems Technology as a ubiquitous platform for innovations has laid the foundation for the rapid growth of the Information in the future innovation. The purpose of the 1st ICOIACT 2018 is to promote discussion and interaction among academics, researchers, and professionals in the field of information and technologies. In this conference, the author types that we got came from a student, academia, and government. We deeply thank the authors for their participation and high contribution in this conference.

The theme of The 1st ICOIACT 2018 "Opportunities and Challenges on Intelligent Systems Future Innovation"

The 1st ICOIACT 2018 (ICOIACT 2018) held on 6-7 March 2018 in Grand Zuri, Yogyakarta, Indonesia.

This conference provides an international forum for the presentation and showcase of recent advances on various aspects of ubiquitous technology. It will reflect the state-of-the-art of the methods, involving theory, algorithm, numerical simulation, error and uncertainty analysis and/or novel application of new processing techniques in engineering, science, and other disciplines related to ubiquitous computing. In this conference, several topics on the specific themes for intensive discussions are also planned according to the areas of interest.

We would like to extend our gratitude to the Technical Program Committee that has been reviewed the papers and conducted very interesting conference program as well as the invited and plenary speakers.

Finally, we would like to thank the steering committee members, the conference chairman, the organizing committee, the IEEE Student Branch of Universitas Amikom Yogyakarta, and the financial support from the conference sponsors that conducted the success of The 1st ICOIACT 2018.

The Editor of The 1st ICOIACT 2018

Ferry Wahyu Wibowo (Universitas Amikom Yogyakarta)

## Technical Program Committee

Intan Ermahani A. Jalil	Universiti Teknikal Malaysia	Malaysia
Mohd. Fadlee A. Rasid	Universiti Putra Malaysia	Malaysia
Farhan Aadil	COMSATS Institute of Information Technology	Pakistan
Mohd Helmy Abd Wahab	Universiti Tun Hussein Onn Malaysia	Malaysia
Roslina Abdul Hamid	Universiti Malaysia Pahang	Malaysia
Rohani Abu Bakar	Universiti Malaysia Pahang	Malaysia
Tapodhir Acharjee	Assam University, Silchar	India
Sumarni Adi	University of Amikom Yogyakarta	Indonesia
Jitendra Agrawal	Rajiv Gandhi Proudयोगiki Vishwavidyalaya, Bhopal	India
David Agustriawan	Asia University	Taiwan
Mohd Khairul Ikhwan Ahmad	Universiti Tun Hussein Onn Malaysia	Malaysia
Kaveh Ahmadi	University of Toledo	USA
Mansoor Ahmed	COMSATS Institute of Information Technology	Pakistan
Md Ahmed	Universiti Malaysia Pahang	Malaysia
Michele Albano	CISTER/INESC-TEC, ISEP, Polytechnic Institute of Porto	Portugal
Baba Alhaji	Nigerian Defence Academy	Niger
Shajith Ali	SSN College of Engineering, Chennai	India
AbdulRahman Alsewari	Universiti Malaysia Pahang	Malaysia
Anas Alsobeh	Yarmouk University	Jordan
Dhani Ariatmanto	Universitas Amikom Yogyakarta	Indonesia
Takuya Asaka	Tokyo Metropolitan University	Japan
Koichi Asatani	Nankai University	Japan
Ahmad Ashari	Gadjah Mada University	Indonesia
Media Ayu	Sampoerna University	Indonesia
Azizul Azizan	Universiti Teknologi Malaysia (UTM)	Malaysia
Azreen Azman	Universiti Putra Malaysia	Malaysia
Mohamad Badra	Zayed University	United Arab Emirates
Aslina Baharum	Universiti Malaysia Sabah	Malaysia
Vinayak Bairagi	University of Pune	India
I Putu Agung Bayupati	Udayana University	Indonesia
Robert Biuk-Aghai	University of Macau	Macao
Rajendra Boppana	University of Texas at San Antonio	USA
Indra Budi	Computer Science	Indonesia
Bin Cao	Harbin Institute of Technology Shenzhen Graduate School	P.R. China
Alessandro Carrega	CNIT	Italy
Maria Chiara Caschera	CNR	Italy
Mu-Song Chen	Electrical Engineering, Da-Yeh University	Taiwan
Tai-Chen Chen	MAXEDA Technology	Taiwan
Thomas Chen	City University London	United Kingdom (Great Britain)
Uei-Ren Chen	Hsiuping University of Science and Technology	Taiwan
Wichian Chutimaskul	King Mongkut's University of Technology Thonburi	Thailand
Domenico Ciunzo	Network Measurement and Monitoring (NM2), Naples, IT	Italy
Senthilkumar CP	Auburn University	USA
Akhmad Dahlan	Universitas Amikom Yogyakarta	Indonesia
Frista Damayanti	Universitas Amikom Yogyakarta	Indonesia
Andreas Dewald	ERNW Research GmbH	Germany
Ahmed Douik	California Institute of Technology	USA

Alban Duverdier	Centre National D'Etudes Spatiales (CNES)	France
Mohamed Elwekeil	Faculty of Electronic Engineering, Menoufia University	Egypt
Ferda Ernawan	Universiti Malaysia Pahang	Malaysia
Noriko Etani	Peach Aviation Limited	Japan
Ahmad Fajar	Bina Nusantara University	Indonesia
Rodrigo Falcão	Technische Universität Kaiserslautern	Germany
Gianluigi Ferrari	University of Parma	Italy
Dhomas Hatta Fudholi	Universitas Islam Indonesia	Indonesia
Alireza Ghasempour	University of Applied Science and Technology	Iran
Razvan Andrei Gheorghiu	Politehnica University of Bucharest	Romania
Javier Gozálvez	Universidad Miguel Hernandez de Elche	Spain
Rostam Affendi Hamzah	Universiti Teknikal Malaysia Melaka	Malaysia
Byeong-jun Han	Korea University	Korea
Sihui Han	University of Michigan	USA
Seng Hansun	Universitas Multimedia Nusantara	Indonesia
Manik Hapsara	University of New South Wales at ADFA	Australia
K Haribabu	BITS Pilani	India
Iswadi Hasyim Rosma	Universitas Riau	Indonesia
Su-Cheng Haw	MMU	Malaysia
Gamantyo Hendrantoro	Institut Teknologi Sepuluh Nopember	Indonesia
Roberto Carlos Herrera Lara	National Polytechnic School	Ecuador
Tonny Hidayat	Universitas AMIKOM Yogyakarta	Indonesia
Danial Hooshyar	Korea University	Korea
Liang Huang	Zhejiang University of Technology	P.R. China
Nurul Izzatty Ismail	Universiti Tun Hussein Onn Malaysia (UTHM)	Malaysia
Nurulisma Ismail	Universiti Malaysia Perlis	Malaysia
Ramkumar Jaganathan	VLB Janakiammal College of Arts and Science	India
Arihant Jain	Jaipur Engineering College & Research Centre	India
Muhammad Herman Jamaluddin	Universiti Teknikal Malaysia Melaka	Malaysia
Arun Jana	Centre for Development Advanced Computing	India
Biao Jiang	The City University of New York	USA
Hasan Kahtan	Universiti Malaysia Pahang	Malaysia
Ritesh Kalle	HITACHI	India
Hiroshi Kamabe	Gifu University	Japan
Sokratis Katsikas	Norwegian University of Science and Technology	Norway
Mohammad Khalily Dermany	Islamic Azad University, Khomein Branch	Iran
Zaheer Khan	Lecturer, Khana-E-Noor University	Afghanistan
Hasan Ali Khattak	COMSATS Institute of Information Technology	Pakistan
Praveen Khethavath	LaGuardia Community College	USA
Fukuro Koshiji	Tokyo Polytechnic University	Japan
Dimitrios Koukopoulos	University of Patras	Greece
Krisnawati Krisnawati	STMIK AMIKOM Yogyakarta	Indonesia
Rakesh Kumar	National Institute of Technical Teachers Training & Research	India
Kusnawi Kusnawi	AMIKOM University	Indonesia
Kusrini Kusrini	AMIKOM Yogyakarta University	Indonesia
Tubagus Maulana Kusuma	Gunadarma University	Indonesia
Armin Lawi	Hasanuddin University	Indonesia
Wen Chek Leong	University of Malaya	Malaysia
Suryadiputra Liawatimena	Bina Nusantara University	Indonesia
Linawati Linawati	Universitas Udayana	Indonesia
Josip Lorincz	University of Split	Croatia

Pavel Loskot	Swansea University	United Kingdom (Great Britain)
Emha Taufiq Luthfi	Universitas AMIKOM Yogyakarta	Indonesia
Yosi Madsu	Widyatama University	Indonesia
Mahdin Mahboob	Stony Brook University	USA
Murni Mahmud	International Islamic University Malaysia	Malaysia
Ali Maqousi	University of Petra	Jordan
M Marimin	Bogor Agricultural University	Indonesia
Prita Dewi Mariyam	Universitas Indonesia	Indonesia
David Martin Gomez	Carlos III University of Madrid	Spain
Vitaliy Mezhujev	Universiti Malaysia Pahang	Indonesia
Miftahuddin Miftahuddin	Syiah Kuala University	Indonesia
Yoshihiro Mizoguchi	Kyushu University	Japan
Ahmed Mobashsher	The University of Queensland	Australia
Kamaludin Mohamad Yusof	Universiti Teknologi Malaysia	Malaysia
Rozlina Mohamed	Universiti Malaysia Pahang	Malaysia
Seyed Sahand Mohammadi Ziabari	Vrije University of Amsterdam	The Netherlands
Mohamed Moharam	Misr University For Science and Technolgy	Egypt
Mohd Hafiz Mohd Hassin	Universiti Malaysia Pahang	Malaysia
Mohd Hanif Mohd Ramli	Universiti Teknologi MARA	Malaysia
Mohd Nizam Mohmad Kahar	Universiti Malaysia Pahang	Malaysia
Ayan Mondal	Indian Institute of Technology, Kharagpur	India
Al-Fahim Mubarak-Ali	Universiti Malaysia Pahang	Malaysia
Amrit Mukherjee	School of Electronic Engineering	India
Syibrah Naim	Universiti Sains Malaysia	Malaysia
N Nasimuddin	Institute for Infocomm Research	Singapore
Asro Nasiri	University of Amikom Yogyakarta	Indonesia
Shah Nazir	University of Peshawar	Pakistan
Ponrudee Netisopakul	King Mongkut's Institute of Technology Ladkrabang	Thailand
Hu Ng	Multimedia University	Malaysia
Kok-Why Ng	Multimedia University	Malaysia
Md Asri Ngadi	Universiti Teknologi Malaysia	Malaysia
Ruzelita Ngadiran	Universiti Malaysia Perlis	Malaysia
Atsushi Nunome	Kyoto Institute of Technology	Japan
Nitish Ojha	Chandigarh University, Mohali, Punjab	India
Ilker Ali Ozkan	Selcuk University	Turkey
Henry Palit	Petra Christian University	Indonesia
Jae-Hyun Park	Chung-Ang University	Korea
Shahril Parumo	Universiti Teknikal Malaysia Melaka	Indonesia
Doan Perdana	Telkom University	Indonesia
Kiran Sree Pokkuluri	Shri Vishnu Engineering College for Women	India
N. Prabakaran	Madanapalle Institute of Technology and Science	India
Gede Pramudya Ananta	Universiti Teknikal Malaysia Melaka	Malaysia
Anand Prasad	NEC Corporation	Japan
T Prasannavenkatesan	Adhiyamaan College of Engineering, Hosur	India
Tri Priyambodo	Universitas Gadjah Mada	Indonesia
Reza Pulungan	Universitas Gadjah Mada	Indonesia
Mauridhi Purnomo	Institut of Technology Sepuluh Nopember	Indonesia
Nila Puspitasari	Universitas AMIKOM Yogyakarta	Indonesia
Yuansong Qiao	Athlone Institute of Technology	Ireland
Basit Qureshi	University of Bradford	United Kingdom (Great Britain)

Ali Rafiei	University of Technology Sydney	Australia
Sarni Rahim	Universiti Teknikal Malaysia Melaka	Malaysia
Hemant Kumar Rath	Tata Consultancy Services	India
Ajit Reddy	Nokia	USA
Eric Renault	Institut Mines-Telecom -- Telecom SudParis	France
Bagus Rintyarna	Sepuluh Nopember Institute of Technology	Indonesia
Simon Pietro Romano	University of Napoli Federico II	Italy
Yanti Rusmawati	Telkom University	Indonesia
Houari Sabirin	KDDI Research, Inc.	Japan
Saiyan Saiyod	Khon Kaen University	Thailand
Umi Salamah	Sebelas Maret University	Indonesia
Syantam Sarkar	Vijaya Vittala Institute of Technology	India
Riyanarto Sarno	Institut Teknologi Sepuluh Nopember	Indonesia
Mithileysh Sathiyarayanan	City, University of London	United Kingdom (Great Britain)
Dian Sawitri	UDINUS	Indonesia
Soumya Sen	University of Calcutta, Kolkata	India
Anindita Septiarini	Univeristas Mulawarman	Indonesia
Amel Serrat	USTO MB	Algeria
Wawan Setiawan	Universitas Pendidikan Indonesia	Indonesia
Arief Setyanto	Universitas AMIKOM Yogyakarta	Indonesia
Iwan Setyawan	Satya Wacana Christian University	Indonesia
Syarifah Fazlin Seyed Fadzir	Universiti Teknologi Malaysia	Malaysia
Sfenrianto Sfenrianto	Binus University	Indonesia
Aditi Sharma	MBM Engineering College Jodhpur	India
Mukul Sharma	Rajasthan Technical University	India
Vesh Raj Sharma Banjade	Intel Corporation	USA
Sanggyu Shin	Advanced Institute of Industrial Technology	Japan
Imam Shofi	Universitas Islam Negeri Syarif Hidayatullah Jakarta	Indonesia
Dhananjay Singh	Hankuk University of Foreign Studies	Korea
Heri Sismoro	Universitas Amikom Yogyakarta	Indonesia
China Sonagiri	MRIET JNTUH Hyderabad	India
Houbing Song	Embry-Riddle Aeronautical University	USA
lickho Song	Korea Advanced Institute of Science and Technology	Korea
Yi-Jen Su	Shu-Te University	Taiwan
Joey Suba	University of the Assumption	Philippines
Sudarmawan Sudarmawan	AMIKOM Yogyakarta University	Indonesia
Abba Suganda Girsang	Bina Nusantara University	Indonesia
Parman Sukarno	Telkom University	Indonesia
Andi Sunyoto	Universitas AMIKOM Yogyakarta	Indonesia
Nico Surantha	Bina Nusantara University	Indonesia
Govind Suryawanshi	University of Pune Pune	India
Aries Susanto HT	UIN Syarif Hidayatullah Jakarta	Indonesia
Suyanto Suyanto	Telkom University	Indonesia
Hironori Suzuki	Nippon Institute of Technology	Japan
Takuji Tachibana	University of Fukui	Japan
Srinivasulu Tadisetty	Kakatiya University College of Engineering and Technology	India
Hironao Takahashi	DHA Suffer University	Japan
Sushil Thale	Fr. C. Rodrigues Institute of Technology	India
Ivanna Timotius	Satya Wacana Christian University	Indonesia
Radiana Triatmadja	Universitas Gadjah Mada	Indonesia

Mihail Tyagunov	National Research University Moscow Power Engineering	Russia
Muhamad Idaham Umar Ong	Universiti Malaysia Pahang	Malaysia
Asako Uraki	Keio University	Japan
Addy Wahyudie	UAE University	United Arab Emirates
Kuncoro Wastuwibowo	Telkom Indonesia	Indonesia
Julian Webber	Osaka University	Japan
Ferry Wahyu Wibowo	Universitas AMIKOM Yogyakarta	Indonesia
Oki Wicaksono	Universitas Gadjah Mada	Indonesia
Dedy Wijaya	Telkom University	Indonesia
JingAn Xue	Tsinghua University	P.R. China
Warusia Yassin	Universiti Teknikal Malaysia Melaka	Malaysia
Mehmet Akif Yazici	Istanbul Technical University	Turkey
Thaweesak Yingthawornsuk	King Mongkut's University of Technology Thonburi	Thailand
Yuya Yokoyama	Kyoto Prefectural University	Japan
Chau Yuen	Singapore University of Technology and Design	Singapore
Go Yun Il	Heriot-Watt University Malaysia	Malaysia
Fauziah Zainuddin	Universiti Malaysia Pahang	Malaysia
Akram Zeki	International Islamic University Malaysia	Malaysia
Weiwen Zhang	Institute of High Performance Computing	Singapore
Sri Zuliana	UIN Sunan Kalijaga	Indonesia

## **Arief Setyanto**

## **Chair**

Arief Setyanto (Universitas AMIKOM Yogyakarta, Indonesia)

## **Akhmad Dahlan**



Akhmad Dahlan (Universitas Amikom Yogyakarta, Indonesia)

## **Nila Feby Puspitasari**

## **15747**

Nila Puspitasari (Universitas AMIKOM Yogyakarta, Indonesia)

Sumarni Adi (University of Amikom Yogyakarta, Indonesia)

Kusrini Kusrini (AMIKOM Yogyakarta University, Indonesia)

Emha Taufiq Luthfi (Universitas AMIKOM Yogyakarta, Indonesia)



Ferry Wahyu Wibowo (Universitas AMIKOM Yogyakarta, Indonesia)

## Additional Reviewers

Intan Ermahani A. Jalil	Universiti Teknikal Malaysia	Malaysia
Farhan Aadil	COMSATS Institute of Information Technology	Pakistan
Mohd Helmy Abd Wahab	Universiti Tun Hussein Onn Malaysia	Malaysia
Tapodhir Acharjee	Assam University, Silchar	India
David Agustriawan	Asia University	Taiwan
Mohd Khairul Ikhwan Bin Ahmad	Universiti Tun Hussein Onn Malaysia	Malaysia
Kaveh Ahmadi	University of Toledo	USA
Michele Albano	CISTER/INESC-TEC, ISEP, Polytechnic Institute of Porto	Portugal
Baba Alhaji	Nigerian Defence Academy	Niger
Shajith Ali	SSN College of Engineering, Chennai	India
Anas M.R. Alsobeh	Yarmouk University	Jordan
Dhani Ariatmanto	Universitas Amikom Yogyakarta	Indonesia
Takuya Asaka	Tokyo Metropolitan University	Japan
Koichi Asatani	Nankai University	Japan
Ahmad Ashari	Gadjah Mada University	Indonesia
Aslina Baharum	Universiti Malaysia Sabah	Malaysia
Vinayak K Bairagi	University of Pune	India
I Putu Agung Bayupati	Udayana University	Indonesia
Ravi Bhushan	Kurukshetra University	India
Robert P. Biuk-Aghai	University of Macao	Macao
Rajendra V Boppana	University of Texas at San Antonio	USA
Indra Budi	Computer Science	Indonesia
Maria Chiara Caschera	CNR	Italy
Satyananda Champati Rai	Silicon Institute of Technology, Bhubaneswar	India
Mu-Song Chen	Electrical Engineering, Da-Yeh University	Taiwan
Tai-Chen Chen	MAXEDA Technology	Taiwan
Thomas M Chen	City University London	United Kingdom (Great Britain)
Uei-Ren Chen	Hsiuping University of Science and Technology	Taiwan
Wichian Chutimaskul	King Mongkut's University of Technology Thonburi	Thailand
Domenico Ciuonzo	Network Measurement and Monitoring (NM2), Naples, IT	Italy
Andi Dharmawan	Universitas Gadjah Mada	Indonesia
Ahmed Douik	California Institute of Technology	USA
Alban Duverdier	Centre National D'Etudes Spatiales (CNES)	France
Ferda Ernawan	Universiti Malaysia Pahang	Malaysia
Noriko Etani	Peach Aviation Limited	Japan
Ahmad Nurul Fajar	Bina Nusantara University	Indonesia
Dhomas Hatta Fudholi	Universitas Islam Indonesia	Indonesia
Alireza Ghasempour	University of Applied Science and Technology	Iran
Razvan Andrei Gheorghiu	Politehnica University of Bucharest	Romania
Muhammad Asif Habib	National Textile University	Pakistan
Rostam Affendi Hamzah	Universiti Teknikal Malaysia Melaka	Malaysia
Byeong-jun Han	Korea University	Korea
Sihui Han	University of Michigan	USA
Seng Hansun	Universitas Multimedia Nusantara	Indonesia
K Haribabu	BITS Pilani	India
Iswadi Hasyim Rosma	Universitas Riau	Indonesia
Su-Cheng Haw	MMU	Malaysia



Roberto Carlos Herrera Lara	National Polytechnic School	Ecuador
Tonny Hidayat	Universitas AMIKOM Yogyakarta	Indonesia
Danial Hooshyar	Korea University	Korea
Liang Huang	Zhejiang University of Technology	P.R. China
Nurul Izzatty Ismail	Universiti Tun Hussein Onn Malaysia (UTHM)	Malaysia
Nurulisma Ismail	Universiti Malaysia Perlis	Malaysia
Ramkumar Jaganathan	VLB Janakiammal College of Arts and Science	India
Arihant Kumar Jain	Jaipur Engineering College & Research Centre	India
Muhammad Herman Jamaluddin	Universiti Teknikal Malaysia Melaka	Malaysia
Arun Jana	Centre for Development Advanced Computing	India
Lahiru Jayasinghe	Singapore University of Technology and Design	Singapore
Biao Jiang	The City University of New York	USA
Dimitrios Kallergis	University of Piraeus	Greece
Hiroshi Kamabe	Gifu University	Japan
Sokratis K. Katsikas	Norwegian University of Science and Technology	Norway
Mohammad Khalily Dermany	Islamic Azad University, Khomein Branch	Iran
Praveen Khethavath	LaGuardia Community College	USA
Fukuro Koshiji	Tokyo Polytechnic University	Japan
Dimitrios Koukopoulos	University of Patras	Greece
Krisnawati Krisnawati	STMIK AMIKOM Yogyakarta	Indonesia
Puneet Kumar	Calix Inc	USA
Rakesh Kumar	National Institute of Technical Teachers Training & Research	India
Tubagus Maulana Kusuma	Gunadarma University	Indonesia
Billy Pik Lik Lau	Singapore University of Technology and Design	Singapore
Armin Lawi	Hasanuddin University	Indonesia
Wen Chek Leong	University of Malaya	Malaysia
Suryadiputra Liawatimena	Bina Nusantara University	Indonesia
Hans-Dieter Liess	Universität der Bundeswehr München	Germany
Linawati Linawati	Universitas Udayana	Indonesia
Josip Lorincz	University of Split	Croatia
Pavel Loskot	Swansea University	United Kingdom (Great Britain)
Emha Taufiq Luthfi	Universitas AMIKOM Yogyakarta	Indonesia
Mahdin Mahboob	Stony Brook University	USA
Amit Kumar Manocha	Maharaja Ranjit Punjab Technical University	India
M Marimin	Bogor Agricultural University	Indonesia
Prita Dewi Mariyam	Universitas Indonesia	Indonesia
David Martin Gomez	Carlos III University of Madrid	Spain
Miftahuddin Miftahuddin	Syiah Kuala University	Indonesia
Yoshihiro Mizoguchi	Kyushu University	Japan
Ahmed Toaha Mobashsher	The University of Queensland	Australia
Kamaludin Mohamad Yusof	Universiti Teknologi Malaysia	Malaysia
Seyed Sahand Mohammadi Ziabari	Vrije University of Amsterdam	The Netherlands
Mohamed Hussein Moharam	Misr University For Science and Technolgy	Egypt
Mohd Hanif Mohd Ramli	Universiti Teknologi MARA	Malaysia
Al-Fahim Mubarak-Ali	Universiti Malaysia Pahang	Malaysia
Amrit Mukherjee	School of Electronic Engineering	India
Shameemraj Mohinuddin Nadaf	Tata Consultancy Services Ltd	India
Syibrah Naim	Universiti Sains Malaysia	Malaysia
N Nasimuddin	Institute for Infocomm Research	Singapore

Asro Nasiri	University of Amikom Yogyakarta	Indonesia
Shah Nazir	University of Peshawar	Pakistan
Ponrudee Netisopakul	King Mongkut's Institute of Technology Ladkrabang	Thailand
Hu Ng	Multimedia University	Malaysia
Kok-Why Ng	Multimedia University	Malaysia
Md Asri Ngadi	Universiti Teknologi Malaysia	Malaysia
Ruzelita Ngadiran	Universiti Malaysia Perlis	Malaysia
Hea Choon Ngo	Universiti Teknikal Malaysia Melaka	Malaysia
Atsushi Nunome	Kyoto Institute of Technology	Japan
Nitish Ojha	Chandigarh University, Mohali, Punjab	India
Ilker Ali Ozkan	Selcuk University	Turkey
Henry Novianus Palit	Petra Christian University	Indonesia
Shahril Parumo	Universiti Teknikal Malaysia Melaka	Indonesia
Kiran Sree Pokkuluri	Shri Vishnu Engineering College for Women	India
N. Prabaharan	Madanapalle Institute of Technology and Science	India
Gede Pramudya Ananta	Universiti Teknikal Malaysia Melaka	Malaysia
Tri K Priyambodo	Universitas Gadjah Mada	Indonesia
Reza Pulungan	Universitas Gadjah Mada	Indonesia
Mauridhi Hery Purnomo	Institut of Technology Sepuluh Nopember	Indonesia
Agfianto Eko Putra	Universitas Gadjah Mada	Indonesia
Yuansong Qiao	Athlone Institute of Technology	Ireland
Basit Qureshi	University of Bradford	United Kingdom (Great Britain)
Ali Rafiei	University of Technology Sydney	Australia
Sarni Rahim	Universiti Teknikal Malaysia Melaka	Malaysia
Ajit Reddy	Nokia	USA
Bagus Rintyarna	Sepuluh Nopember Institute of Technology	Indonesia
Samrat Sabat	University of Hyderabad	India
Houari Sabirin	KDDI Research, Inc.	Japan
Umi Salamah	Sebelas Maret University	Indonesia
Sayantam Sarkar	Vijaya Vittala Institute of Technology	India
Riyanarto Sarno	Institut Teknologi Sepuluh Nopember	Indonesia
Mithileysh Sathiyarayanan	City, University of London	United Kingdom (Great Britain)
Dian Sawitri	UDINUS	Indonesia
Soumya Sen	University of Calcutta, Kolkata	India
Anindita Septiarini	Univeristas Mulawarman	Indonesia
Amel Serrat	USTO MB	Algeria
Wawan Setiawan, WS	Universitas Pendidikan Indonesia	Indonesia
Iwan Setyawan	Satya Wacana Christian University	Indonesia
Sfenrianto Sfenrianto	Binus University	Indonesia
Aditi Sharma	MBM Engineering College Jodhpur	India
China Venkateswarlu Sonagiri	MRIET JNTUH Hyderabad	India
Houbing Song	Embry-Riddle Aeronautical University	USA
Yi-Jen Su	Shu-Te University	Taiwan
Joey Suba	University of the Assumption	Philippines
Sudarmawan Sudarmawan	AMIKOM Yogyakarta University	Indonesia
Abba Suganda Girsang	Bina Nusantara University	Indonesia
Parman Sukarno	Telkom University	Indonesia
Andi Sunyoto	Universitas AMIKOM Yogyakarta	Indonesia
Nico Surantha	Bina Nusantara University	Indonesia
Govind R Suryawanshi	University of Pune Pune	India
Aries Susanto HT	UIN Syarif Hidayatullah Jakarta	Indonesia

Suyanto Suyanto	Telkom University	Indonesia
Takuji Tachibana	University of Fukui	Japan
Srinivasulu Tadisetty	Kakatiya University College of Engineering and Technology	India
Sushil Thale	Fr. C. Rodrigues Institute of Technology	India
Ivanna Timotius	Satya Wacana Christian University	Indonesia
Radiana Triatmadja	Universitas Gadjah Mada	Indonesia
Mihail Tyagunov	National Research University Moscow Power Engineering	Russia
Asako Uraki	Keio University	Japan
Wahyono Wahyono	Universitas Gadjah Mada	Indonesia
Addy Wahyudie	UAE University	United Arab Emirates
Daniel Watzenig	Graz University of Technology	Austria
Julian L Webber	Osaka University	Japan
Oki Wicaksono	Universitas Gadjah Mada	Indonesia
Dedy Rahman Wijaya	Telkom University	Indonesia
JingAn Xue	Tsinghua University	P.R. China
Warusia Mohamed Yassin	Universiti Teknikal Malaysia Melaka	Malaysia
Mehmet Akif Yazici	Istanbul Technical University	Turkey
Yuya Yokoyama	Kyoto Prefectural University	Japan
Chau Yuen	Singapore University of Technology and Design	Singapore
Go Yun Il	Heriot-Watt University Malaysia	Malaysia
Akram M. Zeki	International Islamic University Malaysia	Malaysia
Weiwen Zhang	Institute of High Performance Computing	Singapore

# 2018 International Conference on Information and Communications Technology (ICOIACT)

## Parallel Session 1-A & 1-B

<i>A Novel Electrically Tunable IMSL Phase Shifter Based on LC for X-band Microwave Applications</i> Odai H. Raheem (Harbin Institute of Technology, P.R. China), JiaHui Fu (Harbin Institute of Technology, P.R. China) .....	1
<i>A New Electrically Tunable Frequency for ?-Shaped Microstrip Patch Array based on N-LC Featuring Dual-Band Dual-Beam</i> Odai H. Raheem (Harbin Institute of Technology, P.R. China), JiaHui Fu (Harbin Institute of Technology, P.R. China) .....	6
<i>Management of fault tolerance and traffic congestion in cloud data center</i> Humphrey Emesowum (University of Portsmouth, United Kingdom (Great Britain)) .....	10
<i>Design and analysis of feedback control system</i> Shibli Nisar (NUCES-FAST & NUCES-FAST, Pakistan) .....	16

## Parallel Session 1-C

<i>Recommendation System for Property Search Using Content Based Filtering Method</i> Tessy Badriyah (Electronic Engineering Polytechnic Institute of Surabaya, Indonesia), Iwan Syarif (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia), Wiratmoko Yuwono (Politeknik Elektronika Negeri Surabaya, Indonesia), Sefryan Azvy (Politeknik Elektronika Negeri Surabaya (PENS), Indonesia) .....	25
<i>Query Algorithm Optimization with TempTable on Employee Pages Module Knowledge Management System</i> Karto Iskandar (BINA NUSANTARA University, Indonesia) .....	30
<i>Combined Economic Emission Dispatch with Cubic Criterion Function Considering Various Price Penalty Factor Using Cuckoo Search Algorithm</i> Muhammad Khalil (Institut Teknologi Sepuluh Nopember, Indonesia), Rony Seto Wibowo (Institut Teknologi Sepuluh Nopember, Indonesia), Ontoseno Penangsang (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia) .....	36
<i>Measuring The Quality of Various Version an Object Oriented Software Utilizing CK Metrics</i> Iwan Binanto (Sanata Dharma University, Indonesia) .....	41

## Parallel Session 1-D

<i>Classification of Cell Types In Acute Myeloid Leukemia (AML) of M4, M5 and M7 Subtypes With Support Vector Machine Classifier</i> Andika Setiawan (Universitas Gadjah Mada, Indonesia), Agus Harjoko (Universitas Gadjah Mada, Indonesia), Tri Ratnaningsih (Universitas Gadjah Mada, Indonesia), E Suryani (University of Sebelas Maret, Indonesia), Wiharto Wiharto (Universitas Sebelas Maret, Indonesia), Sarngadi Palgunadi (Sebelas Maret University, Indonesia) .....	45
<i>Indonesian Traffic Sign Detection and Recognition Using Color and Texture Feature Extraction and SVM Classifier</i> Isna Fauzia Rahmah (Malang State Polytechnic, Indonesia), Cahya Rahmad (State Polytechnic of Malang, Indonesia), Rosa Asmara (State Polytechnic of Malang, Indonesia) .....	50
<i>Leaf Morphological Feature Extraction Based on K-Nearest Neighbor</i> Muhamad Hardi (Universitas Dian Nuswantoro, Indonesia), Muhammad Nur Firdaus (Universitas Dian Nuswantoro, Indonesia), Bayu Putra Pamungkas (Universitas Dian Nuswantoro, Indonesia), Usman Sudiby (Universitas Dian Nuswantoro, Indonesia), Christy Atika Sari (Dian Nuswantoro University, Indonesia), Yani Parti Astuti (Dian Nuswantoro University, Indonesia), Eko Rachmawanto (Universitas Dian Nuswantoro, Indonesia) .....	56
<i>Bas Relief Image Enhancement</i> Karina Auliasari (National Institute of Technology (ITN Malang), Indonesia), Mira Orisa (National Institute of Technology (ITN Malang), Indonesia) .....	62

## Opening Ceremony + Key Note Speakers

<i>Enhancing Generality of Meta-Heuristic Algorithms through Adaptive Selection and Hybridization</i> Kamal Z Zamli (Universiti Malaysia Pahang, Malaysia) .....	67
<i>Animation Opportunities of Intelligent Multimedia Systems in Developing a Creative Economy Park</i> Mohammad Suyanto (Universitas AMIKOM Yogyakarta, Indonesia), Ferry Wahyu Wibowo (Universitas AMIKOM Yogyakarta, Indonesia) .....	72

## Parallel Session 2-A

<i>Wireless Service at Public University: A Survey of Users Perception on Security Aspects</i> Arif Ridho Lubis (Politeknik Negeri Medan, Indonesia), Ferry Fahrizal (Politeknik Negeri Medan, Indonesia), Muharman Lubis (Telkom University, Indonesia), Hatim MohamadTahir (Universiti Utara Malaysia & School of Computing, Malaysia) .....	78
<i>Geolocation Prediction in Social Media Data Using Text Analysis: A Review</i> Muhammad Nur Yasir Utomo (Universitas Gadjah Mada, Indonesia), Teguh Bharata Adji (Universitas Gadjah Mada, Indonesia), Igi Ardiyanto (Universitas Gadjah Mada & Faculty of Engineering, Indonesia) .....	84

<i>Context-Based Awareness in Location Recommendation System to Enhance Recommendation Quality: A Review</i> Sulis Setiowati (University of Gadjah Mada, Indonesia), Teguh Bharata Adji (Universitas Gadjah Mada, Indonesia), Igi Ardiyanto (Universitas Gadjah Mada & Faculty of Engineering, Indonesia) .....	90
<i>A Study On The Road Accidents Using Data Investigation And Visualization In Los Baños, Laguna, Philippines</i> Jonardo Asor (Technological Institute of the Philippines, Philippines), Gene Marck Catedrilla (Technological Institute of the Philippines, Philippines), Jheanel Estrada (Technological Institute of the Philippines, Philippines) .....	96
<i>Study on Odometry Sensor Alternative using 3D LiDAR for Urban Area Application</i> Abdurahman Dwijotomo (Universiti Teknologi Malaysia, Malaysia), Hatta Ariff (Universiti Teknologi Malaysia, Malaysia) .....	102
<i>Comparison Performance Between Rare Event Weighted Logistic Regression And Truncated Regularized Prior Correction On Modelling Imbalanced Welfare Classification In Bali</i> Sony Puji Triasmoro (Institut Teknologi Sepuluh Nopember & Badan Pusat Statistik, Indonesia), Vita Ratnasari (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia), Agnes Rumiati (Institut Teknologi Sepuluh Nopember, Indonesia) .....	108
<i>An Analysis and a Comparative Study of Cryptographic Algorithms Used on the Internet of Things (IoT) Based on Avalanche Effect</i> Khumbelo Difference Muthavhine (University of South Africa, South Africa), Sumbwanyambe Mbuyu (University of South Africa, South Africa) .....	114
<i>Analysis of Evaluation Quality Website From Developers Perspective For Build Website</i> Dwi Rahayu (Universitas Amikom, Indonesia), Emma Utami (STMIK AMIKOM Yogyakarta, Indonesia), Emha Taufiq Luthfi (Universitas AMIKOM Yogyakarta, Indonesia) .....	120

## Parallel Session 2-B

<i>360 Degree View of Employee design to get to Know Your Employee from every angel on Blood Transfusion Unit PMI Tangerang District</i> Oleh Soleh (STMIK Raharja, Indonesia), Hani Ariessanti (Perguruan Tinggi Raharja, Indonesia), Indrianingrum Ningrum (STMIK Raharja, Indonesia), Yuliawan Wawan (Univrsitsa Budi Luhur, Indonesia) .....	125
<i>Application of Bayesian Network Model in Determining the Risk of Building Damage Caused by Earthquakes</i> Devni P Sari (Universitas Gadjah Mada & Universitas Negeri Padang, Indonesia) .....	131
<i>Web-Based Geographic Information System for School Mapping and Disaster Mitigation</i> Yuliana Ariyanti (Universitas Sebelas Maret, Indonesia), Rosihan Yuana (Sebelas Maret University, Indonesia), Aris Budianto (Universitas Sebelas Maret, Indonesia) .....	136
<i>Improving Accuracy of C4.5 Algorithm Using Split Feature Reduction Model and Bagging Ensemble for Credit Card Risk Prediction</i> Much Aziz Muslim (Universitas Negeri Semarang, Indonesia), Aldi Nurzahputra (Universitas Negeri Semarang, Indonesia), Budi Prasetyo (Universitas Negeri Semarang, Indonesia) .....	141

<i>Gamified Mobile Micro-learning Framework: A Case Study of Civil Service Management Learning</i>	
Deno Norsanto (Institut Teknologi Bandung, Indonesia), Yusep Rosmansyah (Bandung Institute of Technology, Indonesia) .....	146
<i>Model Development Of Students' Scholarship Status At First Asia Institute Of Technology And Humanities (FAITH)</i>	
Jonalyn Joy Labayne (Technological Institute of the Philippines, Philippines), Jheanel Estrada (Technological Institute of the Philippines, Philippines), Lester Lanto Mercado (Technological Institute of the Philippines, Philippines) .....	152
<i>CEW-DTW: A New Time Series Model For Text Mining</i>	
GuanDong Zhang (University of Western Ontario, Canada), Hao Yu (University of Western Ontario, Canada), Lu Xiao (Syracuse University, USA) .....	158
<i>Introducing TAMEx Model for Availability of E-Exam in Wireless Environment</i>	
Gede Sukadarmika (University of Udayana, Indonesia), Linawati Linawati (Universitas Udayana, Indonesia), Nyoman Putra Sastra (Electrical Engineering Universitas Udayana, Indonesia) .....	163

## Parallel Session 2-C

<i>Design and Implementation of an Experimental UAV Network</i>	
Prabhu Jyot Singh (Central Queensland University, Sydney, Australia), Rohan de Silva (CQUniversity Sydney, Australia) .....	168
<i>Intrusion Detection Against Unauthorized File Modification by Integrity Checking and Recovery with HW/SW Platforms Using Programmable System-On-Chip (SoC)</i>	
Mochamad Julianto S (Institut Teknologi Bandung, Indonesia), Rinaldi Munir (Institut Teknologi Bandung, Indonesia) .....	174
<i>Reliable Geographic Routing Protocol for Vehicular Ad-hoc Networks under Shadowing and Multipath Environments</i>	
Reena Kasana (Jawaharlal Nehru University, India), Sushil Kumar (Jawaharlal Nehru University, New Delhi, India) .....	180
<i>An Improved Message Capacity and Security using Divide and Modulus Function in Spatial Domain Steganography</i>	
De Rosal Ignatius Moses Setiadi (Dian Nuswantoro University, Indonesia), Heru Agus Santoso (Dian Nuswantoro University, Indonesia), Eko Hari Rachmawanto (Dian Nuswantoro University, Indonesia), Christy Atika Sari (Dian Nuswantoro University, Indonesia) .....	186
<i>Simple and Secure Image Steganography using LSB and Triple XOR Operation on MSB</i>	
Yani Parti Astuti (Dian Nuswantoro University, Indonesia), De Rosal Ignatius Moses Setiadi (Dian Nuswantoro University, Indonesia), Eko Hari Rachmawanto (Dian Nuswantoro University, Indonesia), Christy Atika Sari (Dian Nuswantoro University, Indonesia) .....	191
<i>Protection Coordination Using Zone Selective Interlocking and Neural Network Method in Plan IEEE 9 Bus</i>	
Rachmad Pujiantara (Institut Teknologi Sepuluh Nopember & Institut Teknologi Sepuluh Nopember, Indonesia) .....	196

<i>Power Flow Control of Battery Energy Storage System Using Droop Voltage Regulation Technique Integrated with Hybrid PV/Wind Generation System</i>	
Andri Pradipta (Institut Teknologi Sepuluh Nopember, Indonesia), Dedet Riawan (Institut Teknologi Sepuluh Nopember, Indonesia), Soedibyo Soedibyo (Institut Teknologi Sepuluh Nopember, Indonesia) .....	202

## Parallel Session 2-D

<i>Complex-Valued Support Vector Machines Based on Multi-Valued Neurons</i>	
Motonobu Hattori (University of Yamanashi & Interdisciplinary Graduate School of Medicine, Engineering and Agriculture, Japan) .....	208
<i>Reduction of Catastrophic Forgetting for Multilayer Neural Networks Trained by No-Prop Algorithm</i>	
Motonobu Hattori (University of Yamanashi & Interdisciplinary Graduate School of Medicine, Engineering and Agriculture, Japan) .....	214
<i>Design and Development Smart Industrial Training Management Software with Artificial Neural Network (ANN) on Java</i>	
Efan Ntyo (Gajah Tunggal Polytechnic, Indonesia), Muhammad Ridwan Arif Cahyono (Gajah Tunggal Polytechnic, Indonesia) .....	220
<i>Deep Reinforcement Learning for Recommender Systems</i>	
Isshu Munemasa (Meiji University, Japan), Yuta Tomomatsu (Meiji University, Japan), Kunioki Hayashi (DesignOne Japan, Inc., Japan), Tomohiro Takagi (Meiji University, Japan) .....	226
<i>Application of Analytic Hierarchy Process (AHP) and Simple Additive Weighting (SAW) Method In Singer Selection Process</i>	
Afrianda Cahyapratama (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	234
<i>Back Propagation Neural Network Experiment on Team Matchmaking MOBA game</i>	
Evawaty Tanuar (Bina Nusantara University, Indonesia) .....	240
<i>Optimizing Time and Cost using Goal Programming and FMS Scheduling</i>	
Shoffi Sabilla (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Yutika Amelia Effendi (Institut Teknologi Sepuluh Nopember, Indonesia) .....	244
<i>Classification Algorithm for Edible Mushroom Identification</i>	
Agung Wibowo (STMIK Nusa Mandiri Sukabumi, Indonesia) .....	250

## Parallel Session 3-A

<i>QoS and RMA Performance Analysis for Wireless Mesh Network Implementation</i>	
Ahmad Fauzan Aji (Universitas Sebelas Maret, Indonesia), Puspanda Hatta (Universitas Sebelas Maret, Indonesia), Endar Wihidayat (Sebelas Maret University, Indonesia) .....	254



<i>Comparison of Discrete Event Simulation and Agent Based Simulation for Evaluating the Performance of Port Container Terminal</i>	
Aziz Fajar (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Abd. Charis Fauzan (Institut Teknologi Sepuluh Nopember, Indonesia) .....	259
<i>Evaluation of the Performance of a Machine Learning Algorithms in Swahili-English Emails Filtering System Relative to Gmail Classifier</i>	
Rashid Abdulla Omar (Institute Teknologi Sepuluh Nopemba & ITS, Indonesia), Ir. Aris Tjahyanto (Institute Teknologi Sepuluh Nopember, Indonesia) .....	266
<i>Improving the Quality of Enterprise IT Goals using COBIT 5 Prioritisation Approach</i>	
Firman Anindra (Universitas Nasional & BINUS University, Indonesia) .....	270
<i>Metrics Analysis of Risk Profile: A Perspective on Business Aspects</i>	
Prajna Deshanta Ibnugraha (Telkom University & Universitas Gadjah Mada, Indonesia), Lukito Edi Nugroho (Universitas Gadjah Mada, Indonesia), Paulus Insap Santosa (Universitas Gadjah Mada, Indonesia) .....	275
<i>Civil Servant Behaviors Performance Evaluation: Combining DEAHP and 360-degree Feedback</i>	
Irfani Zuhurfillah (University of Diponegoro, Indonesia), Farikhin Farikin (Diponegoro University, Indonesia), R Rizal Isnanto (Diponegoro University, Indonesia) .....	280
<i>Evaluation of Container Forecasting Methods for Analyzing Port Container Terminal Performance Using Agent-Based Simulation</i>	
Ryan Setiawan (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	286
<i>Risk and Countermeasure Analysis of Network-based Global Airplane Tracking System</i>	
Zhijun Wu (Civil Aviation University of China, P.R. China), Xuan Liu (Civil Aviation University of China, P.R. China), Akhmad Dahlan (Universitas Amikom Yogyakarta, Indonesia) .....	292

### Parallel Session 3-B

<i>Taxpayer Compliance Classification Using C4.5, SVM, KNN, Naive Bayes and MLP</i>	
M. Jupri (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	297
<i>Classification on Passion Fruit's Ripeness using K-Means Clustering and Artificial Neural Network</i>	
Sitti Wetenriajeng Sidehabi (Politeknik ATI Makassar, Indonesia), Ansar Suyuti (Hasanuddin of University, Indonesia), Intan Sari Areni (Hasanuddin University, Indonesia), Ingrid Nurtanio (Hasanuddin University, Indonesia) .....	304
<i>Data Level Approach for Imbalanced Class Handling on Educational Data Mining Multiclass Classification</i>	
Yoga Pristyanto (Universitas Gadjah Mada, Indonesia), Irfan Pratama (Universitas Gadjah Mada, Indonesia), Anggit Ferdita Nugraha (Universitas Gadjah Mada, Indonesia) .....	310
<i>Machine Learning: Fisher Fund Classification using Neural Network and Particle Swarm Optimization</i>	
Arifin Tindi (Universitas Diponegoro, Indonesia) .....	315

<i>Robustness of Classical Fuzzy C-Means (FCM)</i> Bahrul Ilmi Nasution (Sekolah Tinggi Ilmu Statistik, Indonesia), Robert Kurniawan (Sekolah Tinggi Ilmu Statistik, Indonesia) .....	321
<i>Additive Survival Least Square Support Vector Machines and Feature Selection on Health Data in Indonesia</i> C. Khotimah (Institut Teknologi Sepuluh Nopember & LPDP, Indonesia), Santi Wulan Purnami (Sepuluh Nopember Institute of Technology, Indonesia), Dedy Dwi Prastyo (Institut Teknologi Sepuluh Nopember, Indonesia) .....	326
<i>Optimization of Forecasted Port Container Terminal Performance Using Goal Programming</i> Shabrina Choirunnisa (Institute of Technology Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Abd. Charis Fauzan (Institut Teknologi Sepuluh Nopember, Indonesia) .....	332

### Parallel Session 3-C

<i>River Body Extraction And Classification Using Enhanced Models of Modified Normalized Water Difference Index At Yeh Unda River Bali</i> Putu Virga Nanta Nugraha (Gadjah Mada University & Gadjah Mada University, Indonesia), Sunu Wibirama (Universitas Gadjah Mada, Indonesia), Risanuri Hidayat (Gadjah Mada University (UGM), Indonesia) .....	337
<i>Real-time motion tracking for dance visualization using Kalman filters</i> Karina Abramova (IT University of Copenhagen, Denmark), Andrea Corradini (Copenhagen School of Design and Technology, Denmark), Andrea Corradini (Copenhagen School of Design and Technology, Denmark) .....	343
<i>Global Features Selection for Dynamic Signature Verification</i> Ano Rahardika (Sepuluh Nopember Institute of Technology, Indonesia), Aris Tjahyanto (Sepuluh Nopember Institute of Technology, Indonesia) .....	348
<i>3D Human Face Reconstruction Using Depth Sensor of Kinect 2</i> Ratha Siv (Universitas Gadjah Mada & UGM, Indonesia), Igi Ardiyanto (Universitas Gadjah Mada & Faculty of Engineering, Indonesia), Rudy Hartanto (Gadjah Mada University & Electrical Engineering and Information Technology Departmen, Faculty of Engineering Gadjah Mada University, Indonesia) .....	355
<i>Leaves Image Synthesis Using Generative Adversarial Networks With Regularization Improvement</i> Muhammad Eka Purbaya (University of Gadjah Mada, Indonesia), Noor Akhmad Setiawan (Universitas Gadjah Mada, Indonesia), Teguh Bharata Adji (Universitas Gadjah Mada, Indonesia) .....	360
<i>Estimating Fish Weight Based on Visual Captured</i> Raihan Islamadina (University of Serambi Mekkah, Indonesia) .....	366
<i>Risk Analysis Of IT Applications Using FMEA and AHP SAW Method With COBIT 5</i> Amrina Apriliana (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Yutika Amelia Effendi (Institut Teknologi Sepuluh Nopember, Indonesia) .....	373

<i>Improvement of MFCC Feature Extraction Accuracy Using PCA in Indonesian Speech Recognition</i>	
Anggun Winursito (Universitas Gadjah Mada, Indonesia), Risanuri Hidayat (Gadjah Mada University (UGM), Indonesia), Agus Bejo (Universitas Gadjah Mada, Indonesia) .....	379

### Parallel Session 3-D

<i>Optimization of Light Tracker Movement Using Fuzzy Logic Control</i>	
Lutfi Mahardika (Universitas Negeri Malang, Indonesia) .....	384
<i>Design of Server Room Temperature and Humidity Control System using Fuzzy Logic based on Microcontroller</i>	
Febryan Hari Purwanto (Universitas Amikom, Indonesia), Ema Utami (Universitas Amikom Yogyakarta, Indonesia), Eko Pramono (Universitas Amikom Yogyakarta, Indonesia) .....	390
<i>Design of Smart Lock System for Doors with Special Features Using Bluetooth Technology</i>	
Muhammad Sabirin Hadis (Universitas Hasanuddin, Indonesia), Elyas Palantei (Universitas Hasanuddin, Indonesia), Amil Ahmad Ilham (Universitas Hasanuddin, Indonesia), Akbar Hendra (Universitas Hasanuddin, Indonesia) .....	396
<i>Design of Robot Control System With the Use of Hand Gesture Based Wireless</i>	
Eka Susanti Tekasanti, ESN (Department of Poltythecnic Sriwijaya & Poltythecnic Company, Indonesia), Rosita Febriani Rftn, RFN (Department of Polytechnic Sriwijaya & Sriwijaya Company, Indonesia), Sholihin Hin, SHN (State of Polytechnic Sriwijaya & State of Polytechnic Sriwijaya, Indonesia), R A Halimah Tussadyah Ritfhs, Rth (Department of Poltythecnic Sriwijaya & Sriwijaya Company, Indonesia) .....	401
<i>The Development of Quail Eggs Smart Incubator for Hatching System based on Microcontroller and Internet of Things (IoT)</i>	
Dyah Anggraeni (UIN Sunan Gunung Djati & Bolabot Techno Robotic Institute, Indonesia), W. S. Mada Sanjaya (UIN Sunan Gunung Djati Bandung, Indonesia) .....	407
<i>Design of Olfactory Mobile Robot for Detecting the Leak of Gas Sources by implementing Hot-Wire Anemometer</i>	
Gamma Rahardi (Institut Teknologi Sepuluh Nopember, Indonesia), Muhammad Rivai (Institut Teknologi Sepuluh Nopember, Indonesia), Djoko Purwanto (Institut Teknologi Sepuluh Nopember, Indonesia) .....	412
<i>Spoiled Meat Level Classification Using Semiconductor Gas Sensor, Image Processing and Neural Network</i>	
Vinda Kartika (Institut Teknologi Sepuluh Nopember, Indonesia), Muhammad Rivai (Institut Teknologi Sepuluh Nopember, Indonesia), Djoko Purwanto (Institut Teknologi Sepuluh Nopember, Indonesia) .....	418
<i>Scale-up of Mixing Process Based on Constant Power/Volume and Equal Blend Time Using Visimix Simulation</i>	
Waliyuddin Sammadikun (Universitas Negeri Semarang, Indonesia) .....	424

## Parallel Session 4-A

<i>LINGO-Based on Robust Counterpart Open Capacitated Vehicle Routing Problem (RCOCVRP) Model of Waste Transportation in Palembang</i> Fitri Maya Puspita (University of Sriwijaya, Indonesia), Yusuf Hartono (Universitas Sriwijaya, Indonesia), Desi Indah Permatasari (Sriwijaya University, Indonesia), Bella Arisha (Sriwijaya University, Indonesia) .....	429
<i>LINGO-Based Optimization Problem of Cloud Computing of Bandwidth Consumption in the Internet</i> Fitri Maya Puspita (University of Sriwijaya, Indonesia), Indrawati Indrawati (Sriwijaya University, Indonesia), Inosensius Nadeak (Sriwijaya University, Indonesia), Sri Erlita (Sriwijaya University, Indonesia), Bella Arisha (Sriwijaya University, Indonesia) .....	436
<i>Hybrid Forecasting Model To Predict Air Passenger and Cargo In Indonesia</i> Ratna Sulistyowati (Institute Teknologi Sepuluh Nopember, Indonesia), Suhartono Suhartono (Institut Teknologi Sepuluh Nopember, Indonesia), Heri Kuswanto (Institut Teknologi Sepuluh Nopember, Indonesia) .....	442
<i>Predicting Student's Psychomotor Domain on The Vocational High School Using Linear Regression</i> Yuni Yamasari (Institut Teknologi Sepuluh Nopember, Indonesia), Rina Harimurti (Universitas Negeri Surabaya, Indonesia), Ekohariadi Ekohariadi (Universitas Negeri Surabaya, Indonesia), Munoto Munoto (Universitas Negeri Surabaya, Indonesia), I. G. P. Asto Buditjahjanto (Universitas Negeri Surabaya, Indonesia) .....	448
<i>Classifying Beneficiaries of Islamic Boarding School Rehabilitation Aid Based on Neural Network Approaches</i> Ahmad Andi Akmal Almafaluti (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia), Supeno Susiki (Sepuluh Nopember Institute Of Technology, Indonesia), Mauridhi Hery Purnomo (Institut of Technology Sepuluh Nopember, Indonesia) .....	454
<i>Improving the Cluster Validity on Student' s Psychomotor Domain Using Feature Selection</i> Yuni Yamasari (Institut Teknologi Sepuluh Nopember, Indonesia), Supeno Mardi Susiki Nugroho (Institut Teknologi Sepuluh Nopember, Indonesia), Rina Harimurti (Universitas Negeri Surabaya, Indonesia), Mauridhi Hery Purnomo (Institut of Technology Sepuluh Nopember, Indonesia) .....	460
<i>Determining Linear Temporal Logic Formula for Decomposed Process Model</i> Maryamah Maryamah (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Afina Nurlaili (Institut Teknologi Sepuluh Nopember, Indonesia) .....	466
<i>Time and Cost Optimization using Fuzzy Goal Programming</i> Made Agus Putra Subali (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Yutika Amelia Effendi (Institut Teknologi Sepuluh Nopember, Indonesia) .....	471

## Parallel Session 4-B

<i>Detection of Organic Solvent Compounds Using Optical Fiber Interferometer Array and Neural Network Pattern Recognition</i> Dwi Sasmita Aji Pambudi (Institut Teknologi Sepuluh Nopember, Indonesia), Muhammad Rivai (Institut Teknologi Sepuluh Nopember, Indonesia), Achmad Arifin (Sepuluh Nopember Institute of Technology, Indonesia) .....	477
<i>Solving Inverse Kinematics Trajectory Tracking of Planar Manipulator using Neural Network</i> Nurani Lathifah (State University of Malang, Indonesia) .....	483
<i>Prototype of Fire Symptom Detection System</i> Oxsy Giandi (Institut Teknologi Sepuluh Nopember & ITS, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	489
<i>Automatic Ranking System of University based on Technology Readiness Level Using LDA-Adaboost.MH</i> Bagus Rintyarna (Sepuluh Nopember Institute of Technology & Muhammadiyah University of Jember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Aрга Yuananda (Institut Teknologi Sepuluh Nopember (ITS) Surabaya Surabaya, Indonesia) .....	495
<i>Developing Statistical Business Register Service System Based on Microservice Architecture</i> Suhardi Suhardi (Bandung Institute of Technology, Indonesia), Dwy Bagus Cahyono (Institut Teknologi Bandung & Badan Pusat Statistik, Indonesia), Novianto Budi Kurniawan (Institut Teknologi Bandung, Indonesia) .....	500
<i>Effects of Depth Burial on Current Carrying Capacity of XLPE 86/150 (170) kV Underground Cable</i> Ayudha Nandi Pradipta (Universitas Indonesia, Indonesia), Chairul Hudaya (Universitas Indonesia, Indonesia) .....	506
<i>Warding off the plagiarism with the applications (Case study at Bina Nusantara University student and faculty member)</i> Surjandy Surjandy (Bina Nusantara University, Indonesia) .....	511

## Parallel Session 4-C

<i>A Text Classification on The Downstreaming Potential of Biomedicine Publications in Indonesia</i> Mesnan Silalahi (Indonesian Institute of Sciences, Indonesia), Ria Hardiyati (Indonesian Institute of Sciences, Indonesia), Tri Handayani (Indonesian Institute of Sciences, Indonesia), Irene Nadhiroh (Indonesian Institute of Science, Indonesia), Mia Amelia (Indonesian Institute of Sciences, Indonesia), Rizka Rahmida (Indonesian Institute of Sciences, Indonesia) .....	515
<i>Multi Document Summarization for the Indonesian Language Based on Latent Dirichlet allocation and Significance sentence</i> Agus Widjanarko (Diponegoro University, Indonesia), Retno Kusumaningrum (Diponegoro University, Indonesia) .....	520
<i>Twitter Data Transformation for Network Visualization Based Context Analysis</i> Hani Nurrahmi (Telkom University, Indonesia), Rini Wijayanti (Indonesian Institute of Sciences, Indonesia), Andri Fachrur Rozie (Indonesian Institute of Sciences, Indonesia), Andria Arisal (Indonesian Institute of Sciences, Indonesia) .....	525

<i>Non-formal Affixed Word Stemming in Indonesian Language</i> Rahardyan Bisma Setya Putra (Universitas Amikom Yogyakarta, Indonesia), Ema Utami (Universitas Amikom Yogyakarta, Indonesia) .....	531
<i>Text Mining Based on Tax Comments as Big Data Analysis Using SVM and Feature Selection</i> Mihuandayani Mihuandayani (Universitas Amikom Yogyakarta & PT. Time Excelindo, Indonesia), Emma Utami (STMIK AMIKOM Yogyakarta, Indonesia), Emha Taufiq Luthfi (Universitas AMIKOM Yogyakarta, Indonesia) .....	537
<i>Indonesian Twitter Cyberbullying Detection using Text Classification and User Credibility</i> Hani Nurrahmi (Telkom University, Indonesia), Dade Nurjanah (Telkom University, Indonesia) .....	543
<i>Food Trend Based on Social Media for Big Data Analysis Using K-Mean Clustering and SAW</i> Mihuandayani Mihuandayani (Universitas Amikom Yogyakarta & PT. Time Excelindo, Indonesia), Herda Ramandita (Universitas Amikom Yogyakarta, Indonesia), Arief Setyanto (Universitas AMIKOM Yogyakarta, Indonesia), Ikhwan Sumafta (Magister of Information Engineering, Indonesia) .....	549
<i>Time and Cost Optimization Using Scheduling Job Shop and Linear Goal Programming Model</i> Biandina Meidyani (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Afina Nurlaili (Institut Teknologi Sepuluh Nopember, Indonesia) .....	555

#### **Parallel Session 4-D**

<i>Effect of Stator Slot Geometry on High Speed Spindle Motor Performance</i> Wawan Purwanto, WP (Universitas Negeri Padang & UNP, Indonesia) .....	561
<i>Analysis of Load Effects and Unbalance Voltage on Air Gap Eccentricity in Indication Performace of Three Phase Induction Motors</i> Nur Alham (Institut Teknologi Sepuluh Nopember, Indonesia), Dimas Asfani (INSTITUT TEKNOLOGI SEPULUH NOPEMBER, Indonesia), I Made Yulistya Negara (ITS, Indonesia), Belly Yan Dewantara (Institut Teknologi Sepuluh Nopember, Indonesia) .....	566
<i>Optimization of Grounding Resistance to Minimize Transient Currents at 150 kV Sulselrabar System</i> Mochammad Apriyadi Hadi Sirad (University Patria Artha, Indonesia), Muhammad Djalal (State Polytechnic of Ujung Pandang, Indonesia), Muhammad Rais Rais (University Patria Artha, Indonesia), Andi Nur Putri (University Patria Artha, Indonesia) .....	572
<i>Adaptive DOCR Coordination in Loop Distribution System With Distributed Generation Using Firefly Algorithm-Artificial Neural Network</i> Destina Lestari (Institut Teknologi Sepuluh Nopember, Indonesia), Mauridhi Hery Purnomo (Institut of Technology Sepuluh Nopember, Indonesia), Margo Pujiantara (Institut Teknologi Sepuluh Nopember, Indonesia), Daeng Rahmatullah (Institut Teknologi Sepuluh Nopember, Indonesia) .....	579
<i>Blind Compressive Sensing for Cognitive Radio Networks using I2-Minimization Recovery and Spectrum Segmentation</i> Ahmed Ebian (Ain Shams University & Telecom Egypt, Egypt), Salwa El-Ramly (Ain Shams University, Egypt), Bassant Abdelhamid (Faculty of Engineering Ain Shams University, Egypt) .....	585



<i>Failover Mechanism During Upgrading Process for Software-Defined Networking</i> Siew-Hoon Lim (Universiti Sains Malaysia, Malaysia), Yung-Wey Chong (Universiti Sains Malaysia, Malaysia), Qi-Guan Ng (Universiti Sains Malaysia, Malaysia), Khong-Lim Yap (Universiti Sains Malaysia, Malaysia) .....	591
<i>Audio Beam Steering With Array Phased Method</i> Amaro Da Silva Gaviola (Institut Teknologi Sepuluh Nopember, Indonesia), Muhammad Rivai (Institut Teknologi Sepuluh Nopember, Indonesia), Hendra Kusuma (Institut Teknologi Sepuluh Nopember, Indonesia) .....	597
<i>Correlated Double Ring Channel Model at High Speed Environment in Vehicle to Vehicle Communications</i> Wahyu Pamungkas (Institut Teknologi Telkom Purwokerto & Departemen Teknik Elektro, Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia), Titiek Suryani (Institut Teknologi Sepuluh Nopember, Indonesia), Iwan Wirawan (ITS, Indonesia) .....	601

## Parallel Session 5-A

<i>Moving Object Tracking Using Hybrid Method</i> Galandaru Swalaganata (Institut Agama Islam Negeri Tulungagung, Indonesia), Muniri Muniri (Institut Agama Islam Negeri Tulungagung, Indonesia), Yessi Affriyenni (Gadjah Mada University, Indonesia) .....	607
<i>Herbal Leaf Classification Using Images in Natural Background</i> Affix Mareta (Universitas Gadjah Mada, Indonesia), Indah Soesanti (Universitas Gadjah Mada, Indonesia), Oyas Wahyunggoro (UGM, Indonesia) .....	612
<i>Granuloma Image Detection Through Periapical Radiograph by Using Gabor Wavelet Method and Support Vector Machine Classification</i> Muhammad Fadhil Zuandi (Telkom University, Indonesia), Bambang Hidayat (Telkom University, Indonesia), Suhardjo Sitam (Padjajaran University, Indonesia) .....	617
<i>Non-Blind RGB Image Watermarking Technique using 2-Level Discrete Wavelet Transform and Singular Value Decomposition</i> Yudit Arum Mekarsari (Dian Nuswantoro University, Indonesia), De Rosal Ignatius Moses Setiadi (Dian Nuswantoro University, Indonesia), Christy Atika Sari (Dian Nuswantoro University, Indonesia), Eko Hari Rachmawanto (Dian Nuswantoro University, Indonesia), Muljono Muljono (Dian Nuswantoro University, Indonesia) .....	623
<i>Sliding Window Method for Eye Movement Detection based on Electrooculogram Signal</i> Catur Atmaji (Universitas Gadjah Mada, Indonesia), Agfianto Eko Putra (Universitas Gadjah Mada, Indonesia), Arrijal Hanif (Electronics and Instrumentation, Indonesia) .....	628
<i>Modeling of Head Movements Towards Lateral Acceleration Direction via System Identification for Motion Sickness Study</i> Sarah 'atifah Binti saruchi (Universiti Teknologi Malaysia, Malaysia), Hatta Ariff (Universiti Teknologi Malaysia, Malaysia) .....	633
<i>Similarity Measures of Object Selection in Interactive Applications based on Smooth Pursuit Eye Movements</i> Herlina Herlina (Universitas Gadjah Mada, Indonesia), Igi Ardiyanto (Universitas Gadjah Mada & Faculty of Engineering, Indonesia), Sunu Wibirama (Universitas Gadjah Mada, Indonesia) .....	639

<i>Classification of Arabica and Robusta Coffee Using Electronic Nose</i> Dike Magfira (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	645
--	-----

## Parallel Session 5-B

<i>Xbee Pro Module Application in to Organize and Monitoring Earthquake Disaster Locations with the Robot Control System</i> Ade Wasti AW, Aw (Department of Poltythecnic Sriwijaya & Sriwijaya Company, Indonesia), Rosita Febriani Rftn, RFN (Department of Polytechnic Sriwijaya & Sriwijaya Company, Indonesia), Sholihin Hin, SHN (State of Polytechnic Sriwijaya & State of Polytechnic Sriwijaya, Indonesia), Eka Susanti Tekasanti, ESN (Department of Poltythecnic Sriwijaya & Poltythecnic Company, Indonesia), Emilia Hesti Eml, Ehn (Department of Poltythecnic Sriwijaya & Sriwijaya Company, Indonesia) .....	651
<i>Design of Fractional-Order Proportional-Integral-Derivative Controller: Hardware Realization</i> Ibnu Masngut (Universitas Gadjah Mada, Indonesia), Gilang Nugraha Putu Pratama (Universitas Gadjah Mada, Indonesia), Adha Imam Cahyadi (Universitas Gadjah Mada, Indonesia), Samiadji Herdjunto (Universitas Gadjah Mada, Indonesia), John Fisher Jefferson Pakpahan (Universitas Gadjah Mada, Indonesia) .....	656
<i>A Remedy Design of PI Controller for Liquid Level Control</i> Tri Astuti Rahmawati (Universitas Gadjah Mada, Indonesia), Ni'matul 'Abdah Adhiya Fakhriy (Universitas Gadjah Mada, Indonesia), Gilang Nugraha Putu Pratama (Universitas Gadjah Mada, Indonesia), Adha Imam Cahyadi (Universitas Gadjah Mada, Indonesia), Samiadji Herdjunto (Universitas Gadjah Mada, Indonesia) .....	661
<i>Door Automation System Based on Speech Command and PIN Using Android Smartphone</i> Retha Arifin (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	667
<i>Disturbance Compensation Using CTC with NDOB for Formation Control of Mobile Robots</i> Arya Kusumawardana (ITS, Indonesia) .....	673
<i>Control System Based On Fuzzy Logic In Nutmeg Oil Distillation Process For Energy Optimization</i> Syamsul Syamsul (Politeknik Negeri Lhokseumawe, Indonesia), Rudi Syahputra (Lecturer, Indonesia), Suherman Suherman (Lecturer, Indonesia) .....	679
<i>A Modified Algorithm for Full Fuzzy Transportation Problem with Simple Additive Weighting</i> Muhammad Sam'an (Diponegoro University, Indonesia), Farikhin Farikin (Faculty of Science and Mathematics, Diponegoro University, Indonesia, Indonesia), Bayu Surarso (Faculty of Science and Mathematics, Diponegoro University, Indonesia), Solichin Zaki (Faculty of Science and Mathematics, Diponegoro University, Indonesia) .....	684



## Parallel Session 5-C

<i>On the Modeling of The Average Value of High School National Examination in West Java Using Bayesian Hierarchical Mixture Normal Approach</i> Dapih Dapih (Institut Teknologi Sepuluh Nopember, Indonesia), Nur Iriawan (Institut Teknologi Sepuluh Nopember, Indonesia), Kartika Fithriasari (Institut Teknologi Sepuluh Nopember, Indonesia) .....	689
<i>Transportation Choice Modeling on Commuter in Jabodetabek Using Bayesian Network and Polytomous Logistic Regression</i> Ratih Kusuma Dewi (Institut Teknologi Sepuluh Nopember, Indonesia), Nur Iriawan (Institut Teknologi Sepuluh Nopember, Indonesia), Irhamah Irhamah (Institut Teknologi Sepuluh Nopember, Indonesia) .....	695
<i>The Effectiveness of Peripheral Interaction Concept for Mobile Phone Usage while Driving</i> Kristian Nugraha (Duta Wacana Christian University, Indonesia) .....	701
<i>Performance Analysis of vDesktop using PCoIP Accelerator VS vSGA-Based on VMware Environment - A Case Study at UKRIDA University</i> Marcel Yap (Krida Wacana Christian University, Indonesia) .....	705
<i>Interaction Between Fluid and Solid Body Surfaces in Fluid Simulation using Material-Point Method</i> Tito Kesumo Siregar (Institut Teknologi Bandung, Indonesia), Rinaldi Munir (Bandung Institute of Technology, Indonesia), Dody Dharma (Institut Teknologi Bandung, Indonesia) .....	709
<i>Implementation of Numerical attribute Discretization for Outlier Detection on Mixed Attribute Dataset</i> Dwi Maryono (Universitas Sebelas Maret, Indonesia) .....	715
<i>Wavelet Based-Analysis of Alpha Rhythm on EEG Signal</i> Fera Lestari (Institut Teknologi Sepuluh November, Indonesia) .....	719
<i>Implementation of Real-Time Scanner Java Language Text with Mobile Vision Android Based</i> Fariz Dzulfiqar Nurzam (AMIKOM University, Indonesia), Emha Taufiq Luthfi (Universitas AMIKOM Yogyakarta, Indonesia) .....	724

## Parallel Session 5-D

<i>Modelling of Driver`s Steering Behavior Control in Emergency Collision Avoidance by using Focus Time Delay Neural Network</i> Nurhaffizah Hassan (Universiti Teknologi Malaysia, Malaysia), Hatta Ariff (Universiti Teknologi Malaysia, Malaysia) .....	730
<i>Detection of Unstable Approaches in Flight Track with Recurrent Neural Network</i> Aini Hanifa (Institut Teknologi Bandung, Indonesia), Saiful Akbar (Institut Teknologi Bandung, Indonesia) .....	735
<i>Implementation of the Semantic Web in Business Process Modeling Using Petri Nets</i> Yutika Amelia Effendi (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	741

<i>Problem Transformation Methods For Prediction of Opinion and Exceptions In Financial Statements Audit Reports: Case For Financial Statements Audit In Central Kalimantan Province</i>	
Allantutra Guslawa (Institut Teknologi Sepuluh Nopember, Indonesia), E Endroyono (ITS & Institut Teknologi Sepuluh Nopember, Indonesia), Supeno Mardi Susiki Nugroho (Institut Teknologi Sepuluh Nopember, Indonesia) .....	747
<i>Modeling The Household Milk Consumption Data by Endogenous Bayesian Tobit Quantile (BTQ) Regression in Sidoarjo</i>	
Sartika Ayu Wulandari (Institut Teknologi Sepuluh Nopember, Indonesia), Ismaini Zain (Institut Teknologi Sepuluh Nopember, Indonesia), Santi P Rahayu (Institut Teknologi Sepuluh Nopember, Indonesia) .....	753
<i>Spatial Probit Regression Model: Recursive Importance Sampling Approach</i>	
Taufiq Dewanto (Institut Teknologi Sepuluh Nopember, Indonesia), Vita Ratnasari (Institut Teknologi Sepuluh Nopember Surabaya, Indonesia), Puhadi Puhadi (Sepuluh Nopember Institute of Technology, Indonesia) .....	759
<i>The Implementation of E-Government Through Social Media Use In Local Government of Solo Raya</i>	
Andre N. Rahmanto (Sebelas Maret University, Indonesia), Chairul Huda Atma Dirgatama (Sebelas Maret University, Indonesia) .....	765
<i>Dynamical characteristics of the FSO transmission capacity in the presence of Rician turbulence</i>	
Stefan Panić (University of Niš & University of Priština, Serbia), Hranislav Milosevic (Faculty of Natural Sciences and Mathematics, University of Priština, Serbia), Vladeta Milenkovic (Faculty of Electrical Engineering, Serbia), Selena Vasić (Faculty of Information Technology, University of Metropolitan, Belgrade, Serbia) .....	769

## Parallel Session 6-A

<i>An Initial Research on Halstead's Technique For Programming Pattern Study</i>	
Yulius Denny Prabowo (Kalbis Institute, Indonesia) .....	773
<i>Optimal capacitor placement and economic analysis for reactive power compensation to improve system's efficiency at Bosowa Cement Industry, Maros</i>	
Syahrul Mustafa (Universitas Hasanuddin, Indonesia) .....	778
<i>Model Predictive Control on Dual Axis Solar Tracker using Matlab/Simulink Simulation</i>	
Muhammad Ikhwan (Sepuluh Nopember Institute of Technology, Indonesia), Mardlijah Mardlijah (Institut Teknologi Sepuluh Nopember, Indonesia), Chairul Imron (Institut Teknologi Sepuluh Nopember Surabaya (ITS), Indonesia) .....	784
<i>Using CVRP Model in Designing Decision Support System for Optimizing Distribution Route and Amounts of Utilized Vehicles</i>	
La Ode Mohamad Zulfiqar (Universitas Diponegoro, Indonesia) .....	789
<i>Optimal bonding arrangement for protection of communication signals in the oil and gas industry</i>	
Febby Purnama Madrin (E LIFE SOLUTIONS PLT, Malaysia), Muhammad Akmal Ayob (Universiti Teknologi Malaysia, Malaysia), Mostafa SayahKarajy (UTM, Malaysia), Hazrul Izwan Hussien (Petronas Global Technical Solution Sdn Bhd, Malaysia), Mohammad Akmal Abu Taib (Petronas Global Technical Solution Sdn Bhd, Malaysia), Mohamad Faudzi (Petronas Global Technical Solution Sdn Bhd, Malaysia), Eko Supriyanto (UTM, Malaysia) .....	793

<i>Design of Transmissive Huygens Metasurface Using Modified Cross and Patch Structure</i> Ashif Aminulloh Fathnan (Indonesian Institute of Science, Indonesia) .....	798
<i>Dual-Stage Flyback Inverter Controlled by Sensorless Current for Microinverter</i> Miftakhul Huda (State Polytechnic of Malang, Indonesia) .....	802
<i>A Double Stage Micro-Inverter for Optimal Power Flow Control in Grid-Connected PV System</i> A. Khabib (State Polytechnic of Malang, Indonesia) .....	808

## Parallel Session 6-B

<i>Determine The Best Option for Nearest Medical Services Using Google Maps API, Haversine and TOPSIS Algorithm</i> Yuda Harja (Institut Teknologi Sepuluh Nopember, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia) .....	814
<i>Cooling Load Calculation of Cold Storage Container for Vegetables, Case Study C Campus-UISI, Ngipik</i> Shanti Sari (Universitas Internasional Semen Indonesia, Indonesia), Niken Pratami (Universitas Internasional Semen Indonesia, Indonesia) .....	820
<i>An Identification of Success of Academic System Application Using Delone and McLean Design</i> Salahudin Robo (Universitas Atmajaya Yogyakarta, Indonesia), Djoko Budiyanto Setyohadi (Universitas Atma Jaya Yogyakarta, Indonesia), Albertus Joko Santoso (Universitas Atma Jaya Yogyakarta, Indonesia) .....	827
<i>Breakdown Voltage for Mixed CF<sub>3</sub>CHCl<sub>2</sub>+N<sub>2</sub> Gases as Gas Insulation Application</i> Tedy Juliandhy (Gadjah Mada University, Indonesia) .....	833
<i>Life Cycle Management on the Operation of 400 MW Power Generation</i> Ali Yusni, Yus (INSTITUT TEKNOLOGI BANDUNG, Indonesia) .....	838
<i>Inventory Control System with Safety Stock and Reorder Point Approach</i> Devi Efrilianda (Universitas Diponegoro, Indonesia), Mustafid Mustafid (Diponegoro University, Indonesia), R Rizal Isnanto (Diponegoro University, Indonesia) .....	844
<i>Rain Detection System for Estimate Weather Level Using Mamdani Fuzzy Inference System</i> Ahmad Yusuf Ardiansyah (Institut Teknologi Sepuluh Nopember & Indonesia, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Oxy Giandi (Institut Teknologi Sepuluh Nopember & ITS, Indonesia) .....	848

## Parallel Session 6-C

<i>Efficient Skyline-based Web Service Composition with QoS-awareness and Budget Constraint</i> Vynska Amalia Permadi (Sepuluh Nopember Institute of Technology, Indonesia) .....	855
<i>CCTV Traffic congestion analysis at Pejompongan using case based reasoning</i> Surjandy Surjandy (Bina Nusantara University, Indonesia), Firman Anindra (Universitas Nasional & BINUS University, Indonesia) .....	861

<i>Goal Programming to Optimize Time and Cost for each Activity in Port Container Handling</i> Aulia Tegar Rahman (Institut of Technology Sepuluh November, Indonesia), Riyanarto Sarno (Institut Teknologi Sepuluh Nopember, Indonesia), Yutika Amelia Effendi (Institut Teknologi Sepuluh Nopember, Indonesia) .....	866
<i>Development of Smart Public Transportation System in Jakarta City based on Integrated IoT Platform</i> Dina Fitria Murad, DFM (Bina Nusantara University, Indonesia) .....	872
<i>Data Partition and Hidden Neuron Value Formulation Combination in Neural Network Prediction Model Case Study: Non-Tax Revenue Prediction for Indonesian Government Unit</i> Fadly Anshori Lubis (Institut Teknologi Bandung, Indonesia), Albarda Albarda (Institut Teknologi Bandung, Indonesia) .....	879
<i>Data Mining Technique With Cluster Analysis Use K-Means Algorithm For LQ45 Index On Indonesia Stock Exchange</i> Andreas R Condrobimo (Bina Nusantara University, Indonesia) .....	885
<i>Hybrid Singular Spectrum Analysis-ARIMA Modelling for Direct and Indirect Forecasting of Farmer's Term of Trade in East Java</i> Dyah Reni Irmawati (Institut Teknologi Sepuluh Nopember, Indonesia), Mohamad Atok (Institut Teknologi Sepuluh Nopember, Indonesia), Suhartono Suhartono (Institut Teknologi Sepuluh Nopember, Indonesia) .....	889
<i>An Artificial Neural Network with Bagging to Address Imbalance Datasets on Clinical Prediction</i> Izhan Fakhruzi (Marmara University, Turkey) .....	895

## Parallel Session 6-D

<i>Doppler Effect in VANET Technology on High User's Mobility</i> Wahyu Pamungkas (Institut Teknologi Telkom Purwokerto & Departemen Teknik Elektro, Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia), Titiek Suryani (Institut Teknologi Sepuluh Nopember, Indonesia) .....	899
<i>Pathloss Modeling Based On Measurement At 3 Ghz for On body Area Network Application</i> Kurnia Kartika (Institut Teknologi Sepuluh Nopember, Indonesia) .....	905
<i>Spatial Optimization on Placement BTS and MCP by Utilizing Data Coordinates Existing Tower</i> Prasetyo Yuliantoro (Institut Teknologi Sepuluh Nopember, Indonesia), E Endroyono (ITS & Institut Teknologi Sepuluh Nopember, Indonesia), Achmad Affandi (Institut Teknologi Sepuluh Nopember, Indonesia) .....	911
<i>Design of Land Optical Fiber Backbone Communication Network in North Sumatera</i> Yudiansyah Yudiansyah (University of Indonesia, Indonesia), Prita Dewi Mariyam (Universitas Indonesia, Indonesia), Arie Pangesti Aji (Universitas Indonesia, Indonesia), Novietasari Chisnariandini (University of Indonesia, Indonesia), Catur Apriono (Universitas Indonesia, Indonesia) .....	915
<i>Regulatory Challenges of Broadband Communication Services from High Altitude Platforms (HAPs)</i> Diah Yuniarti (Ministry of Information and Communication Technology, Indonesia) .....	919
<i>Low-Cost Portable Spectrometer for Lard Detection based on SVM Method</i> Dyah Anggraeni (UIN Sunan Gunung Djati & Bolabot Techno Robotic Institute, Indonesia), W. S. Mada Sanjaya (UIN Sunan Gunung Djati Bandung, Indonesia) .....	923

<i>Segmentation of MRI Images for Brain Cancer Detection</i>	
Wassim El Hajj Chehade (Beirut Arab University, Lebanon) .....	929
<i>Makhraj Recognition of Hijaiyah Letter for Children Based on Mel-Frequency Cepstrum Coefficients (MFCC) and Support Vector Machines (SVM) Method</i>	
Dyah Anggraeni (UIN Sunan Gunung Djati & Bolabot Techno Robotic Institute, Indonesia), W. S. Mada Sanjaya (UIN Sunan Gunung Djati Bandung, Indonesia) .....	935

Author	Session	Start page	Title
<b>A</b>			
Abdelhamid, Bassant	4D.6	585	
Abramova, Karina	3C.8	343	
Abu Taib, Mohammad Akmal	6A.5	793	
Adji, Teguh	3C.11	360	
	2A.2	84	
	2A.3	90	
Affandi, Achmad	6D.3	911	
Affriyenni, Yessi	5A.1	607	
Aji, Ahmad	3A.1	254	
Aji, Arie Pangesti	6D.4	915	
Akbar, Saiful	5D.5	735	
Akmal Almafaluti, Ahmad Andi	4A.5	454	
Albarda, Albarda	6C.5	879	
Alham, Nur	4D.2	566	
Amelia, Mia	4C.7	515	
Anggraeni, Dyah	3D.5	407	
	6D.6	923	
	6D.8	935	
Anindra, Firman	3A.4	270	
	6C.2	861	
Apriliana, Amrina	3C.13	373	
Apriono, Catur	6D.4	915	
Ardiansyah, Ahmad	6B.7	848	
Ardiyanto, Igi	5A.11	639	
	2A.2	84	
	2A.3	90	
	3C.10	355	
Areni, Intan Sari	3B.6	304	
Ariessanti, Hani	2B.13	125	
Ariff, Hatta	5D.2	730	
	5A.10	633	
	2A.5	102	
Arifin, Achmad	4B.2	477	
Arifin, Retha	5B.6	667	
Arisal, Andria	4C.10	525	
Arisha, Bella	4A.2	436	
	4A.1	429	
Ariyanti, Yuliana	2B.15	136	
Asfani, Dimas	4D.2	566	
Asmara, Rosa	1D.2	50	
Asor, Jonardo	2A.4	96	
Astuti, Yani	1D.3	56	
	2C.11	191	
Atma Dirgatama, Chairul	5D.11	765	
Atmaji, Catur	5A.9	628	
Atok, Mohamad	6C.7	889	
Auliasari, Karina	1D.4	62	
AW, Ade Wasti	5B.2	651	
Ayob, Muhammad Akmal	6A.5	793	
Azvy, Sefryan	1C.1	25	

<b>B</b>		
Badriyah, Tessy	1C.1	25
Bejo, Agus	3C.14	379
Binanto, Iwan	1C.4	41
Binti saruchi, Sarah 'atifah	5A.10	633
Budianto, Aris	2B.15	136
Buditjahjanto, I. G. P. Asto	4A.4	448
<b>C</b>		
Cahyadi, Adha Imam	5B.4	661
	5B.3	656
Cahyapratama, Afrianda	2D.15	234
Cahyono, Dwy Bagus	4B.10	500
Cahyono, Muhammad Ridwan Arif	2D.8	220
Catedrilla, Gene Marck	2A.4	96
Chisnariandini, Novietasari	6D.4	915
Choirunnisa, Shabrina	3B.13	332
Chong, Yung-Wey	4D.7	591
Condrobimo, Andreas	6C.6	885
Corradini, Andrea	3C.8	343
Corradini, Andrea	3C.8	343
<b>D</b>		
Dahlan, Akhmad	3A.8	292
Dapiah, Dapiah	5C.1	689
de Silva, Rohan	2C.1	168
Dewantara, Belly	4D.2	566
Dewanto, Taufiq	5D.10	759
Dewi, Ratih	5C.2	695
Dharma, Dody	5C.6	709
Djalal, Muhammad	4D.3	572
Dwijotomo, Abdurahman	2A.5	102
<b>E</b>		
Ebian, Ahmed	4D.6	585
Effendi, Yutika	5D.6	741
	4A.8	471
	6C.3	866
	2D.17	244
	3C.13	373
Efrilianda, Devi	6B.6	844
Ekohariadi, Ekohariadi	4A.4	448
El Hajj Chehade, Wassim	6D.7	929
El-Ramly, Salwa	4D.6	585
Emesowum, Humphrey	1A & 1B.3	10
Eml, Emilia Hesti	5B.2	651
Endroyono, E	6D.3	911
	5D.8	747
Erlita, Sri	4A.2	436
Estrada, Jheanel	2A.4	96
	2B.18	152
<b>F</b>		
Fahrizal, Ferry	2A.1	78
Fajar, Aziz	3A.2	259
Fakhriy, Ni'matul	5B.4	661

Fakhruzi, Izhan	6C.8	895
Farikin, Farikhin	5B.9	684
	3A.6	280
Fathnan, Ashif Aminulloh	6A.6	798
Faudzi, Mohamad	6A.5	793
Fauzan, Abd. Charis	3A.2	259
	3B.13	332
Ferdita Nugraha, Anggit	3B.7	310
Firdaus, Muhammad Nuur	1D.3	56
Fithriasari, Kartika	5C.1	689
Fu, JiaHui	1A & 1B.1	1
	1A & 1B.2	6
<b>G</b>		
Gaviola, Amaro	4D.8	597
Giandi, Oxsy	6B.7	848
	4B.7	489
Guslawata, Allantutra	5D.8	747
<b>H</b>		
Hadi Sirad, Mochammad Apriyadi	4D.3	572
Hadis, Muhammad Sabirin	3D.3	396
Handayani, Tri	4C.7	515
Hanif, Arrijal	5A.9	628
Hanifa, Aini	5D.5	735
Hardi, Muhamad	1D.3	56
Hardiyati, Ria	4C.7	515
Hari Purwanto, Febryan	3D.2	390
Harimurti, Rina	4A.6	460
	4A.4	448
Harja, Yuda	6B.1	814
Harjoko, Agus	1D.1	45
Hartanto, Rudy	3C.10	355
Hartono, Yusuf	4A.1	429
Hassan, Nurhaffizah	5D.2	730
Hatta, Puspananda	3A.1	254
Hattori, Motonobu	2D.3	208
	2D.4	214
Hayashi, Kunioki	2D.13	226
Hendra, Akbar	3D.3	396
Herdjunanto, Samiadji	5B.4	661
	5B.3	656
Herlina, Herlina	5A.11	639
Hidayat, Bambang	5A.6	617
Hidayat, Risanuri	3C.3	337
	3C.14	379
Hin, Sholihin	5B.2	651
	3D.4	401
Huda, Miftakhul	6A.7	802
Hudaya, Chairul	4B.11	506
Hussien, Hazrul Izwan	6A.5	793
<b>I</b>		
Ibnugraha, Prajna	3A.5	275
Ikhwan, Muhammad	6A.3	784



Ilham, Amil Ahmad	3D.3	396
Imron, Chairul	6A.3	784
Indrawati, Indrawati	4A.2	436
Insap Santosa, Paulus	3A.5	275
Irhamah, Irhamah	5C.2	695
Iriawan, Nur	5C.1	689
	5C.2	695
Irmawati, Dyah	6C.7	889
Iskandar, Karto	1C.2	30
Islamadina, Raihan	3C.12	366
Isnanto, R Rizal	6B.6	844
	3A.6	280

### J

Juliandhy, Tedy	6B.4	833
Julianto S, Mochamad	2C.3	174
Jupri, M.	3B.5	297

### K

Kartika, Kurnia	6D.2	905
Kartika, Vinda	3D.7	418
Kasana, Reena	2C.4	180
Kesumo Siregar, Tito	5C.6	709
Khabib, A.	6A.8	808
Khalil, Muhammad	1C.3	36
Khotimah, C.	3B.10	326
Kumar, Sushil	2C.4	180
Kurniawan, Novianto	4B.10	500
Kurniawan, Robert	3B.9	321
Kusuma, Hendra	4D.8	597
Kusumaningrum, Retno	4C.8	520
Kusumawardana, Arya	5B.7	673
Kuswanto, Heri	4A.3	442

### L

Labayne, Jonalyn Joy	2B.18	152
Lathifah, Nurani	4B.5	483
Lestari, Destina	4D.5	579
Lestari, Fera	5C.9	719
Lim, Siew-Hoon	4D.7	591
Linawati, Linawati	2B.20	163
Liu, Xuan	3A.8	292
Lubis, Arif Ridho	2A.1	78
Lubis, Fadly Anshori	6C.5	879
Lubis, Muharman	2A.1	78
Luthfi, Emha Taufiq	5C.10	724
	4C.12	537
	2A.8	120

### M

Madrin, Febby Purnama	6A.5	793
Magfira, Dike	5A.12	645
Mahardika, Lutfi	3D.1	384
Mardlijah, Mardlijah	6A.3	784
Mareta, Affix	5A.5	612
Mariyam, Prita Dewi	6D.4	915

Maryamah, Maryamah	4A.7	466
Maryono, Dwi	5C.7	715
Masngut, Ibnu	5B.3	656
Mbuyu, Sumbwanyambe	2A.7	114
Meidyani, Biandina	4C.16	555
Mekarsari, Yudit Arum	5A.8	623
Mercado, Lester	2B.18	152
Mihuandayani, Mihuandayani	4C.12	537
	4C.15	549
Milenkovic, Vladeta	5D.12	769
Milosevic, Hranislav	5D.12	769
MohamadTahir, Hatim	2A.1	78
Muljono, Muljono	5A.8	623
Munemasa, Isshu	2D.13	226
Munir, Rinaldi	5C.6	709
Munir, Rinaldi	2C.3	174
Muniri, Muniri	5A.1	607
Munoto, Munoto	4A.4	448
Murad, Dina	6C.4	872
Muslim, Much Aziz	2B.16	141
Mustafa, Syahrul	6A.2	778
Mustafid, Mustafid	6B.6	844
Muthavhine, Khumbelo Difference	2A.7	114
<b>N</b>		
Nadeak, Inosensius	4A.2	436
Nadhiroh, Irene	4C.7	515
Nasution, Bahrul	3B.9	321
Ng, Qi-Guan	4D.7	591
Ningrum, Indrianingrum	2B.13	125
Nisar, Shibli	1A & 1B.4	16
Norsanto, Deno	2B.17	146
Ntyo, Efan	2D.8	220
Nugraha, Kristian	5C.4	701
Nugraha, Putu Virga Nanta	3C.3	337
Nugroho, Lukito	3A.5	275
Nurjanah, Dade	4C.13	543
Nurlaili, Afina	4A.7	466
	4C.16	555
Nurrahmi, Hani	4C.10	525
	4C.13	543
Nurtanio, Ingrid	3B.6	304
Nurzahputra, Aldi	2B.16	141
Nurzam, Fariz	5C.10	724
<b>O</b>		
Omar, Rashid	3A.3	266
Orisa, Mira	1D.4	62
<b>P</b>		
Pakpahan, John	5B.3	656
Palantei, Elyas	3D.3	396
Palgunadi, Sarngadi	1D.1	45
Pambudi, Dwi	4B.2	477
Pamungkas, Bayu Putra	1D.3	56

Pamungkas, Wahyu	6D.1	899
	4D.9	601
Panić, Stefan	5D.12	769
Penangsang, Ontoseno	1C.3	36
Permadi, Vynska	6C.1	855
Permatasari, Desi Indah	4A.1	429
Prabowo, Yulius	6A.1	773
Pradipta, Andri	2C.14	202
Pradipta, Ayudha Nandi	4B.11	506
Pramono, Eko	3D.2	390
Prasetiyo, Budi	2B.16	141
Prastyo, Dedy	3B.10	326
Pratama, Gilang	5B.4	661
	5B.3	656
Pratama, Irfan	3B.7	310
Pratami, Niken	6B.2	820
Pristyanto, Yoga	3B.7	310
Pujiantara, Margo	4D.5	579
Pujiantara, Rachmad	2C.13	196
Purbaya, Muhammad Eka	3C.11	360
Purhadi, Purhadi	5D.10	759
Purnami, Santi	3B.10	326
Purnomo, Mauridhi	4A.6	460
	4D.5	579
	4A.5	454
Purwanto, Djoko	3D.6	412
	3D.7	418
Purwanto, Wawan	4D.1	561
Puspita, Fitri Maya	4A.1	429
	4A.2	436
Putra, Agfianto	5A.9	628
Putri, Andi	4D.3	572

## R

Rachmawanto, Eko	5A.8	623
	2C.10	186
	2C.11	191
Rachmawanto, Eko	1D.3	56
Rahardi, Gamma	3D.6	412
Rahardika, Ano	3C.9	348
Rahayu, Dwi	2A.8	120
Rahayu, Santi	5D.9	753
Raheem, Odai H.	1A & 1B.2	6
	1A & 1B.1	1
Rahmad, Cahya	1D.2	50
Rahmah, Isna	1D.2	50
Rahmaida, Rizka	4C.7	515
Rahman, Aulia	6C.3	866
Rahmanto, Andre	5D.11	765
Rahmatullah, Daeng	4D.5	579
Rahmawati, Tri	5B.4	661
Rais, Muhammad Rais	4D.3	572
Ramandita, Herda	4C.15	549
Ratnaningsih, Tri	1D.1	45

Ratnasari, Vita	2A.6	108
	5D.10	759
Rftn, Rosita Febriani	3D.4	401
	5B.2	651
Riawan, Dedet	2C.14	202
Rintyarna, Bagus	4B.8	495
Ritfhs, R A Halimah Tussadyah	3D.4	401
Rivai, Muhammad	4B.2	477
	3D.6	412
	3D.7	418
	4D.8	597
Robo, Salahudin	6B.3	827
Rosmansyah, Yusep	2B.17	146
Rozie, Andri	4C.10	525
Rumiati, Agnes	2A.6	108

## S

Sabilla, Shoffi	2D.17	244
Sam'an, Muhammad	5B.9	684
Sammadikun, Waliyuddin	3D.8	424
Sanjaya, W.	3D.5	407
	6D.6	923
	6D.8	935
Santoso, Albertus	6B.3	827
Santoso, Heru Agus	2C.10	186
Sari, Christy	1D.3	56
	2C.10	186
	2C.11	191
	5A.8	623
Sari, Devni	2B.14	131
Sari, Shanti	6B.2	820
Sarno, Riyanarto	3A.7	286
	5D.6	741
	2D.15	234
	4B.7	489
	3A.2	259
	4B.8	495
	4A.8	471
	4A.7	466
	6C.3	866
	5B.6	667
	6B.7	848
	3B.5	297
	2D.17	244
	4C.16	555
	6B.1	814
	3B.13	332
	5A.12	645
	3C.13	373
Sastra, Nyoman Putra	2B.20	163
SayahKarajy, Mostafa	6A.5	793
Setiadi, De Rosal Ignatius Moses	2C.10	186
	2C.11	191
	5A.8	623

Setiawan, Andika	1D.1	45
Setiawan, Noor Akhmad	3C.11	360
Setiawan, Ryan	3A.7	286
Setiowati, Sulis	2A.3	90
Setya Putra, Rahardyan	4C.11	531
Setyanto, Arief	4C.15	549
Setyohadi, Djoko	6B.3	827
Sidehabi, Sitti Wetenriajeng	3B.6	304
Silalahi, Mesnan	4C.7	515
Singh, Prabhu Jyot	2C.1	168
Sitam, Suhardjo	5A.6	617
Siv, Ratha	3C.10	355
Soedibyo, Soedibyo	2C.14	202
Soesanti, Indah	5A.5	612
Soleh, Oleh	2B.13	125
Subali, Made Agus Putra	4A.8	471
Sudibyo, Usman	1D.3	56
Suhardi, Suhardi	4B.10	500
Suhartono, Suhartono	4A.3	442
	6C.7	889
Suherman, Suherman	5B.8	679
Sukadarmika, Gede	2B.20	163
Sulistyowati, Ratna	4A.3	442
Sumafta, Ikhwan	4C.15	549
Supriyanto, Eko	6A.5	793
Surarso, Bayu	5B.9	684
Surjandy, Surjandy	6C.2	861
	4B.12	511
Suryani, E	1D.1	45
Suryani, Titiek	6D.1	899
	4D.9	601
Susiki, Supeno	4A.5	454
Susiki Nugroho, Supeno Mardi	4A.6	460
	5D.8	747
Suyanto, Mohammad	Opening Ceremony + Key Note Speakers.2	72
Suyuti, Ansar	3B.6	304
Swalaganata, Galandaru	5A.1	607
Syahputra, Rudi	5B.8	679
Syamsul, Syamsul	5B.8	679
Syarif, Iwan	1C.1	25
<b>T</b>		
Takagi, Tomohiro	2D.13	226
Tanuar, Evawaty	2D.16	240
Tekasanti, Eka Susanti	3D.4	401
	5B.2	651
Tindi, Arifin	3B.8	315
Tjahyanto, Aris	3C.9	348
Tjahyanto, Ir. Aris	3A.3	266
Tomomatsu, Yuta	2D.13	226
Triasmoro, Sony	2A.6	108
<b>U</b>		
Utami, Ema	4C.11	531

	3D.2	390
Utami, Emma	4C.12	537
	2A.8	120
Utomo, Muhammad Nur Yasir	2A.2	84
<b>V</b>		
Vasić, Selena	5D.12	769
<b>W</b>		
Wahyunggoro, Oyas	5A.5	612
Wawan, Yuliawan	2B.13	125
Wibirama, Sunu	3C.3	337
	5A.11	639
Wibowo, Agung	2D.18	250
Wibowo, Ferry Wahyu	Opening Ceremony + Key Note Speakers.2	72
Wibowo, Rony	1C.3	36
Widjanarko, Agus	4C.8	520
Wiharto, Wiharto	1D.1	45
Wihidayat, Endar	3A.1	254
Wijayanti, Rini	4C.10	525
Winursito, Anggun	3C.14	379
Wirawan, Iwan	4D.9	601
Wu, Zhijun	3A.8	292
Wulandari, Sartika	5D.9	753
<b>X</b>		
Xiao, Lu	2B.19	158
<b>Y</b>		
Yamasari, Yuni	4A.6	460
	4A.4	448
Yap, Khong-Lim	4D.7	591
Yap, Marcel	5C.5	705
Yu, Hao	2B.19	158
Yuana, Rosihan	2B.15	136
Yuananda, Arga	4B.8	495
Yudiansyah, Yudiansyah	6D.4	915
Yuliantoro, Prasetyo	6D.3	911
Yulistya Negara, I Made	4D.2	566
Yuniarti, Diah	6D.5	919
Yusni, Ali	6B.5	838
Yuwono, Wiratmoko	1C.1	25
<b>Z</b>		
Zain, Ismaini	5D.9	753
Zaki, Solichin	5B.9	684
Zamli, Kamal	Opening Ceremony + Key Note Speakers.1	67
Zhang, GuanDong	2B.19	158
Zuandi, Muhammad Fadhil	5A.6	617
Zuhrufillah, Irfani	3A.6	280
Zulfiqar, La Ode	6A.4	789

# Improving Visual Presentation of Bas Relief Image from Historical Temple

Karina Auliasari

Department of Informatics  
National Institute of Technology (ITN Malang)  
Malang, Indonesia  
karina.auliasari86@gmail.com

Mira Orisa

Department of Informatics  
National Institute of Technology (ITN Malang)  
Malang, Indonesia  
mir4\_orisa@yahoo.co.id

**Abstract**—Two stages are developed in this research namely optimal pre-processing and main-processing. The pre-processing is to enhance the presentation of image relief by using contrast stretching, histogram equalization and adaptive histogram equalization. Here the presentation of image is vital for the input of main process. Three operations of image enhancement are employed to improve image contrast, including contrast stretching, histogram equalization and adaptive histogram equalization. Comparison between contrast stretching with  $\alpha$  value 1.1 and histogram equalization show that the gray-level of histogram equalization result are distributed. Experiment of show that the adaptive histogram equalization has produced the best image enhancement. After doing image enhancement the next step is to do threshold and edge detection operations. This procedure enhances horizontal or vertical edge of the figure. The image enhancement operation is very useful to remove the illumination no uniformities. Threshold process using Otsu algorithm shows that both of LPF kernel 1 and 2 output image have a similar result rather than LPF kernel 3. Three of LPF kernels has produced two different threshold values. Kapur algorithm show that both of LPF kernel 2 dan 3 output image have a similar result of rather than LPF kernel 1 output image. The experiment also show that Sobel and Canny operators has enhanced edges and weaken weak textures.

**Keywords**— *relief image; image enhancement; image analysis*

## I. INTRODUCTION

A relief is a sculptured artwork carved on the surface of the stone or wood. There are three types of relief namely as high relief, bas reliefs and sunken relief [1]. High relief have standout from the surface of the field. Meanwhile high relief could be found in the monument [2]. In Bas relief only half have standout from the surface. However in sunken relief, the relief have carved on the surface. In Indonesia many temple have applied bas relief as ornament style. A skillfull handrafter is needed to restore of the temple because the works involve manual crafting of complicated figures and symbols found in every area of the temple. A relief have various meaning or stories and purpose. A symbols or figures in relief contains but human figures, animals and plants shape which are symbolic not naturalists. The animals and plants have a tendency to fill relief field beside the human figure.

Each relief is observed to obtained the description or stories about the figure. This process produce the description of every icons from the relief. Most of the temples on Java island experience some damage due to their age that have been existed on earth for hundreds years. The damages involve obsolescent, flaking, perforated and changes color [2]. These damages affect the shape of the figures or symbols of relief. Therefore to restore them, complicated works are required that involve the works of archeologists or other related reseacher to analyze the meaning of relief.

A number of research papers related to the use of image processing methods in the relief image are studied. A report of the literature review is presented here. Belhumeur *et. al* [3] developed some algorithm to reconstruct surface of bas relief. Their works require a structure of transformation from a shape to a corresponding bas relief. The technique employs shading and shadowing that are identical if the viewer's perspective changes slightly around an orthogonal view. However, if an optimum angle of view is exceeded, it produce distortion and unnatural results. This approach therefore ultimately relies on human perception. Weyrich *et. al* [4] demonstrated a technique to produce seamless reliefs that stitches figures with multiple heights. The example of this work is to generate a collage or a cubism-like piece of art. This approach lead to a noticeable reduction of user defined parameters. The result show that this approach is much simpler and faster without sacrificing the quality of the output. Kerber *et. al* [5] employed a single scale approach for unsharp masking in a bilateral filter. This approach is to smooth the gradient signal. A bilateral filter is known for its edge preserving nature. When being applied to a set of figures with different height, the algorithm ensures the sharpness of curvature extrema as they appear at ridges and valleys. Alexa and Matusik [6] created reliefs that present different appearance when the reliefs were illuminated from different direction of light sources. Instead of exposing relief to one constant lighting, they are capable of producing bas reliefs that contain information about a pair of input images. Their method was the first attempt to exploit the nature of reliefs. The complexity to retrieve edges from natural image object is high and indeed become an open research issue [7]. This study aims to automate the process of understanding temple relief, despite the difficulties to analyze the contents of

natural images. This research also proposes several methods of image enhancement and image analysis to improve image visual quality of bas relief. The purpose is to restore the shape of the figures or symbols on the relief.

## II. METHOD

The objective of the research is to improve visual presentation of relief images found in historical temples. Each fragment from the collection of relief images consists of several figures, in which the conditions of some of them experiences damage condition. The damage is due to obsolescent, flaking, perforated and changes color. Some stones are also experience eroded and mossy as shown in Fig. 1. Before processing the relief images, the size of image is set to 448 x 336 pixels in order to conserve memory usage and limiting the iteration.



Fig. 1. Relief image acquisition

The research aim to produce better relief image that involves image enhancement and segmentation process. Two main stages are included for visual analysis and object segmentation as shown in Fig. 2.

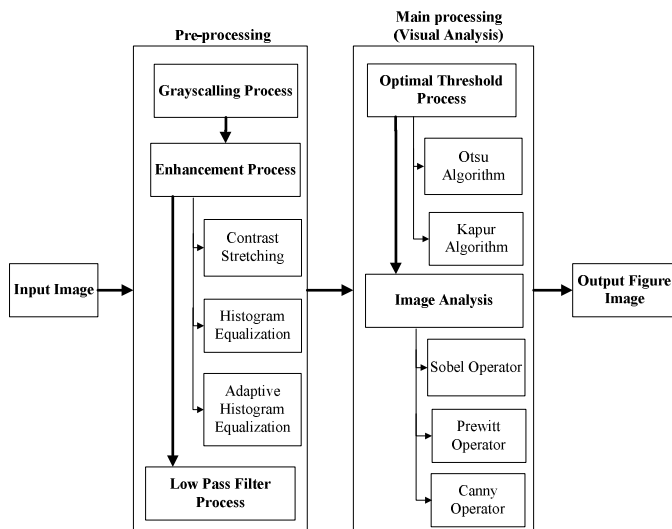


Fig. 2. Visual analysis and object segmentation stage

Several operations of image enhancement are employed to improve image contrast and spatial characteristics of image appearances such as reducing noise on distorted images, eliminating some form of focal and blur errors, modifying or correcting image geometry in order to combine many images. The digital image enhancement is to improve the visual quality from degraded image. The visual analysis stage is conducted on the result of three different image enhancement that include contrast stretching, histogram equalization and adaptive histogram equalization. Image enhancement using pixel point process to change the gray-level of each pixel in the input image to a new value. The general equation of point process follows formula 1, with M is an operation function with I as input pixel and O is the output. The brightness of an output pixel residing at coordinates (x,y) is equal to the brightness of input pixel at the same coordinate after being converted by the function M.

$$O(x,y) = M[I(x,y)] \quad (1)$$

One-by-one of the gray-level in the input image is modified to a new value and placed in the output image at the same spatial location. Using this operation, all pixels are modified individually in which the pixel at coordinates I(x,y) in the input image has been changed and returned to the output image at coordinate O(x,y) as shown in Fig. 3.

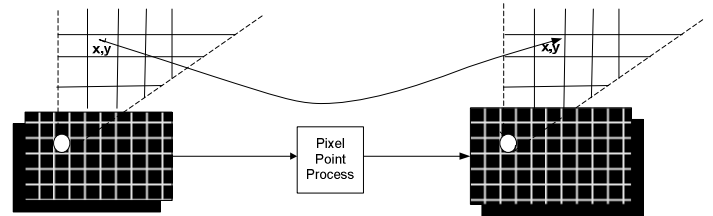


Fig. 3. Each pixel value in the input image is changed

Relief images with low-contrast and high-contrast are improved by pixel point process to change the intensity value of . The change of intensity value by contrast stretching operation is illustrated in mathematical equations as shown in Equation 2. Based on Equation 2 the contrast value is increased if the value of  $> 1$  and decreased if the value  $< 1$ .

$$O(x,y) = \alpha I(x,y) \quad (2)$$

Histogram equalization process is done by modifying the gray-level distribution into uniformity. The purpose of the histogram equalization is to obtain an even distribution of the histogram, so each degree of gray-level has a relatively equal number of pixels. Each degree of gray-level image is expressed by  $hist[k+1]$  where k is 0, 1, 2 to L-1, where L is the number of pixels of the gray-level. Histogram accumulation for all the pixels having k is represented by Equation 3. The next step the value of k replaced by the value of  $\alpha$  according to the function as shown in equation 4 where N is the number of pixels in the image.

$$c[k+1] = \sum_{i=1}^k hist[i], k = 0, 1, 2, \dots, L-1 \quad (3)$$

$$a_k = round\left((L-1) \frac{c[k+1]}{N}\right), k = 0, 1, 2, \dots, L-1 \quad (4)$$

The result of the developed algorithms for image



enhancement would be compared to its others based on the visual appearance of original image. The best approach of image enhancement is selected based on visual analysis and would be passed to the filtering stage. The filtering stage employ low-pass kernel in order to reduce the noise. This process employs convolution operation that modify the value of a pixel with a number of neighboring areas of pixels based on predetermined kernel. The kernel is operated by shifting in the input image. The kernel is multiplied by the pixel area of the input image to obtain a new value of the output pixel as shown in Fig. 4. Low-pass filter (LPF) is used to eliminate the noise of a relief image. The low-pass kernel of this experiment process is  $[1/9 \ 1/9 \ 1/9; \ 1/9 \ 1/9 \ 1/9; \ 1/9 \ 1/9 \ 1/9]$ ,  $[1/16 \ 1/8 \ 1/16; \ 1/8 \ 1/4 \ 1/8; \ 1/16 \ 1/8 \ 1/16]$  and  $[1/10 \ 1/10 \ 1/10; \ 1/10 \ 1/5 \ 1/10; \ 1/10 \ 1/10 \ 1/10]$ .

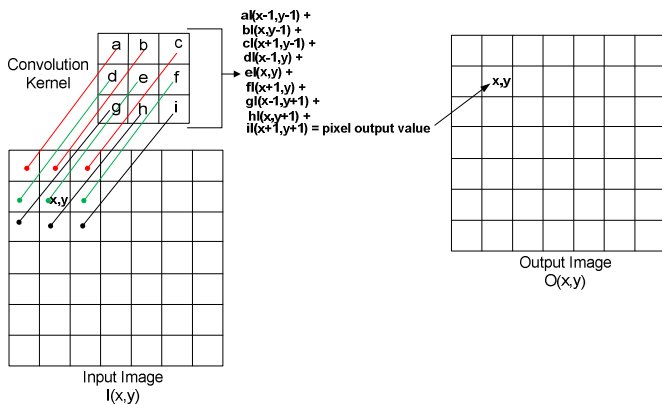


Fig. 4. The convolution process for the input image pixel  $I(x, y)$  modified on the output image pixel  $O(x, y)$

Next stages is to employ thresholding and edge detection in order to localize image object. The threshold consist of Otsu [8] and Kapur algorithm [9]. Here Otsu method help to determine threshold value by clustering foreground and background histogram, while Kapur method is operated based on entropy value.

### III. EXPERIMENT AND DISCUSSION

The data of relief images are obtained from several temple, located near Malang City, namely Candi Jago, Candi Kidal and Candi Singosari. Not all figures of reliefs have a complete shape. Some content of the relief image suffer from deterioration due to the condition of the temple. This condition show the complexity to deal with actual relief image obtained directly from the temple spot. Relief image prepared as input image has a dimensions of  $340 \times 648$  pixels. The beginning of all processes is to do image enhancement of the input image. Prior to the image repair process, the input image is converted into grayscale first. Contrast enhancement is applied for the input image that after from high contrast. The results show a gray-level composition on image histogram indicating that the pixel value is dominated by a low gray-level value. Contrast stretching operations has improved a low-contrast image, with three different  $\alpha$  values. The values is below 1 (0.8) and two values is more than 1 (1.1 and 1.4). The results of each  $\alpha$  value

are presented in Fig. 5. The result show that the  $\alpha$  value 1.1 has a wide range of values. The output image with  $\alpha$  value of 1.1 has no gray-level values dominating by dark or light color. The histogram of this result indicates a relatively uniform gray-level value. The comparison between contrast stretching with  $\alpha$  value 1.1 and histogram equalization indicate that the gray-level of histogram equalization result are distributed. The output image from this comparison show that histogram equalization has more clear presentation than contrast stretching, that makes the relief object is more visible. A comparison result between histogram equalization and adaptive histogram equalization is shown in Fig. 6. The histogram equalization show good result but the gray-level change unnaturally and not significantly. The adaptive histogram equalization is capable of presenting a sharp object shape. Fig. 6 shows that the adaptive histogram equalization produces the best image enhancement.

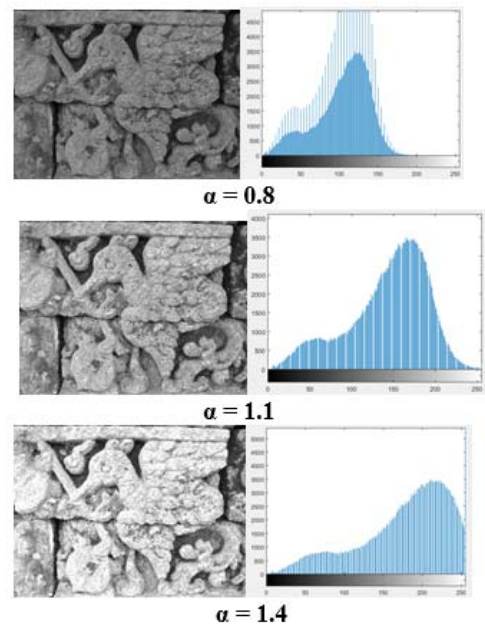


Fig. 5. Result of stretching contrast operation

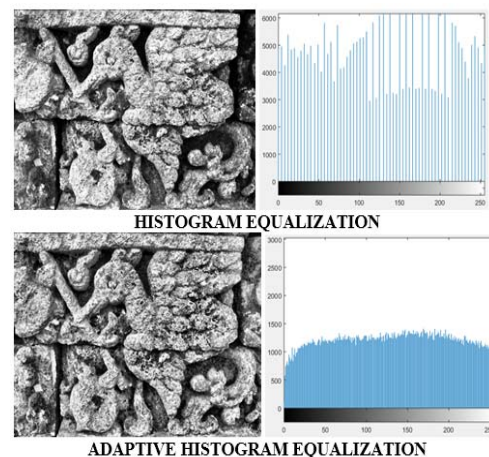


Fig. 6. Result histogram equalization and adaptive histogram equalization

The validity of the enhancement also be evaluated by image analysis process that employ threshold process and edge detection in order to localize image object. The threshold process using Otsu and Kapur algorithm [8], [9] are shown in Fig. 7. Before Otsu and Kapur algorithm is applied low-pass filter is used to pass smooth areas by considering both global and local information in the image. Three different kernel of LPF are employed. The results are shows in Fig. 7.

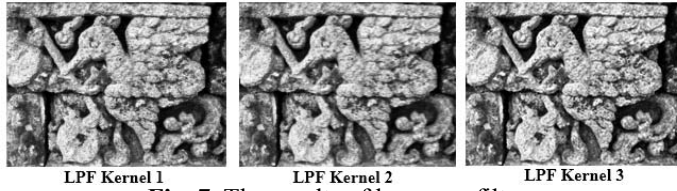


Fig. 7. The results of low-pass filter

Threshold process using Otsu algorithm deliver two different threshold values. Low-pass filter with kernel 1 and kernel 2 have the same threshold values (0.4784) using Otsu algorithm. Different value has produced by low-pass filter with kernel 3 where threshold value is 0.475. Otsu algorithm shows that both of LPF kernel 1 and 2 output image have a similar result rather than LPF kernel 3. This result is because of three LPF kernels have produced two different threshold values. Kapur algorithm with LPF kernel 2 and kernel 3 have the same threshold values (124). Different threshold value has produced by LPF kernel 1 where threshold value is 125. Kapur algorithm shown that both of LPF kernel 2 dan 3 have a similar result rather than LPF kernel 1. Both output image of Otsu and Kapur threshold process are shown in Fig. 8. Edge detection results using Sobel, Prewitt and Canny operators are shown in Fig. 8. The result show that both (Sobel and Canny) operators have enhanced edges and weaken weak textures. Fig. 9 also shows the effect of using Prewitt operator that smooth areas of an image, but some edge of the object is gone.

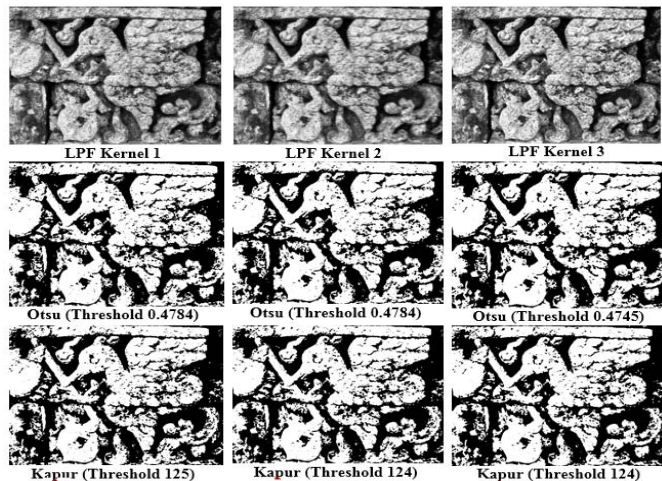


Fig. 8. The results of Otsu and Kapur algorithm

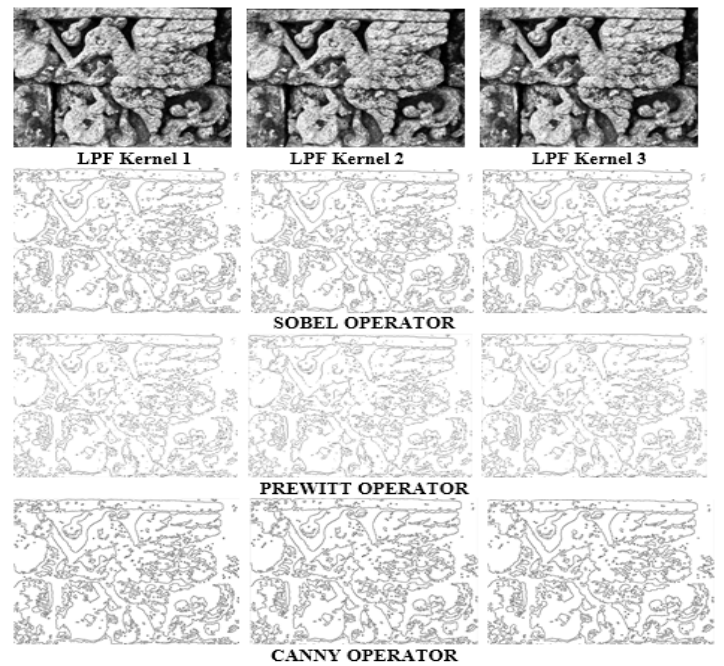


Fig. 9. Segmentation results of Sobel, Prewitt and Canny

#### IV. CONCLUSION

The experimental result shows a gray-level composition on image histogram that indicates the domination of low grayscale value. Contrast stretching operations improves a low-contrast image, with three different  $\alpha$  values. The values is below 1 (0.8) and two values is more than 1 (1.1 and 1.4). The  $\alpha$  value 1.1 has a wide range of values with no gray-level values dominating by dark or light colors, the histogram of this result indicates a relatively uniform gray-level value. The comparison between contrast stretching with  $\alpha$  value 1.1 and histogram equalization indicate that the gray-level of histogram equalization result are distributed. The output image from this comparison show that histogram equalization has more clear presentation than contrast stretching, that makes the relief object is more visible. Adaptive histogram equalization has produced the best image enhancement based on the analysis of experimental result. The validity of the enhancement is also evaluated by image analysis that employs threshold and edge detection in order to localize image object. Threshold process using Otsu algorithm deliver two different threshold values. Low-pass filter with kernel 1 and kernel 2 have same threshold values (0.4784) using Otsu algorithm. Different value has produced by low-pass filter with kernel 3 where threshold value is 0.475. Otsu algorithm shows that both of LPF kernel 1 and 2 output image have a similar result rather than LPF kernel 3. This result is because of three LPF kernels that produce two different threshold values. Kapur algorithm with LPF kernel 2 and kernel 3 have the same threshold values (124). Different threshold value is produced by LPF kernel 1 where threshold value is 125. Kapur algorithm shows that both of LPF kernel 2 dan 3 output image have a similar result of threshold value rather than LPF kernel 1. Sobel and Canny operators is shown to be significantly better than Prewitt operator. Because the edges of Sobel and Canny operators contains more edge pixels than Prewitt operator.

## ACKNOWLEDGMENT

This work is supported by the Research Grant 2017, Research on Beginner Lecturer Scheme from Directorate General of Higher Education, Ministry of Research and Technology and Higher Education Republic of Indonesia.

## REFERENCES

- [1] Rogers, L.R., 1974. Relief sculpture. Oxford University Press, Oxford.
- [2] Fitriana, I., 2014. Tim Ahli Jerman Teliti Kerusakan Batu Relief Candi Borobudur. access in [www.kompas.com](http://www.kompas.com) at July 2017.
- [3] Belhumeur, P.N., Kriegman, D.J. and Yuille, A.L., 1999. The bas-relief ambiguity. *International Journal of Computer Vision*, 35(1), 33-44.
- [4] Weyrich, T. Deng, J., Barnes, C., Rusinkiewicz, S. and Finkelstein A., 2007. Digital bas-relief from 3D scenes. *ACM Transactions on Graphics*, 26(3), 32-39.
- [5] Kerber, J., Tevs, A., Belyaev, A., Zayer, R. and Seidel, H.P., 2009. Feature Sensitive Bas Relief Generation. *IEEE International Conference on Shape Modelling and Applications*, 148-154.
- [6] Alexa, M. and Matusik, W., 2010. Reliefs as images. *ACM Transactions on Graphics*, 29(4), 1-7.
- [7] C. Crysdian. 2017 *Performance measurement without ground truth to achieve optimal edge*. *International Journal of Image and Data Fusion*, Taylor and Francis Group (available at <https://doi.org/10.1080/19479832.2017.1384764>).
- [8] Otsu, N., 1979. A Threshold Selection Method from Gray-Level Histograms. *IEEE Transaction on Systems, Man and Cybernetics*, Vol. SMC-9, No. 1, January 1979.
- [9] Kapur, J.N, Sahoo, P.K. and Wong, A.K.C., 1985. A New Method for Gray-Level Picture Thresholding Using Entropy of the Histogram, *Computer Vision, Graphics and Image Processing*, Vol. 29, 273-285.
- [10] Maini, R. and Aggarwal, H., 2009. Study and Comparison of Various Image Edge Detection Techniques. *International Journal of Image Processing*, 3(1),1-11.
- [11] Polesel, A., Ramponi, G. and Mathews, J.V., 2000. Image Enhancement via Adaptive Unsharp Masking. *IEEE Transaction on Image Processing*. Vol. 9, No. 3, March 2000.
- [12] Cheng, H.D. and Shi, X.J., 2004. A Simple and Effective Histogram Equalization Approach to Image Enhancement. *Digital Signal Processing*, Vol. 14, 158-170.
- [13] Ibrahim, H. and Kong, N.S.P., 2007. Brightness Preserving Dynamic Histogram Equalization for Image Contrast Enhancement. *IEEE Transaction on Consumer Electronics*, Vol. 53, No.4, November 2007.
- [14] Liu, S., Martin, R.R, Langbein, F.C. and Rosin, P.L. 2007. Segmenting Geometrics Reliefs from Textured Background Surfaces. *Computer-Aided Design & Applications*, Vol.4, Nos. 1-4.
- [15] Gu, K.G.G.Z., Lin, W. and Liu, M. 2015. The Analysis of Image Contrast : From Quality Assesment to Automatic Enhancement. *IEEE Transaction on Cybernetics*, 2168-2267.
- [15] Sinha, K. and Sinha,G.R. 2014. Efficient Segmentation Methods for Tumor Detection in MRI Images *IEEE Student's Conference on Electrical, Electronics and Computer Science*.
- [16] Tochon, G., Feret, J.B., Valero, S., Martin, R.E., Knapp, D.E., Salembier, P.J., Chanussot and Asner, G.P. 2015 On the use of binary partition trees for the crown segmentation of tropical rainforest hyperspectral images. *Remote Sensing Environment*, vol. 159, pp. 318-331.
- [17] Salman, N. 2006. Image Segmentation Based on Watershed and Edge Detection Techniques. *The International Arab Journal of Information Technology*, vol. 3, no.2.
- [18] G. Tochon, J.B. Feret S. Valero, R.E. Martin, D.E. Knapp, P. Salembier, J. Chanussot, and G.P. Asner. 2015 *On the use of binary partition trees for the crown segmentation of tropical rainforest hyperspectral images*. *Remote Sensing Environment*, vol. 159, pp. 318-331.
- [19] I. Isgum, M.J.N.L Benders, B. Avants, M.J. Cardoso, S.J. Counsell, E.F. Gomez, L. Gui, P.S. Huppi, K.J. Kersbergen, A. Markopoulos, A. Melbourne, P. Moeskops, C.P. Mol, M. Kuklisova-Murgasova, D. Rueckert, J.A. Schnabel, V. Srhoj-Egekher, J. Wu, S. Wang, L.S de Vries and M.A. Viergever. 2015 *Evaluation of automatic neonatal brain segmentation algorithms : The NeoBrainS12 challenge*. *Medical Image Analysis*, vol. 20, pp. 135-151.
- [20] L. Yuan, Q. Yu, C. Shen, W. Hu, and Z. Yang. 2016 *New Watershed segmentation algorithm based on hybrid gradient and self-adaptive marker extraction*. *Proceedings of IEEE 2nd International Conference on Computer and Communications*, 978-1-4673-9026-2,pp. 624-628.
- [21] A. Campbell, P. Murray, E. Yakushina, S. Marshall, and W. Ion. 2017 *Automated microstructural analysis of titanium alloys using digital image processing*. *Proceedings of 4th International Conference recent Trends in Structural Materials (IOP Conference Series : Materials Science and Engineering 179 (2017) 012011)*, doi: 10.1088/1757-899X/179/012011).
- [22] A. Galibourg, J. Dumoncel, N. Telmon, A. Calvet, J. Michetti and D. Maret. 2017 *Assessment of automatic segmentation of teeth using a watershed-based method*. *The British Institute of Radiology (available at https://doi.org/10.1259/dmfr.20170220)*.
- [23] T. Kavzoglu and H. Tonbul. 2017 *A Comparative study of segmentation quality for multi-resolution segmentation and watershed transform*. *Proceedings of IEEE 8th International Conference on Recent Advances in Space Technologies (RAST 2017)*.
- [24] J.B.T.M. Roerdink and A. Meijster. 2001. *The watershed transform : definitions, algorithms and parallelization strategies*. *Fundamenta Informaticae*, vol. 41, pp. 187-228.
- [25] N. Amoda and R.K. Kulkarni. 2013. *Image segmentation and detection using watershed transform and region based image retrieval*. *International Journal of Emerging Trends & Technology in Computer Science*, vol. 2.
- [26] A. Chadha and N. Satam. 2013. *A robust rapid approach to image segmentation with optimal thresholding and watershed transform* *International Journal of Computer Applications*, vol. 65, no. 9.





# *Certificate of Participation*

This certificate is awarded to

# Karina Auliasari

who has participated in The International Conference on  
INFORMATION AND COMMUNICATIONS TECHNOLOGY 2018 (ICOIACT-2018)  
Yogyakarta - Indonesia, 6-8 March 2018

General Chair of ICOIACT 2018



Arief Setyanto, S.Si., M.T., Ph.D.

Organized by:



Sponsored by:

