2017 15th INTERNATIONAL CONFERENCE on QiR

(Quality in Research)

INTERNATIONAL SYMPOSIUM ON ELECTRICAL AND COMPUTER ENGINEERING

ISBN : 978-1-5090-6397-0

XPLORE COMPLIANT

Organized by:

UNIVERSITAS INDONESIA

FACULTY OF ENGINEERING

in conjunction with:

IEEE 6th IEEE International Conference on Advanced Logistics and Transport (ICALT 2017)

SAREK International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA)

International Conference on Dwelling Form I-DWELL

3rd Binnual Meeting on Bioprocess Engineering

isBE 2nd International Symposium on Biomedical Engineering

Co-Hosted by:

UNIVERSITAS UDAYANA FAKULTAS TEKNIK

POLITEKNIK NEGERI BALI

The Westin Resort Nusa Dua, Bali

24-27 July 2017

QiR THE 15th INTERNATIONAL CONFERENCE
The Westin Resort Nusa Dua, Bali

International Symposium on Electrical and Computer Engineering

24 – 27 July 2017

Bali, Indonesia

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PREFACE

WELCOME FROM THE RECTOR OF UNIVERSITAS INDONESIA

It is both a pleasure and honor for me to welcome you all to the 15th International Conference on QiR (Quality in Research) 2017 in Nusa Dua, Bali, Indonesia.
Universitas Indonesia strives to be one of the leading research universities and the most outstanding academic institution in the world. UI is distinctive among research universities in its commitment to the academic invention and research activities through various scientific programs. QiR 2017 is our main academic conference in the field of engineering and technology which has been successfully held for the last two decades. It is our hope that this world class scientific program would showcase our scientists and researchers achievements and provide forums for scientific exchanges in their respective fields.

The theme this year of 'Science, Technology and Innovation for Sustainable World', is very relevant with the fact that the globalization today results in very competitive atmosphere in all aspects. However, this flourishing competition should consider the harmony and balance between human needs and the environment quality for creating favorable sustainable future. Scientists and researchers, hand in hand with industrial experts are creating and developing new sustainable technologies that enable us to make products and services more efficient, design better buildings, produce safer cars, keep people healthier and building smarter cities.

I extend my sincere thanks to the Faculty of Engineering Universitas Indonesia, supporting parties and institutions for their participation and contributions in QiR 2017. I would also thank our colleagues from Universitas Udayana and Politeknik Negeri Bali for their gracious support and hospitality. Additionally, I extend a hearty thank you to the members of the organizing committees for dedicating their valuable time so that each one of us enjoys an exceptional conference program over the next several days. May we have a successful, stimulating, fruitful and rewarding conference.

Prof. Dr. Ir. Muhammad Anis, M.Met.
Rector
Universitas Indonesia

PREFACE

WELCOME FROM THE DEAN OF FACULTY OF ENGINEERING UNIVERSITAS INDONESIA

Welcome to the 15th International Conference on QiR (Quality in Research) 2017. The Faculty of Engineering Universitas Indonesia is delighted to host our flagship international academic event this year back in Bali, Indonesia. This two-day, biennial conference is presented together with our co-hosts Universitas Udayana and Politeknik Negeri Bali with the hope that this would be able to provide an international media for exchange of the knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of science, technology and innovation.

The main theme for this year conference, "Science, Technology and Innovation for Sustainable World" is consistent with the mission of our faculty to be a leading institution with the initiatives that responds to local, national and global societal needs. In that context, the Faculty of Engineering Universitas Indonesia is performing state-of-the arts research and development in engineering and architecture areas which results in technology and innovation which contribute to sustainable development at both national and global level. QiR 2017 provides platforms and forums to disseminate our scientific achievements and exchange information with our counterparts from Indonesia and all over the world. This event will allow for further research and education collaborations between Universitas Indonesia and its partners worldwide.

I would like to express my deepest appreciation to our sponsors, supported parties and various contributors for their never ending supports of this conference. I would also like to convey my gratitude to all of our distinguished speakers for making the time to share their knowledge with us. To our fellow researchers and/or practitioners from Indonesia and overseas, welcome and enjoy your stay in this Nusa Dua, Bali. I would also like to invite all participants in expressing our appreciation to all members of the QiR 2017 organizing committee for their hard work in making this conference success.

Prof. Dr. Ir. Dedi Priadi, DEA
Dean Faculty of Engineering
Universitas Indonesia

PREFACE

WELCOME FROM THE QiR 2015 ORGANIZING COMMITTEE

On behalf of the organizing committee, it is a great pleasure for us to welcome you to the 15th International Conference on Quality in Research (QiR) 2017 to be held in Bali, Indonesia on July, 24 – 27, 2017. This biennial event is co-organized with the Faculty of Engineering Universitas Udayana and Politeknik Negeri Bali.

The main theme for this year conference is "Science, Technology and Innovation for Sustainable World". Under this theme the conference focuses on the innovative research and contribution in science and technology toward achieving sustainable world. In line with this theme, it is our utmost pleasure to hold the QiR 2017 in conjunction with the 6th IEEE-International Conference on Advanced Logistics and Transport (ICALT), the 2nd International Symposium on Biomedical Engineering (ISBE 2017), International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA) and the 3rd Biannual Meeting on Bioprocess Engineering.

The QiR 2017 brings together national and international academicians, researchers, executives, government, industrial and business officials, practitioners and leaders to present and discuss a vast range of engineering, architectural designs and community development based on green and smart technology. It is our hope and aim that this conference would be able to provide an international media for exchange of the knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of science, technology and innovation. Furthermore, QiR 2017 benefits industry sector, since it would create a close contact between and among the audiences. The audiences mostly come from different job and activities: therefore this is a great potential and opportunity to meet each other, creating fruitful discussions and broaden business relationship.

QiR has been growing, since its first event two decades ago, into our flagship academic event with international reputation. This year, we have received almost 1000 submissions from more than 26 countries. Along with our events in conjunction, more than 500 oral and poster presentations is scheduled with expected 700 participants gather in the event.
On behalf of QiR 2017 committee, we would like to thank all of our speakers, participants, contributors, partners and professional associations for their generous contributions. We also would like to acknowledge the support from our International Advisory Board members and distinguished reviewers. Last but not least, a special thanks to our local co-organizer, Universitas Udayana and Politeknik Negeri Bali.
We wish all of you a productive and rewarding conference, also a pleasant and memorable stay in Nusa Dua, Bali, Indonesia.
Thank you and we hope to see you again in QiR 2019.

Ardiyansyah, Ph.D.
General Chair of QiR 2017 Organizing Committee

KEYNOTE SPEAKER

- **Dr. Thomas J. Goldsby** | Ohio State University, USA.
- **Prof. Jackie Yi-Ru Ying** | Institute of Bioengineering and Nanotechnology in Singapore
- **Prof. Dr. Drs. Benyamin Kusumoputro, MSc.** | Universitas Indonesia, Indonesia

INVITED SPEAKER

- **Prof. Dr. Yifan CHEN, FIET, SMIEEE** | University of Waikato, New Zealand
- **Prof. Dr.-Ing Ir. Kalamullah Ramli, M.Eng.** | Universitas Indonesia, Indonesia

KEYNOTE SPEAKER

Thomas Goldsby
Ohio State University

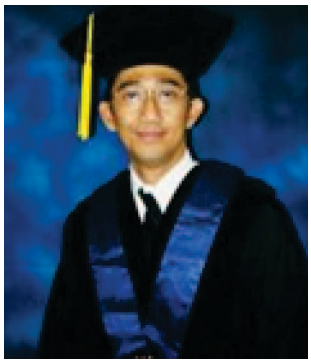
Dr. Thomas J. Goldsby is a Harry T. Mangurian, Jr. Foundation Professor in Business and Professor of Logistics at The Ohio State University. He holds a B.S. in Business Administration from the University of Evansville, M.B.A. from the University of Kentucky, and Ph.D. in Marketing and Logistics from Michigan State University. He is the Co-Editor-in-Chief of the Journal of Business Logistics and former Editor of Transportation Journal. He serves as Associate Director of the Center for Operational Excellence (COE), a Research Fellow of the National Center for the Middle Market, and a research associate of the Global Supply Chain Forum, all housed at Ohio State's Fisher College of Business.
His research interests include logistics strategy, supply chain integration, and the theory and practice of lean and gile supply chain strategies. He has published more than 50 articles in academic and is the co-author of five books and is a proud recipients of: the Best Paper Award at the Transportation Journal (2012-2013), Bernard J. LaLonde Award at the Journal of Business Logistics (2007), and has twice received the Accenture Award for best paper published in the International Journal of Logistics Management (1998 and 2002). Dr. Goldsby has received recognition for excellence in teaching at Iowa State University, The Ohio State University, and The University of Kentucky.

Jackie Yi-Ru Ying
Institute of Bioengineering and Nanotechnology in Singapore

Prof. Jackie Yi-Ru Ying was born in Taipei in 1966. She earned a B.Eng. degree, graduating summa cum laude from Cooper Union in 1987. She then attended Princeton University, receiving her MA in 1988 and her PhD in 1991, both in chemical engineering. She spent a year as a Humboldt Fellow at the Institute for New Materials in Saarbrücken and researched nanocrystalline materials with Herbert Gleiter. Prof. Ying became a professor in the Department of Chemical Engineering at the Massachusetts Institute of Technology (MIT) in 1992. She was made a full professor in 2001; at 35 she was one of MIT's youngest full professors. She returned to Singapore in 2003 to serve as the first executive director of the Institute of Bioengineering and Nanotechnology, a division of the Agency for Science, Technology and Research (A*STAR). Her research concerns the biomedical and catalytic applications of nanostructured systems and materials.
She was elected to the Singapore Women's Hall of Fame in 2014. She was one of the recipients of the inaugural 2015 Mustafa Prize awarded by the Mustafa Science and Technology Foundation. She was also awarded the "Top Scientific Achievement" award for "her great scientific and technological contributions and achievements to the synthesis of well-designed advanced nanostructured materials and systems, nanostructured biomaterials and miniaturisedbiosystems for various interesting applications".

KEYNOTE SPEAKER

Benyamin Kusumoputro
Universitas Indonesia



Prof. Dr. Drs. Benyamin Kusumoputro, MSc is a Professor in Computer Intelligence in the Electrical Engineering Department, Faculty of Engineering Universitas Indonesia. He was born in Bandung on November 17th, 1957. He graduated from Bandung Institute of Technology in 1981 with a Bachelor Degree in Physics and was awarded a Master of Engineering Science in Optoelectronics and Laser Applications from Universitas Indonesia, and a Doctoral degree in Engineering from Electrical and Electronics Engineering Department, Bio- sensors, Tokyo Institute of Technology, Tokyo, Japan in 1993. His interest area of research includes: Development of Computational Intelligence and Methodology for Artificial Senses.

He is a member of Institute of Electrical Engineering of Japan (IEEJ), International Society for Optical Engineering (SPIE), International Association of Science and Technology for Development (IASTED), and World Scientific and Engineering Academy and Society (WSEAS). Some of the awards he has received are: Bronze Medal of Civil Servant, Government of Indonesia, 2005; University Research Achievement, Universitas Indonesia in 2005; and representing Universitas Indonesia in the National Outstanding Lecture Competition in 2016.

INVITED SPEAKER

Yifan Chen
University of Waikato

Dr. Yifan Chen is a Professor of Engineering and the Associate Dean of External Engagement for the Faculty of Science and Engineering and the Faculty of Computing and Mathematical Sciences in the University of Waikato, Hamilton, New Zealand. His current research interests include electromagnetic medical imaging and diagnosis, transient communication with application to healthcare, touchable communication and computation with application to targeted drug delivery and contrast-enhanced medical imaging, fundamentals and applications of nanoscale and molecular communications, and channel modelling for next-generation wireless systems and networks.
He is the Coordinator of the European FP7 "CoNHealth" project on intelligent medical ICT, an elected Working Group Co-leader of the European COST Action TD1301 "MiMed" project on microwave medical imaging, an Advisory Committee Member of the European Horizon 2020 "CIRCLE" project on molecular communications, a Voting Member of the IEEE Standards Development Working Group 1906.1 on nanoscale and molecular communications, an Editor for IEEE ComSoc Best Readings in Nanoscale Communication Networks and IEEE Access Special Section in Nano-antennas, Nano-transceivers, and Nano-networks/Communications, and a Vice Chair of the IEEE Nano-scale, Molecular and Quantum Networking Emerging Technical Subcommittee. He is a Fellow of IET and a Senior Member of IEEE.

Kalamullah Ramli
Universitas Indonesia

Prof. Kalamullah Ramli is a Professor in Computer Engineering since July 1, 2009. He finished his Master in Telecommunication Engineering at University of Wollongong, NSW, Australia, in 1997. He then continued his Doktorarbeit on Computer Networks in year 2000 at Universitaet Duisburg-Essen, NRW, Germany, and obtained his Dr.-Ing. in year 2003. His research interests include embedded system, network and information security, computer and communications, and intelligent transportation system. Prof. Kalamullah Ramli was the Director General of Post and ICT Operations of the Ministry of Communication and Information Technology (2013 - 2016). Prof. Kalamullah Ramli has many collaboration work between universities from German, Italy and Malaysia. One of his collaboration received an "AsiaLink" grant from the European Comission between 2005 - 2007 to deliver an initiative named "Improving Mobility of Student between Europe and ASEAN" which resulted in a prototype model of Credit Transfer System Platform between ASEAN and Europe. Based on this experience he was elected as one of the speaker on ASAIHL Conference on December 2008 in Jakarta. This ASAIHL is managed by ASEAN Universities to implement a platform for Credit Transfer System between Universities in ASEAN.

LIST OF REVIEWERS

No.	First Name	Last Name	Affiliation
1	Aji Nur	Widyanto	Universität Duisburg-Essen
2	Abdul	Halim	Universitas Indonesia
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31	Naufan	Raharya	The University of Sydney
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PLACE & DATE OF THE EVENT

Date : 24 – 27 July 2017
Location : BICC the Westin, Nusa Dua, Bali.

The Arrangement of the QiR 2017 Conference can be seen at the table below

Date	Time	Program
24 July	03.00-05.00 p.m	Registration and Welcome Cocktails
25 July	Full Day	Exhibition
	08.30-10.15 am	Opening Ceremony
	10.15-10.30 am	Coffee break
	10.30-11.15 am	Plenary Lecture 1 Prof. Benyamin Kusumoputro
	11.15-12.00 pm	Plenary Lecture 2: Prof. Thomas Goldsby
	01.00-03.00 pm	Parallel Session
		Each parallel session will be started with presentation by Invited Speakers
	03.00-03.30 pm	Poster Session Day 1
		Coffee break
	03.30-06.00 pm	Parallel Session
	06.00-07.00 pm	Poster Session Day 1
	07.00-09.00 pm	Banquette Dinner
26 July	Full Day	Exhibition
	08.30-10.00 am	Parallel Session
		Each parallel session will be started with presentation by Invited Speakers
	10.00-10.30 am	Poster Session Day 2
		Coffee break
	10.30-12.00 pm	Parallel Session
	12.00-01.00 pm	Lunch
		Poster Session Day 2
	01.00-02.00 pm	Plenary Lecture 3 Prof. Jackie Y. Ying
	01.00-03.00 pm	Parallel Session
	03.00-03.30 pm	Coffee break
	07.00-09.00 pm	Dinner and Closing Ceremony
27 July	08.00am-08.00 pm	Social Tour

E Plenary

Tuesday, July 25, 2017 13.00-13.30

Medan Room 2nd fl

Invited Speaker : Professor Yifan Chen, FIET, SMIEEE (The University of Waikato, NZ)

E Plenary

Tuesday, July 25, 2017 13.30-14:00

Medan Room 2nd fl (Moderator : Dr. Muhammad Suryanegara)

Invited Speaker : Professor Kalamullah Ramli (Universitas Indonesia)

E 1 : Communication System and Signal Processing 1

Tuesday, July 25, 2017 13.30-15.00

Medan Room 2nd fl (Chair Session: Prof. Hana Baili)

No	Paper #	ID	Author	Title	Affiliation	Time
1	307	E1 - 1	Hana Baili	Propagation of Chaos in Power Control Games for Energy-Efficient Wireless Networks	Centrale Supelec, France	14.00-14.15
2	622	E1 - 3	Rizal Munadi, Eka Firdaus, Teuku Yuliar Arif and Fitri Yuli Zulkifli	An Evaluation of DNS Server Health of State-Owned Universities in Sumatera Island	Syiah Kuala University, Indonesia	14.30-14.45
3	297	E1 - 4	Dini Fronitasari and Dadang Gunawan	Palm Vein Recognition by Using Modified Local Binary Pattern (LBP) for Extraction Feature	Universitas Indonesia, Indonesia	14.45-15.00

E 2 : Computer Engineering 1						
Tuesday, July 25, 2017 15.15-18.00						
Medan Room 2nd fl (Session Chair: Prof. Poki Chen (NTUST) / Dr. Mat Syai'in)						
No	**Paper #**	**ID**	**Author**	**Title**	**Affiliation**	**Time**
1	890	E2 - 1	Intan Ari Budiastuti, Supeno Mardi Susiki Nugroho and Mochamad Hariadi	Predicting Daily Consumer Price Index Using Support Vector Regression Method	Sepuluh Nopember Institute of Technology (ITS), Indonesia	15.15-15.30
2	85	E2 - 3	I Putu Deny Arthawan Sugih Prabowo, Eko Nugroho and Rudy Hartanto	Analysis on The Green IT Applications Usage for The Firm's Competitive Advantage Strategy	Gadjah Mada University, Indonesia	15.45-16.00
3	479	E2 - 5	Moch Syamsul Arifin Sidik, Mat Syai'In, Sryang Tera Sarena, Lilik Subiyanto, Rachmad Tri Soelistijono, Joko Endrasmono, Annas Singgih Setyoko, Aang Wahidin and Adi Soeprijanto	Smart Vending Machine Based on SMS Gateaway for General Transactions	Shipbuilding Institute of Polytechnic Surabaya, Indonesia	16.15-16.30
4	715	E2 - 6	Putu Manik Prihatini, I Ketut Gede Darma Putra, Ida Ayu Dwi Giriantari and Made Sudarma	Indonesian Text Feature Extraction using Gibbs Sampling and Mean Variational Interference Latent Dirichlet Allocation Indonesian Documents	Udayana University, Indonesia	16.30-16.45

5	873	E2 - 7	Asri Yulianti, Surya Sumpeno and Mauridhi Hery Purnomo	Majority Vote Technique Based On Multi Rough Set for Multi Attributes Decision-Making System	Sepuluh Nopember Institute of Technology (ITS), Indonesia	16.45-17.00

E 3A : Electronic Devices and Semiconductor 1

Wednesday, July 26, 2017 08.00-10.00

Medan Room 2nd fl Session Chair: Dr. Arief Udhiarto/ Dr. Anak Agung Ngurah Made Narottama)

No	Paper #	ID	Author	Title	Affiliation	Time
1	44	E3A - 1	Masahiro Hori, Tokinobu Watanabe and Yukinori Ono	Real-Time Monitoring of Charge-Pumping Process for SiO2/Si Interface Defect Analysis	Shizuoka University, Japan	08.00-08.15
2	182	E3A - 2	Anak Agung Ngurah Made Narottama and Anak Agung Ngurah Gde Sapteka	Effect of Ge Mole Fraction on Current, Voltage and Electric Field Characteristics of High Doping Nanoscale Si1-xGex/Si p-n Diode.	Politeknik Negeri Bali, Indonesia	08.15-08.30
3	93	E3A - 3	Saya Kobayashi and Jun Kondoh	Measurement of Particles in Oil Using Shear Horizontal Surface Acoustic Wave Sensor	Shizuoka University, Japan	08.30-08.45
4	355	E3A - 4	Arief Udhiarto, Bobi Khoerun, Layina Maula Haryanto and Djoko Hartanto	Effect of Anode and Cathode Workfunction on the Operating Voltage and Luminance of a Single Emissive Layer Organic Light Emitting Diode	Universitas Indonesia	08.45-09.00
5	484	E3A - 6	Cahyaning Nur Karimah, Retno Wigajatri Purnamaningsih, Tomy Abuzairi and Nji Raden Poespawati	Bifacial Heterojunction Intrinsic Thin Layer Solar Cells As a BioFET Supply	Universitas Indonesia, Indonesia	09.15-09.30

6	676	E3A - 7	Adnan Afiff, Arup Samanta, Tarik Hasan, Arief Udhiarto, Harry Sudibyo, Djoko Hartanto, Michiharu Tabe, Daniel Moraru, Manoharan Muruganathan and Hiroshi Mizuta	A Statistical Study on the Formation of A-Few-Dopant Quantum Dots in Highly-Doped Si Nanowire Transistors	Shizuoka University, Japan	09.30-09.45

E 3B : Antennas and Microwave Devices

Wednesday, July 26, 2017 08.00-10.00

Surabaya Room 2nd fl (Session Chair: Dr. Achmad Munir/ Dr. Fitri Yuli Zulkifli)

No	Paper #	ID	Author	Title	Affiliation	Time
1	763	E3B - 1	Achmad Munir, Habibur Muhaimin, Mohammad Sigit Arifianto, Chairunnisa, Mohammad Ridwan Effendi and Andriyan Bayu Suksmono	Wideband BPF Composed of Planar Inverted-F Shaped for S-Band Frequency Application	Bandung Institute of Technology (ITB), Indonesia	08.00-08.15
2	588	E3B - 2	Farohaji Kurniawan, Josaphat Tetuko Sri Sumantyo, Mujtahid and Achmad Munir	Effect of Shape Truncation Against Axial Ratio of Left-Handed Circularly Polarized X-Band Antenna	Chiba University, Japan	08.15-08.30
3	259	E3B - 3	Antrisha Daneraici Setiawan and Achmad Munir	Incorporation of High Permittivity Circular Dielectric Resonator for Enhancing Resonant Frequency of Microstrip Antenna	General Achmad Yani University, Indonesia	08.30-08.45
4	294	E3B - 4	Syah Alam, I Gusti Nyoman Wibisana and Indra Surjati	Miniaturization of Array Microstrip Antenna Using Peripheral Slits for Wireless Fidelity Communication	University of 17 August 1945 Jakarta, Indonesia	08.45-09.00
5	360	E3B - 5	Karlisa Priandana, Benyamin Kusumoputro and Eko Tjipto Rahardjo	The Design of ISM-Band Radar Antenna for Small Boat's Trajectory Tracking	Universitas Indonesia, Indonesia	09.00-09.15
6	532	E3B - 6	Dian Widi Astuti, Arif Jubaidillah and Mudrik Alaydrus	Substrate Integrated Waveguide Bandpass Filter for VSAT Downlink	Mercu Buana University, Indonesia	09.15-09.30

7	534	E3B - 7	Dian Widi Astuti, Ahmad Firdausi and Mudrik Alaydrus	Multiband Double Layered Microstrip Antenna by Proximity Coupling for Wireless Applications	Mercu Buana University, Indonesia	09.30-09.45
8	249	E3B - 8	Yulianto La Elo, Fitri Yuli Zulkifli and Eko Tjipto Rahardjo	Design of Wideband Microstrip Antenna With Parasitic Elemen For 4G/LTE Application	Universitas Indonesia, Indonesia	09.45-10.00

E 4A : Electronic Devices and Semiconductor 2

Wednesday, July 26, 2017 10.15-10.00

Medan Room 2nd fl (Session Chair: Dr. Purnomo Sidi Priambodo/ Prof. Hiroshi Inokawa)

No	Paper #	ID	Author	Title	Affiliation	Time
1	73	E4A - 1	Lin Prasetyani and Purnomo Sidi Priambodo	450nm Laser Diode Beam Shaping in Engraving Process	Universitas Indonesia, Indonesia	10.15-10.30
2	189	E4A - 2	Mohammad Iwan Wahyuddin, Purnomo Sidi Priambodo and Harry Sudibyo	Direct Current Load Effects on Series Battery Internal Resistance	Universitas Indonesia, Indonesia	10.30-10.45
3	218	E4A - 3	Hiroshi Inokawa, Kou Akiba and Hiroaki Satoh	Thermal Conductance and Heat Capacity Measurement Utilizing Suspended-Wire Resistor	Shizuoka University, Japan	10.45-11.00
4	273	E4A - 4	Tomy Abuzairi, Nji Raden Poespawati, Retno Wigajatri Purnamaningsih and Dicky Apriady	Preliminary Study of Plasma-treated Water for Germination Stimulation of Agricultural Seeds	Universitas Indonesia, Indonesia	11.00-11.15
5	316	E4A - 5	Natalita Maulani Nursam, Jojo Hidayat, Lia Muliani Pranoto and Suwastika Wijayanti	Electrical Properties of Dye-sensitized Solar Module with Integrated Parallel Connections	Indonesian Institute of Science (LIPI), Indonesia	11.15-11.30
6	918	E4A - 7	Syam Erast Prayoga, Retno Wigajatri Purnamaningsih, Tomy Abuzairi, and Nji Raden Poespawati	Crystalline Silicon Solar Cell Design with AlxGa1-xAs As Heterojunction with Compound Thin Layer for Biosensor Application	Universitas Indonesia, Indonesia	11.45-12.00

E 4B : Medical Applications and Imaging System

Wednesday, July 26, 2017 10.15-10.00

Surabaya Room 2nd fl (Session Chair: Dr. Prima Dewi Purnamasari / Dr. Engelin Shintadewi Julian)

No	Paper #	ID	Author	Title	Affiliation	Time
1	119	E4B - 1	Ernia Susana and Hendrana Tjahjadi	Handheld Pulse Oximeter Using Raspberry Pi B+	Health Polytechnic of Jakarta II, Indonesia	10.15-10.30
2	138	E4B - 2	Engelin Shintadewi Julian, Kiki Prawiroredjo and Gunawan Tjahjadi	The Model of Near Infrared Sensor Output Voltage As a Function of Glucose Concentration in Solution	Trisakti University, Indonesia	10.30-10.45
3	295	E4B - 3	Faisal Narpati and Basari Basari	Design of Ultrawideband Applicator for Microwave Ablation Aimed at Thermal Therapy in Liver Cancer	Universitas Indonesia, Indonesia	10.45-11.00
4	399	E4B - 4	Prima Dewi Purnamasari, Anak Agung Putri Ratna and Benyamin Kusumoputro	Relative Wavelet Bispectrum Feature for Alcoholic EEG Signal Classification Using Artificial Neural Network	Universitas Indonesia, Indonesia	11.00-11.15
5	434	E4B - 5	Bayu Azmi, Wibisono - and Adhi Harmoko Saputro	Portable Gamma Ray Tomography System for Investigation of Geothermal Power Plant Pipe Scaling	National Nuclear Energy Agency (BATAN), Indonesia	11.15-11.30
6	541	E4B - 6	Brahmastro Kresnaraman, Yasutomo Kawanishi, Daisuke Deguchi, Tomokazu Takahashi, Yoshito Mekada, Ichiro Ide and Hiroshi Murase	Headgear Recognition by Decomposing Human Images in the Thermal Infrared Spectrum	Nagoya University, Japan	11.30-11.45
7	599	E4B - 7	Erni Yudaningtyas, Djoko H. Santjojo, Waru Djuriatno, Indrazno Siradjuddin and Muhammad Rony Hidayatullah	Identification of Pulse Frequency Spectrum of Chronic Kidney Disease Patients Measured at TCM Points Using FFT Processing	Brawijaya University, Indonesia	11.45-12.00

8	64	E4B - 8	Hendrana Tjahjadi and Kalamullah Ramli	Review of Photoplethysmography Based Noninvasive Continuous Blood Pressure Methods	Universitas Indonesia, Indonesia	12.00-12.15

E 4C : Control Engineering System 1

Wednesday, July 26, 2017 10.15-10.00

Singaraja Room (Session Chair: Dr. Feri Yusivar / Dr. Wahidin Wahab)

No	Paper #	ID	Author	Title	Affiliation	Time
1	150	E4C – 1	Suwandi Dwi Sahputro, Fahmi Fadilah, Nanda Avianto Wicaksono and Feri Yusivar	Design and Implementation of Adaptive PID Controller for Speed Control of DC Motor	Universitas Indonesia, Indonesia	10.15-10.30
2	191	E4C – 2	Bernadeta Wuri Harini, Aries Subiantoro and Feri Yusivar	Study of Speed Sensorless Permanent Magnet Synchronous Motor (PMSM) Control Problem due to Braking During Steady State Condition	Universitas Indonesia, Indonesia	10.30-10.45
3	397	E4C – 4	Jemie Muliadi, Rizki Langit and Benyamin Kusumoputro	Estimating the UAV Moments of Inertia Directly from Its Flight Data	Universitas Indonesia, Indonesia	11.00-11.15
4	453	E4C – 5	Indrazno Siradjuddin, Zakiyah Amalia, Budhy Setiawan, Rendi Pambudi Wicaksono and Erni Yudaningtyas	Stabilising a Cart Inverted Pendulum System Using Pole Placement Control Method	The State Polytechnic of Malang, Indonesia	11.15-11.30
5	624	E4C – 6	Muhammad Ramadiansyah, Wahidin Wahab and Nasril	Modeling, Simulation and Control of a high Precision Loading-Unloading Robot for CNC Milling Machine	Universitas Indonesia, Indonesia	11.30-11.45
6	722	E4C – 7	Yohanes Berchman Adyapaka Apatya, Feri Yusivar and Aries Subiantoro	Design and Prototyping of 3-Phase BLDC Motor	Universitas Indonesia, Indonesia	11.45-12.00

7	883	E4C – 8	Muhammad Akil, Ingrid Nurtanio and Rhiza Samsoe'oed Sadjad	A DC Motor Speed Control Using LPC-ANFIS Speech Recognition System	Bosowa Polytechnic, Indonesia	12.00-12.15

E 4D : Computer Engineering 2						
Wednesday, July 26, 2017 10.15-10.00						
Hisbiscus Room 1st fl (Session Chair: Dr. Prihandoko / Dr. Misfa Susanto)						
No	**Paper #**	**ID**	**Author**	**Title**	**Affiliation**	**Time**
1	21	E4D – 1	Prihandoko Prihandoko, Bertalya Bertalya and Muhammad Iqbal Ramadhan	An Analysis of Natural Disaster Data by Using K-Means and K-Medoids Algorithm of Data Mining Techniques	Gunadarma University, Indonesia	10.15-10.30
2	26	E4D – 2	Danila Machmud and Dion Ogi	The Implementation of Wash, Rinse, and Spin Technique in Accelerometer's Data Processing on Android Smartphone to Generate Stream Keys	National Crypto Institute, Indonesia	10.30-10.45
3	132	E4D – 3	Mohamad Ali Sadikin, Dea Saka Kurnia Putra and Susila Windarta	S-Mbank: Secure Mobile Banking Authentication Scheme Using Signcryption, Pair Based Text Authentication, and Contactless Smartcard	National Crypto Institute	10.45-11.00
4	386	E4D – 4	Anak Agung Putri Ratna, Randy Sanjaya, Tomi Wirianata and Prima Dewi Purnamasari	Word Level Auto-correction for Latent Semantic Analysis Based Essay Grading System	Universitas Indonesia, Indonesia	11.00-11.15
5	430	E4D – 5	Rini Wisnu Wardhani, Dion Ogi, Mohamad Syahral and Dedy Septono Catur Putranto	Fast Implementation of AES on Cortex-M3 for Security Information Devices	National Crypto Institute, Indonesia	11.15-11.30
6	370	E4D – 6	Misfa Susanto, Risdawati Hutabarat, Yetti Yuniati and Syaiful Alam	Interference Management Using Power Control for Uplink Transmission in Femtocell-Macrocell Cellular Communication Network	University of Lampung, Indonesia	11.30-11.45

7	856	E4D – 7	Astriany Noer, Zulfajri B. Hasanuddin and Dewiani Djamaluddin	Implementation of RFID Based Raspberry Pi for User Authentication and Offline Intelligent Payment System	Hasanuddin University, Indonesia	11.45-12.00
8	881	E4D – 8	Indah Survyana Wahyudi, Mochamad Hariadi and Achmad Affandi	Recommender Engine Using Cosine Similarity Base On Alternating Least Square -Weight Regularization	Sepuluh Nopember Institute of Technology (ITS), Indonesia	12.00-12.15

E 5A : Communication System and Signal Processing 3

Wednesday, July 26, 2017 14.00-15.30

Medan Room 2nd fl (Session Chair: Dr. Ajib Setyo Arifin / Dr. Helmy Fitriawan)

No	Paper #	ID	Author	Title	Affiliation	Time
1	876	E5A - 3	Muhammad Fathur Rahman N, Salama Manjang and Zahir Zainuddin	Water Level Measurement Using Ultrasonic Pipe in Open Channel	Hasanuddin University, Indonesia	14.30-14.45
2	694	E5A - 4	Diah Kusumawati, Muhammad Suryanegara and Sri Ariyanti	IoT Spectrum Requirement for Smart Transportation	Universitas Indonesia, Indonesia	14.45-15.00
3	388	E5A - 5	Helmy Fitriawan, Ahmad Surya Arifin, Danny Mausa, Misfa Susanto and Agus Trisanto	ZigBee Based Wireless Sensor Network and Performance Analysis in Various Environments	University of Lampung, Indonesia	15.00-15.15
4	907	E5A - 6	Ajib Setyo Arifin, Andrianus Pradipta and Dadang Gunawan	Modelling and Analysis E-SIM in Indonesia	Universitas Indonesia, Indonesia	15.15-15.30

E 5B : Power Engineering System 1						
Wednesday, July 26, 2017 14.00-15.30						
Surabaya Room 2nd fl (Session Chair: Prof. Woei-Luen Chen / Dr. Chairul Hudaya)						
No	**Paper #**	**ID**	**Author**	**Title**	**Affiliation**	**Time**
1	766	E5B - 1	Woei-Luen Chen, Chun-Yuan Chen, I-Chyn Wey and Yu-Ping Chou	Design and Control of a 10kW Three-Phase Grid-tied Back to Back Inverter	University of Taipei, Taiwan	14.00-14.15
2	308	E5B - 3	Muhammad Levy Aninditio, Amien Rahardjo and Chairul Hudaya	Lighting Replacement Analysis at Classrooms of Engineering Center, Faculty of Engineering, Universitas Indonesia	Universitas Indonesia, Indonesia	14.30-14.45
3	547	E5B - 4	Agus Indarto, Iwa Garniwa, Rudy Setiabudy and Chairul Hudaya	Total Cost of Ownership Analysis of 60 MVA 150/120 kV Power Transformer	Universitas Indonesia, Indonesia	14.45-15.00
4	593	E5B - 5	Yosi Ohira, Yoyok Dwi Setyo Pambudi and Chairul Hudaya	Utilization of Idle Power Plant for Own Use and Excess Power in an Oil-and-Gas Company	Universitas Indonesia, Indonesia	15.00-15.15
5	687	E5B - 6	Widodo Pudji Muljanto and Rinaldy Dalimi	Secondary Voltage Control of Single Phase Induction Generator Operated in Small Scale Picohydro Power Plant at Off-Grid Area.	Universitas Indonesia, Indonesia	15.15-15.30

E 5C : Control Engineering System 2						
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Singaraja Room (Session Chair: Dr. Muhammad Rif'An / Dr. Mat Syai'in)						
No	**Paper #**	**ID**	**Author**	**Title**	**Affiliation**	**Time**
1	413	E5C - 1	Bhakti Yudho Suprapto, Wahidin Wahab, Benyamin Kusumoputro and Amsa Mustaqim	Modified Elman Recurrent Neural Network for Attitude and Altitude Control of Heavy-lift Hexacopter	Universitas Indonesia, Indonesia	14.00-14.15
2	465	E5C - 2	Muhammad Rif'An, Feri Yusivar and Benyamin Kusumoputro	Adaptive PID Controller Based on Additional Error of an Inversed-Control Signal for Improved Performance of Brushless DC Motor	Universitas Indonesia, Indonesia	14.15-14.30
3	466	E5C - 3	Rosalia H Subrata, Julian Leonard Hardenberg and Ferrianto Gozali	The Use of PID Controller to Get the Stable Floating Condition of the Objects in Magnetic Levitation System	Trisakti University, Indonesia	14.30-14.45

4	508	E5C - 4	Abdul Halim and Muhammad Sulaiman Nur Ubay	Performance Simulation of PID Based ADCS for Earth Observation Micro Satellite	Universitas Indonesia, Indonesia	14.45-15.00
5	555	E5C - 5	Dimas Andy Kurniawan, Mat Syai'In, Syamsiar Kautsar, Lilik Subiyanto, Joko Endrasmono, Rachmad Tri Soelistijono, Annas Singgih Setyoko, Aang Wahidin,Boedi Herijono, Adi Soeprijanto and M. Khoirul Hasin	Hand Typist Robot Modelling for Quadriplegic Person Using Extreme Learning Machine	Shipbuilding Institute of Polytechnic Surabaya, Indonesia	15.00-15.15
6	600	E5C - 6	Yusuf Lestanto, Aries Subiantoro and Feri Yusivar	Two-stage Least Square Method for Model Identification of Vehicle Motion	Universitas Indonesia, Indonesia	15.15-15.30
7	858	ESC-7	Muhammad Adi Nugroho and Benyamin Kusumoputro	Fuzzy-Appearance Manifold and Fuzzy Nearest Distance for Face Recognition on Various Poses and Degraded Images	Universitas Indonesia, Indonesia	15.30-15.45

E 6A : Tera/Optical Devices and Electrical System

Wednesday, July 26, 2017 15.45-18.00

Medan Room 2nd fl (Dr. Teti Zubaidah / Dr. Catur Apriono)

No	Paper #	ID	Author	Title	Affiliation	Time
1	94	E6A - 1	Dewi Anggraeni and Purnomo Sidi Priambodo	Open-loop Fiber Optic Gyroscope Model Based on Angle-random Walk Effect	Universitas Indonesia, Indonesia	15.45-16.00
2	410	E6A - 2	Retno Wigajatri Purnamaningsih, Nji Raden Poespawati, Sasono Rahardjo, Maratul Hamidah, Elhadj Dogheche and Tomy Abuzairi	The Effect of Waveguide Parameters on GaN Based S-bend Y-junction Optical Power Divider	Universitas Indonesia, Indonesia	16.00-16.15
3	564	E6A - 3	Maratul Hamidah, Sasono Rahardjo, Retno Wigajatri Purnamaningsih, Nji Raden Poespawati and Purnomo Sidi Priambodo	Comparison of Coupling Coefficient Variation Effects on Double Couplers Structured Single Ring Resonator with Single and Double Beams Injection	Agency for The Assessment and Application of Technology (BPPT), Indonesia	16.15-16.30

4	570	E6A - 4	Yus Natali, Purnomo Sidi Priambodo and Eko Tjipto Rahardjo	Study on Electro-Optic Modulator Based Distributed Antenna System Over Wavelength Division Multiplexing Passive Optical Network System	Universitas Indonesia, Indonesia	16.30-16.45
5	613	E6A - 5	Catur Apriono, Nofrizal, Mochamad Dandy Firmansyah, Fitri Yuli Zulkifli and Eko Tjipto Rahardjo	Near-field to Far-field Transformation of Cylindrical Scanning Antenna Measurement Using Two Dimension Fast-Fourier Transform	Universitas Indonesia, Indonesia	16.45-17.00
6	733	E6A - 6	Teguh Wahyudi, Catur Apriono, Fitri Yuli Zulkifli and Eko Tjipto Rahardjo	Broadband Planar Bow-tie Antenna on High Resistivity Silicon Substrate for Terahertz Application	Universitas Indonesia, Indonesia	17.00-17.15
7	852	E6A - 7	Teti Zubaidah, Bulkis Kanata, Paniran and Ahmad Yani	Static and Dynamic Magnetic Fields Scattering on a Mini Magneto-static Flux Manipulator for Wireless Power Transfer	Mataram University, Indonesia	17.15-17.30

E 6B : Power Engineering System 2

Wednesday, July 26, 2017 15.45-18.00

Surabaya Room 2nd fl (Dr. Tomy Abuzairi / Dr. Chairul Hudaya)

No	Paper #	ID	Author	Title	Affiliation	Time
1	57	E6B - 1	Heri Suyanto and Rina Irawati	Study Trendsand Challenges of the Developmentof Microgrids	PLN Technical College, Indonesia	15.45-16.00
2	468	E6B - 3	Fitriyanti Mayasari and Rinaldy Dalimi	Dynamic Modeling of CPO Supply to Fulfill Biodiesel Demand in Indonesia	Universitas Indonesia, Indonesia	16.15-16.30
3	559	E6B - 4	Adinda Franky Nelwan, Chairul Hudaya and Rinaldy Dalimi	Concept Development for Quantification of Integrated Energy Security	Universitas Indonesia, Indonesia	16.30-16.45
4	741	E6B - 7	Nur Fitryah, Syamsir Abduh and Ishak Kasim	Grounding System Design Optimalization on 275 KV Betung Substation Based IEEE Standard 80-2000	Trisakti University, Indonesia	17.15-17.30
5	911	E6B - 8	Herlina, Rudy Setiabudy and Amien Rahardjo	Influence of Permanent Magnet and Width of Stator Slot to Cogging Torque Reduction in PMSG Using Anti-Notch and Cutting Edge Method	Universitas Indonesia, Indonesia	17.30-17.45

6	129	E6B - 9	Ratnasari Nur Rohmah and Nurokhim	Simulation of I-131 Dispersion Around KNS (Kawasan Nuklir Serpong) Using Gaussian Plume Model	Muhammadiyah University of Surakarta, Indonesia	17.45-18.00

E 6C : Electrical System and Solar Power System						
Wednesday, July 26, 2017 15.45-18.00						
Manado Room (Dr. Wahidin Wahab / Dr. Gunawan Wibisono)						
No	**Paper #**	**ID**	**Author**	**Title**	**Affiliation**	**Time**
1	604	E6C - 1	Wahidin Wahab	Design and Simulaton of an Output Voltage Stabilization and Control for Solar Power (PV) Application Using Fuzzy Logic Controller	Universitas Indonesia, Indonesia	15.45-16.00
2	349	E6C - 2	Euis Suryati and Gunawan Wibisono	Machine to Machine Application As Kwh Meter Controlling	Universitas Indonesia, Indonesia	16.00-16.15
3	276	E6C - 3	Jazuli Fadil, Soedibyo, Mochamad Ashari	Performance Comparison of Vertical Axis and Horizontal Axis Wind Turbines to Get Optimum Power Output	Sepuluh Nopember Institute of Technology (ITS), Indonesia	16.15-16.30
4	300	E6C - 4	Antonius Rajagukguk, Ciptian Weried Prianandа, Dedet Candra Riawan, Soedibyo Soedibyo and Mochamad Ashari	Novel Derivative Cluster Area Methods (DCAM) for Optimization of PV Farm Under Dynamic Shading Effect	Sepuluh Nopember Institute of Technology (ITS), Indonesia	16.30-16.45
5	63	E6C - 5	Iswan Iswan and Iwa Garniwa	Principal Component Analysis and Cluster Analysis for Development of Electrical System	Universitas Indonesia, Indonesia	16.45-17.00
6	241	E6C - 6	Ciptian Weried Prianandа, Antonius Rajagukguk, Dedet Candra Riawan, Soedibyo Soedibyo and Mochamad Ashari	New Approach of Maximum Power Point Tracking for Static Miniature Photovoltaic Farm Under Partially Shaded Condition Based on New Cluster Topology	Sepuluh Nopember Institute of Technology (ITS), Indonesia	17.00-17.15
7	808	E6C - 7	Wisnu Ananda	External Quantum Efficiency (EQE) Measurement of Solar Cells	Center for Material and Technical Product, Ministry of Inductry, Indonesia	17.15-17.30

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Wednesday, July 26, 2017 15.45-18.00						
Bougenville Room 1st fl Session Chair: Dr. Muhammad Suryanegara/ Dr. Misfa Susanto)						
No	**Paper #**	**ID**	**Author**	**Title**	**Affiliation**	**Time**
1	506	E6D - 1	Gregorius Ivan Baskara and Muhammad Suryanegara	Study of Filter-Bank Multi Carrier (FBMC) Utilizing Mirabbasi-Martin Filter for 5G System	Universitas Indonesia, Indonesia	15.45-16.00
2	758/888	E6D - 2	Abdul Hafid Paronda and Muhamad Asvial	User's Velocity-based Uplink Power Control in 5G Femtocell Networks	Universitas Indonesia, Indonesia	16.00-16.15
3	296	E6D - 3	Andreyanto Pratama, Taufik Hidayatullah and Dedy Septono Catur Putranto	Efficient Implementation of Hash Sequence Authentication Based on RFID	National Crypto Institute, Indonesia	16.15-16.30
4	312	E6D - 4	Sukra Bambang Wahyu Tri Hatmaja, Saptadi Nugroho and Iwan Setyawan	Stationary Obstacle Detection Using Pyramidal Lucas Kanade Optical Flow	Satya Wacana Christian University, Indonesia	16.30-16.45
5	371	E6D - 5	Misfa Susanto, Dika Fauzia, Melvi and Syaiful Alam	Downlink Power Control for Interference Management in Femtocell-Macrocell Cellular Communication Network	University of Lampung, Indonesia	16.45-17.00
6	376	E6D - 6	Lessy Sutiyono Aji, Gunawan Dadang and Gunawan Wibisono	The Adoption of TV White Space Technology as a Rural Telecommunication Solution in Indonesia	Universitas Indonesia, Indonesia	17.00-17.15
7	882	E6D - 8	Muhammad Suryanegara and Insan Laksana Pribadi	Regulatory Recommendations for IoT Smart-health care services by using Privacy Impact Assessment (PIA)	Universitas Indonesia, Indonesia	17.15-17.30

Poster Session Day 1					
Tuesday, July 25, 2017 15.00-15.30					
No	**Paper #**	**ID**	**Author**	**Title**	**Afiliation**
1	474	P - 8	Jeong-Hoon Seol and Sung-Ho Hahm	Drain Current Modeling of GaN Schottky Barrier MOSFETs	Kyungpook National University, South Korea

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Indonesian Text Feature Extraction using Gibbs Sampling and Mean Variational Inference Latent Dirichlet Allocation

PM Prihatini, IKGD Putra, IAD Giriantari, M Sudarma
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Udayana University
Bali, Indonesia

***Abstract*— Latent Dirichlet Allocation has been developed as topic-based method which uses reasoning to determine the topics of a document. There are many methods of reasoning used for Latent Dirichlet Allocation, including the Gibbs Sampling and Mean Variational Inference, the most widely used in research. However, there have not been many studies that discuss the implementation of these methods on the Indonesian text, so analysis is needed to compare its performance in generating feature extraction. Therefore, in this paper, will be implemented the method of reasoning Gibbs Sampling and Mean Variational Inference for Latent Dirichlet Allocation on Indonesian text. The objective is determining the performance of both algorithms on Indonesian text so it can provide a reference about the better reasoning method for Latent Dirichlet Allocation on Indonesian text. The research was implemented on digital Indonesia news text data with 100 documents. The tests are conducted on feature data as the result of extraction process using three type of evaluation metric. The test results show that Gibbs Sampling has a better performance than Mean Variational Inference for Latent Dirichlet Allocation on Indonesian text.**

Keywords—feature extraction; latent dirichlet allocation; gibbs sampling; mean variational inference; Indonesian text

I. INTRODUCTION

Data on the internet continues to grow reaching unlimited amounts. Information retrieval system is the solution that can help the user to search information needed in the enormous data. Information retrieval system consist of two main stage, that are offline and online. A set of very large documents processed first through the offline stage to determine the unique features within each document. The unique features are extracted through feature extraction process. Then, the information searched by the user that have represented by query, will be processed online by matching the query with the features of the document. Based on this matching process, the relevant information is displayed, starting from the highest relevant value to the lowest.

Feature extraction has an important role in information retrieval system to acquire the unique features of a document. The unique features are going to be the candidate answers to the information required by users. To generate the unique features, it is needed an automated process so it can improve the performance of information retrieval systems. The commonly method used for feature extraction process is Term Frequency-Invers Document Frequency or TF-IDF [1-6]. The extraction results from this method directs a document into a single topic, such as inflation news that is included in the economic topic. But in reality, one document discusses many topics, such as inflation news included in economic, social, and political topics. Therefore, Latent Dirichlet Allocation or LDA has been developed as topic-based method which uses reasoning to determine the topics of a document.

LDA extracts document features from the word level, continues to the document level, and finally reaches the corpus level [7]. Feature extraction with LDA is done through the reasoning stage and the results can be implemented for the next mining process. Reasoning becomes important in LDA process because it determines topic distribution in a document. Therefore, selection process of reasoning methods needs a special attention. There are several methods that use for the reasoning of LDA. Blei uses the method of reasoning Variational Inference for LDA, which proved capable of finding the topic distribution in the corpus [7-12]. But, Gibbs Sampling are the most widely method of reasoning used in research of LDA [13-17]. Both methods have proven to work well on English text. However, there have not been many studies that discuss the implementation of these methods on the Indonesian text, so analysis is needed to compare its performance in generating feature extraction.

Therefore, in this paper, will be implemented the method of reasoning Gibbs Sampling and Mean Variational Inference for Latent Dirichlet Allocation on Indonesian text. The objective is determining the performance of both algorithms on Indonesian text so it can provide a reference about the better reasoning method for Latent Dirichlet Allocation. The research was implemented on digital Indonesia news text data with 100 documents. All documents through pre-processing stage. The main process is a document features extracted using Gibbs Sampling and Mean Variational Inference for Latent Dirichlet Allocation. At the end, the tests are conducted on feature data as the result of extraction process using three type of evaluation metric to measure the performance of both algorithms. The next section of this paper will discuss the research method, experimental result, conclusion and upcoming work.

II. RESEARCH METHOD

A. Dataset

The research uses a digital news dataset from online news media in Indonesia. Digital news was taken from the website manually and stored in a text file. The number of files collected was 100 documents, which are extracted through Gibbs Sampling and Mean Variational Inference LDA, as shown by research method in Fig 1.

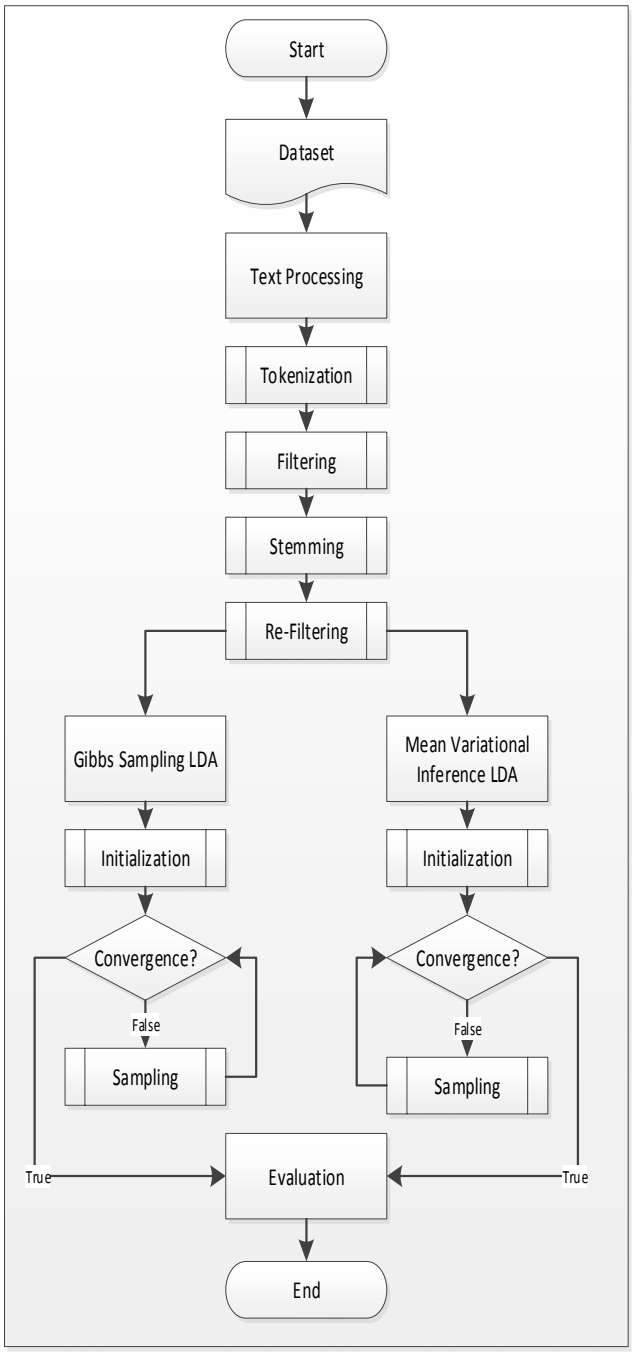

Fig. 1. Algorithm of Gibbs Sampling LDA

B. Text Pre-processing

The text file consists of a collection of sentences that would be split into the smallest unit called a term or word through tokenization process. To avoid errors toward identifying the term, then all the terms converted to lowercase. The result is a text file that contains a list of terms. The list of terms as a result of tokenization checked to find out if there is a term that is included in the stop word. If there is, then the term will be deleted from the list. The aim of this filtering process is to prevent the emergence of terms that are not meaningful as a unique feature of the document. The research used 906 stop words [18]. Stemming is the next processing stage, which checks whether each term is a root word in the dictionary. Otherwise, stemming will remove prefix and suffix of each term in accordance with the rules of Indonesian grammar. The research used 30342 root words. There are five rules used to remove affixes [18]. The last process is rechecking the results stemming whether the resulting root words included in the stop words. This stage is the re-filtering process to ensure that the resulting term list is a unique feature of each document [19].

C. Feature Extraction of Gibbs Sampling LDA

The reasoning process of Gibbs Sampling LDA algorithm begins with initialization. Then the initialization results are used to do a new topic sampling, as shown in Fig. 2 [15]. Variable *nkm* represents the number of topic *k* for each term of document *m*. Variable *nm* represents the count of topic for document *m*. Variable *ntk* represents the number of term *t* for each topic *k*. Variable *nk* represents the count of term for topic *k*. A multinomial random value is used as the initial value at the initialization stage. Then the value of all variables is incremented for each term and for each document in the corpus.

```
#initialization stage
nkm=0, nm=0
ntk=0, nk=0
for m=1 to M do
    for n=1 to Nm do
        zmn=k = Mult (1/K)
        nkm=nkm + 1, nm=nm + 1
        ntk=ntk + 1, nk=nk + 1
    end for
end for
# sampling stage
while not converged do
    for m=1 to M do
        for n=1 to Nm do
            nkm=nkm – 1, nm=nm – 1
            ntk=ntk – 1, nk=nk – 1
            k = p(z,w)
            nkm=nkm + 1, nm=nm + 1
            ntk=ntk + 1, nk=nk + 1
        end for
    end for
end while
```

Fig. 2. Algorithm of Gibbs Sampling LDA

At the sampling stage, the value of all variables is decremented for each term and for each document in the corpus. Then, a new topic is sampling for each term (1). Variables *a* and *b* are corpus parameter [7, 15]. After sampling a new topic, the value of all variables is incremented again. The process of sampling new topics is done repeatedly until the final state is converged. In this research, it is achieved by ten times iteration.

$$p(z,w) = \frac{ntk_{\neg t} + b}{\sum_{t=1}^{V} ntk_{\neg t} + Wb} \frac{nkm_{\neg t} + a}{\sum_{k=1}^{K} nkm_{\neg t} + Ka} \quad (1)$$

Gibbs Sampling LDA algorithm also generates matrix of document-topic *dt* and term-topic *tt* (2)(3) [15].

$$dt = \frac{ntk + b}{\sum_{t=1}^{V} ntk + b} \quad (2)$$

$$tt = \frac{nkm + a}{\sum_{k=1}^{K} nkm + a} \quad (3)$$

D. Feature Extraction of Mean Variational Inference LDA

As with Gibbs Sampling, Mean Variational Inference also begins with the initialization process prior to sampling the topic, as shown in Fig. 3 [7].

Variable *t*, *a* and *b* refer to Dirichlet parameter. Variable *c* refers to multinomial parameter. In the initialization process, both variables were set to value depending on LDA dimension *k* and the number of terms for all documents *N*. This is done for each topic *i* and term *n*. Sampling process on the Mean Variational Inference algorithm is also done repeatedly until it reaches the convergent condition. For each term and topic, the value of *t* updated depending on the value of *b* and *c,* using the function of exponential and digamma *dg*. Then, the value of *t* normalized to sum to 1, and the value of *c* updated using the new value of *t*. The convergence condition for this algorithm uses ten times iteration.

```
for n=1 to N do
    for i=1 to I do
        t =1/k
    end for
end for
for i=1 to N do
    c = a + N/k
end for
while not converged do
    for n =1 to N
        for i = 1 to k
            t = b exp (dg(c))
        end for
        normalize t to sum to 1
    end for
    c = a + Σt
end while
```

Fig. 3. Algorithm of Mean Variational Inference LDA

E. Evaluation of Algorithm

Measurements were performed on the results of feature extraction obtained through the algorithm using three type evaluation metrics.

Precision (*P*) represents how many relevant the retrieved documents (4) [20]. Variable *tp* is true positive, indicates relevant items retrieved. Variable *fp* is false positive, indicates retrieved items. Variable *fn* is false negative, indicates relevant items.

$$P = \frac{tp}{(tp + fp)} \quad (4)$$

Recall (*R*) represents how many relevant documents can be retrieved (5) [20].

$$R = \frac{tp}{(tp + fn)} \quad (5)$$

F-Measure (*F*) represents the harmonic mean value of *P* and *R* (6)[20].

$$F = \frac{2PR}{P + R} \quad (6)$$

III. Result and Analysis

This research uses 100 news documents taken from online news media in Indonesia. This algorithm requires the number of topics to determine the topic of each unique feature in the document. Unique features are the terms that characterize the document that determine the topic of document. In this research, the number of topic *K* is 10 topics. The constant value for *b* is 0.01. The constant value for *a* is 5 [15, 17].

The result of experiment for convergence condition is represented in graph; *x*-axis represents number of iteration; *y*-axis represents difference value of convergence, as shown in Fig. 4. The values of evaluation metric are shown in Table I. It is also shown in graph; the *x*-axis represents number of topic; *y*-axis represents value of evalution metric; the blue dotted line represents the value for Gibbs Sampling LDA, while the red solid line represents the value for Mean Variational Inference LDA, as shown in Fig. 5.

The experimental result in Fig. 4 shows that Gibbs Sampling algorithm has decreased in value from the first iteration to tenth iteration to achieve the zero value, while the value of Mean Variational Inference LDA algorithm fluctuated. This means that Gibbs Sampling LDA algorithm tends to be more stable in achieving convergent conditions than Mean Variational Inference LDA algorithm.

Metric measurements of the experimental result in Table I show that Gibbs Sampling LDA algorithm has a better value than Mean Variational Inference LDA algorithm. This is strengthened by the graph shown in Fig. 5, where F-Measure of Gibbs Sampling LDA algorithm has no significant value changes for all topics (more stable) than Mean Variational

Inference LDA algorithm. This shows that Gibbs Sampling LDA algorithm more relevant in extracting unique features in documents.

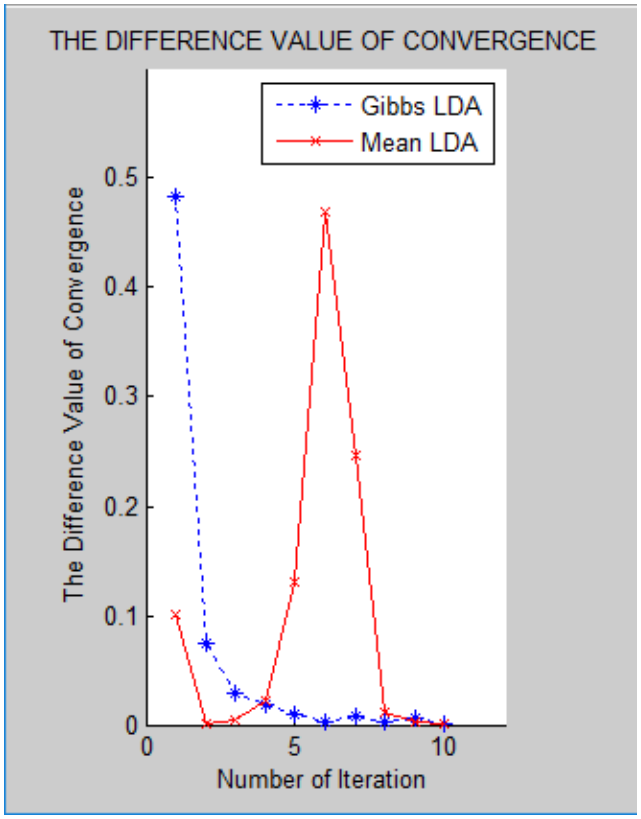

Fig. 4. The Difference Value of Convergence for Gibbs Sampling and Mean Variational Inference LDA

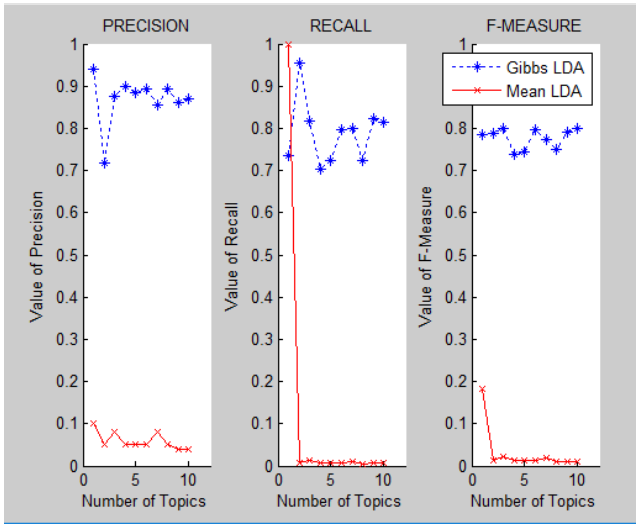

Fig. 5. The Performance of: (a) Precision, (b) Recall, (c) F-Measure

TABLE I. PERFORMANCE OF ALGORITHMS

Method	Precision	Recall	F-Measure
Gibbs Sampling LDA	0.8690	0.7892	0.7770
Mean Variational Inference LDA	0.5001	0.6890	0.5850

IV. CONCLUSION AND FUTURE WORK

Gibbs Sampling and Mean Variational Inference are two famous methods for Latent Dirichlet Allocation that is compared in this paper to extract unique features of an Indonesian text. Its purpose is to determine the performance of both algorithms on Indonesian text. The research was implemented on digital Indonesia news text data with 100 documents, K=10, b=0.01, and a=5. The results of experiment show that Gibbs Sampling has better performance than Mean Variational Inference for LDA. Gibbs Sampling LDA algorithm is more relevant in extracting unique features in a document to find hidden topics in the document. Therefore, Gibbs Sampling LDA algorithm can be implemented to extract Indonesian text.

In the upcoming work, this research will improve the ability of Gibbs Sampling LDA algorithm more better, so it can achieve the most optimal measurement values to extract unique features in documents.

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