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WELCOME MESSAGE FROM GENERAL CHAIR ICITACEE 2019

Dear Colleagues,

It is indeed a great pleasure for me to represent Diponegoro University to welcome you to the 6th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE 2019). We set our goal to run this conference to be conducted annually one after another by two departments: Department of Computer Engineering and Department of Electrical Engineering, Faculty of Engineering, Diponegoro University.

Organizing this annual event has been a continuous success for several years. This conference provides a forum to exchange experiences and promote new trends in the field of Computer and Electrical Engineering. This year, the conference adopts five tracks of scientific research: Control and Circuits, Green Applications and Interdisciplinary, Information and Computer Technology, Telecommunications and Vehicular Technologies, and Power Systems. The countries of authors that submitted papers in the conference are from the Jordan, Malaysia, Saudi Arabia, and Indonesia.

There are 68 submissions in the early and final round, and then after a rigorous review process, we decided 40 papers accepted to oral presentation and one by the online presentation. We wish you a pleasant stay in Semarang, and please feel free to exchange ideas with other experts in the conference.

Dr. Adian Fatchur Rochim General Chair of 6th ICITACEE 2019

WELCOME MESSAGE FROM IEEE INDONESIA SECTION

Dear Distinguished Guests, Colleagues, researchers, professionals, ladies and gentlemen, Good morning, a prosperous, warm, and spirited greeting.

On behalf of IEEE Indonesia Section, we would like to extend our warmest welcome to all keynote speakers, presenters, and participants to the 6th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE 2019). The conference theme is: "The Role of Electrical Engineering and IT Fields to Support Industry Revolution 4.0 and Sustainability of Green Technology".

ICITACEE is an annual conference organized by Computer Engineering Department and Electrical Engineering Department, Universitas Diponegoro. This year conference is organized by Computer Engineering Department, Universitas Diponegoro and technical co-sponsored by IEEE Indonesia Section. The conference aims to bring together researchers and experts in information systems to share their ideas, experiences and insights.

IEEE Indonesia Section has conducted many activities over 32 years in Indonesia. In terms of collaboration, IEEE Indonesia section has a good and mutual relationship with ICT organizations, Industries, Government, Universities as well as the Community in Indonesia. IEEE Indonesia Section has contributed in about 58 different International conferences annually, and this conference is one of the conferences which were initiated by Universitas Diponegoro and technical co-sponsored by IEEE Indonesia Section. This conference shows its sustainability due to the hard work of the conference organizers, well organized conference and high quality papers. We do hope in the near future some high quality conferences will be continued and strengthened, so the result will give more benefit and positive impact to the human being, especially to Indonesian people.

In this occasion, I would also like to say welcome to Semarang, which serves beautiful heritages, culture, with warm, polite and friendly people, a vibrant culture and lifestyle.

Finally, we do hope all of you will have enjoyable and valuable experience during this event. You may share your best knowledge in your area of research and professional activities.

Thank you.

Semarang, 26th September 2019

IEEE Indonesia Section

WELCOME MESSAGE FROM DEAN OF ENGINEERING FACULTY DIPONEGORO UNIVERSITY

Dear Colleagues,

The 6th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE) is now held again as an annual conference organized by Department of Computer Engineering Diponegoro University. This conference aims to provide a forum for researchers, academicians, professionals, and students from various engineering fields and with cross-disciplinary working or interest in the development and design of information technology, computers, and electrical engineering to interact and disseminate the latest issues and researchers. It is a great pleasure to welcome all the invited speakers and guests and all of the participants of this conference who came from various country, in Semarang. I do hope that this conference will be a valuable forum for engineers and scientists to share their precious researches and this event will give significant contributions to the development of Information Technology, Computer, and Electrical Engineering and it will raise the awareness of scientific community members in bringing a better life. I hope that the conference will be stimulating and memorable for you. So, enjoy your time in Semarang.

Prof M Agung Wibowo Dean of Engineering Faculty Diponegoro University

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	Thursday, September 26		Friday, September 27
7:30 - 8:00	*Registration*		
8:00 - 8:10	*Welcoming Speech by General Chair of ICITACEE 2019*		
8:10 - 8:20	*Welcoming Speech by IEEE Indonesia Section*		
8:20 - 8:40	*Welcoming Speech and Opening by Dean of Engineering Faculty, Diponegoro University*		
8:40 - 8:50	*Photo Session*		
8:50 - 9:00	*IEEE at glance by Representative of IEEE Indonesia Section*		
9:00 - 9:15			*City Tour*
9:15 - 9:30	*Coffee Break*		
9:30 - 10:00	*Invited Speaker Session 1*		
10:00 - 10:30	*Invited Speaker Session 2*		
10:30 - 11:00	*Invited Speaker Session 3*		
11:00 - 11:30	*Parallel Session 1 (Telecommunication and Vehicular Technology and Green Applications and Interdisciplinary Topic)*	*Parallel Session 1 (Power Systems)*	
11:30 - 11:40			
11:40 - 11:50			
11:50 - 12:00	*Lunch Break*		
12:00 - 13:00			
13:00 - 14:10	*Parallel Session 2 (Information and Computer Technologies 1)* *Parallel Session 2 (Telecommunications and Vehicular Technologies)*		
14:10 - 14:20			
14:20 - 14:30	*Coffee Break*		
14:30 - 15:40	*Parallel Session 3 (Information and Computer Technologies 2)*	*Parallel Session 3 (Control and Circuits)*	
15:40 - 16:00			
16:00 - 18:30	*Break*		
18:30 - 20:00	*Gala Dinner*		

Thursday, September 26

Invited Speaker Session 3

Room: Amarta 2 and Amarta 3

IS3.1 ***Backward Compatible Low PAPR Preamble for Very High Throughput WLAN IEEE802.11ac***

Wahyul Amien Syafei, Achmad Hidayatno and Ajub Ajulian Zahra

Presenter bio: B.Eng 95 Electrical Engineering Faculty of Engineering Diponegoro University, Indonesia. M.Eng 02 Multimedia Telecommunication Faculty of Engineering Sepuluh Nopember Institute of Technology, Indonesia. Ph.D 09 Department of Electronics and System Engineering Computer Science and Electronics Kyushu Institute of Technology, Japan. Field: Wireless Telecommunication and Mutimedia, MIMO, OFDM, Familiar with IEEE 802.11a/b/g/n/ ac, 3rd-Dan in Karate, 3rd-Dan in Kobudo, Instructor of Okinawan Kobudo, Gold Medal Shorinji Kempo. Speaking: Bahasa Indonesia, Java, Sunda, English, Japanese, Arabic

pp. 1-6

Parallel Session 1 (Power Systems)

Room: Amarta 2

PS1-PS.1 ***Performance Improvement of Scalar Feedback Control for Induction Motors by Using Third Harmony Injection SPWM***

Alif Nabiel Luqman, MIftah Adiguna, Abdul Fandi, Mochammad Facta, Trias Andromeda, Hermawan Hermawan and Iwan Setiawan

pp. 7-12

PS1-PS.2 ***Dynamic Power Injection for Solar PV Constant Power Generation***

Muhammad Kuncoro, Rudi Darussalam, Chandra Budi Sukmono and Iwa Garniwa

pp. 13-17

PS1-PS.3 ***Fast-Charging LTO 18650 Batteries Using a DC PS-3005D Power Supply***

Anggakara Syahbi Syagata, Angga, Trias Andromeda, Iwan Setiawan, Hermawan Hermawan, Abd. Rahim Mat Sidek and Imam Sumpono

pp. 18-22

PS1-PS.4 ***Power Consumption Analysis in Resonant Converter***

Mochammad Facta, Hermawan Hermawan and Muhammad Amjad

pp. 23-26

PS1-PS.5 ***Design of Temperature and Humidity Control Devices in the Leakage Current Test Chamber of 20kV Insulator***

Lastoni Wibowo, Abdul Syakur and Trias Andromeda

pp. 27-32

PS1-PS.6 ***Design of Monitoring Remote Terminal Unit(RTU) Panel Supply Based on IOT Case Study at PLN***

Fikri Shalahudin and Budi Setiyono

Presenter bio: Born in Tegal, 24 June 1995, now become student at Electrical Engineering Diponegoro University

pp. 33-38

Parallel Session 1 (Telecommunication and Vehicular Technology and Green Applications and Interdisciplinary Topic)

Room: Amarta 3

PS1-TG.1 ***Centralized Dynamic Host Configuration Protocol and Relay Agent for Smart Wireless Router***

Wahyul Amien Syafei, Yosua Alvin Adi Soetrisno and Agung Prasetijo

Presenter bio: B.Eng 95 Electrical Engineering Faculty of Engineering Diponegoro University, Indonesia. M.Eng 02 Multimedia Telecommunication Faculty of Engineering Sepuluh Nopember Institute of Technology, Indonesia. Ph.D 09 Department of Electronics and System Engineering Computer Science and Electronics Kyushu Institute of Technology, Japan. Field: Wireless Telecommunication and Mutimedia, MIMO, OFDM, Familiar with IEEE 802.11a/b/g/n/ ac, 3rd-Dan in Karate, 3rd-Dan in Kobudo, Instructor of Okinawan Kobudo, Gold Medal Shorinji Kempo. Speaking: Bahasa Indonesia, Java, Sunda, English, Japanese, Arabic

pp. 39-43

PS1-TG.2 ***Diabetes Prediction System Based on Iridology Using Machine Learning***

Ratna Aminah and Adhi Harmoko Saputro

pp. 44-49

PS1-TG.3 ***Analysis of the Effect of the Wax Coating on Firmness Prediction Model in Malang Apples Based on Visible and Near-Infrared (VNIR) Imaging***

Risti Dwi Putri and Adhi Harmoko Saputro

pp. 50-54

PS1-TG.4 ***Development Conceptual Model Smartphone Adoption for Use Mobile Banking***

Erick Fernando, Surjandy Surjandy and Meyliana Meyliana

pp. 55-59

Parallel Session 2 (Information and Computer Technologies 1)

Room: Amarta 3

PS2-ICT1.1 ***Understanding Digital Skill Use from the Technology Continuance Theory (TCT)***

Nurdin Nurdin, Sagaf S Pettalongi and Mansur Mangasing

Presenter bio: I am a senior Lecturer in Information System at IAIN Palu and the Director of STMIK Bina Mulia Palu- Indonesia. Currently I got a PhD degree in Information TeChnology at Swinburne University of Technology Australia. I have published a number of journal papers and proceedings. My skill related to information systems, e-government and social media.

pp. 60-65

PS2-ICT1.2 ***Analysis Social Media Application Message Trust Factor a Case Study University Student in Indonesia***

Surjandy Surjandy, Wanda Wandoko, Meyliana Meyliana and Erick Fernando

Presenter bio: Phd Student and researcher, Reserach Topic area - Blockchain for Enterprise System Solution (e.g. SCM) - Technology Risk Management - Financial Technology - IT Governance

pp. 66-70

PS2-ICT1.3 ***Early Warning System of Landslide Disaster Using Generalized Neural Network Algorithm***

Aghus Sofwan and Sumardi Sumardi

pp. 71-74

PS2-ICT1.4 ***Intelligent Multiple-Vehicular-Attributes (iMVA) Broadcast Protocol for VANETs***

Agung Prasetijo

pp. 75-80

PS2-ICT1.5 ***Data Privacy Factor of Female Passenger's Data in Indonesia Online Transportation System***

Surjandy Surjandy, Erick Fernando, Meyliana Meyliana, Yuli Eni, Alexandra Joya and Dimitrij Dharma

Presenter bio: Phd Student and researcher, Reserach Topic area - Blockchain for Enterprise System Solution (e.g. SCM) - Technology Risk Management - Financial Technology - IT Governance

pp. 81-85

PS2-ICT1.6 ***Success Factor of the Implementation Blockchain Technology in Pharmaceutical Industry: A Literature Review***

Erick Fernando, Meyliana Meyliana and Surjandy Surjandy

pp. 86-90

PS2-ICT1.7 ***Hierarchical Multi-label Classification to Identify Hate Speech and Abusive Language on Indonesian Twitter***

Faizal Adhitama Prabowo, Muhammad Okky Ibrohim and Indra Budi

pp. 91-96

Parallel Session 2 (Telecommunications and Vehicular Technologies)

Room: Amarta 2

PS2-TVT.1 ***Uplink Boost Eliminate User in Massive MIMO System Using Reinsch Algorithm***

Soraya Mustika, Eko Noerhayati, Anik Nur Handayani, Siti Sendari and Langlang Gumilar

Presenter bio: • Name : Soraya Norma Mustika • Place/ Date of Birth: Malang, Indonesia. August 9th1992 • Resident Address: Jalan Cikaso 16 Malang, East Java, Indonesia 65122 Mobile. +6281944811922.

pp. 97-100

PS2-TVT.2 ***Accuracy Comparison of Radio Direction Finder with 6 and 4 of Log Periodic Dipole Array Antennas***

Kartiko Nugroho, Azli Yahya, Nor Hisham Khamis, Nuramirah M Nor, M Razman Shaari and Abd. Rahim Mat Sidek

pp. 101-104

PS2-TVT.3 ***Design and Construction of Helical Antenna in GSM 900***

Yuli Christyono

pp. 105-109

PS2-TVT.4 ***Bandwidth Enhancement Using Stacked Patch MIMO Antenna with Low Mutual Coupling for 3.5 GHz***

Subuh Pramono

pp. 110-114

PS2-TVT.5 ***The Track Characteristics and the Propagation Model in Train Traffic for Automatic Traffic Door System***

Elfira Nureza Ardina

pp. 115-120

PS2-TVT.6 ***Multi-hop Uplink for Low Power Wide Area Networks Using LoRa Technology***

Misbahuddin Misbahuddin, Muhamad Syamsu Iqbal and Giri Wahyu Wiriasto

pp. 121-125

PS2-TVT.7 ***Automatic Sprinkler System for Water Efficiency Based on LoRa Network***

Arif Nursyahid, Tholud Aprilian, Thomas Agung S, Helmy Helmy, Ari Sriyanto Nugroho and Deddy Susilo

pp. 126-131

Parallel Session 3 (Control and Circuits)

Room: Amarta 2

PS3-CC.1 ***Design of Fabric-Based Soft Robotic Glove for Hand Function Assistence***

Rifky Ismail

Presenter bio: An assistant professor in Department of Mechanical Engineering, Diponegoro University, Indonesia. A researcher in Center for Biomechanics, Biomaterial, Biomechatronics and Biosignal Processing (CBIOM3S) Diponegoro University. I conduct a research on biomechanics, biomaterial, biomechatronics, tribology and engineering design.

pp. 132-137

PS3-CC.2 ***Spark Gap System of Electrical Discharge Machining (EDM)***

Betantya Nugroho, Azli Yahya, Trias Andromeda, Abd. Rahim Mat Sidek and Nor Hisham Khamis

pp. 138-142

PS3-CC.3 ***Development of Omni-Wheeled Mobile Robot Based-on Inverse Kinematic and Odometry***

Aghus Sofwan, Hafidz Mulyana, Hadha Afrisal and Abdul Goni

pp. 143-148

PS3-CC.4 ***Three-Fingered Soft Robotic Gripper Based on Pneumatic Network Actuator***

Mochammad Ariyanto and Rifky Ismail

Presenter bio: I am working on the area of dynamics system and control in Department of Mechanical Engineering, Diponegoro University. My expertises are: - Biomechatronics and biomedical Engineering - Unmanned vehicles, VTOLs and rotorcraft - Flight dynamic modeling, simulation, Navigation, and control - Hardware in-the loop simulation (HILS) & Pilot in-the loop simulation (PILS) - Flying Robot/Aerial robot - object interaction - Control system design, optimization design, Artificial Neural Network (ANN), & Genetic Algorithm (GA) - Biorobotics, robotic hand, supernumerary robotic limbs, exoskeleton robot

pp. 149-153

PS3-CC.5 ***MFCC Feature Extraction and KNN Classification in ECG Signal***

Siti Agrippina Alodia Yusuf and Risanuri Hidayat

pp. 154-158

PS3-CC.6 ***Design Semi-Automatic Control System Using PLC for Stalling Materials in the Forming Machine***

Syahril Ardi

pp. 159-162

PS3-CC.7 ***Designing a Fuzzy Controller of Crude Oil Dilution in Palm Oil Mills***

Enda Wista Sinuraya

pp. 163-168

PS3-CC.8 ***Inertial Navigation System of Quadrotor Based on 10-DOF IMU and GPS Sensors***

Sumardi Sumardi, Taufik Rahmadani and Hadha Afrisal

Presenter bio: Taufik Rahmadani was born on August 19th, 1997 in Semarang city, Middle Java province, Indonesia. In 2015, he joined the Department of Electrical Engineering, University Diponegoro, as a student specially in Control and instrumentation. His current research interests include inertial measurement unit, quadcopter, IoT, and power electronics. he has collaborated actively with researchers in several other disciplines of science and technology.

pp. 169-174

PS3-CC.9 ***Design of Data Acquisition System for Position and Attitude Quadcopter***

Aris Triwiyatno, Sumardi Sumardi, Hadha Afrisal, Dhamastya Adhi Putra and Taufik Rahmadani

pp. 175-178

Parallel Session 3 (Information and Computer Technologies 2)

Room: Amarta 3

PS3-ICT2.1 ***Towards Smart LMS to Improve Learning Outcomes Students Using LenoBot with Natural Language Processing***

Dina Fitria Murad, Dfm, Adhi Iskandar, Erick Fernando, Deryan Maured and Tica Octavia

pp. 179-184

PS3-ICT2.2 ***Using Minimum Distance to Classify Uttered Arabic Words into Subject - Object Name***

Salam Hamdan, Arafat A. Awajan and Akram Al-kouz

Presenter bio: I am a PhD candidate in Computer Science at Princess Sumaya University for Technology. I received my bachelor's degree in Computer Engineering from Al-Balqa Applied University, 2012.I received my master's degree in Information System Security and Digital Criminology from PSUT, 2015. My research interests include hardware security, network security and vehicular ad hoc networks.

pp. 185-190

PS3-ICT2.3 ***MEC Deployment with Distributed Cloud in 4G Network for 5G Success***

Andika Hairuman, Amalia Zahra, I Gede Putra Kusuma Negara and Dina Fitria Murad, Dfm

Presenter bio: Andika Hairuman received his Bachelor degree in Information Systems from Bina Nusantara University, Indonesia in 2019. He is currently pursuing the Master degree in Computer Science at Bina Nusantara University, Indonesia. He is working as a consultant for 15 years and been working in Telecommunication and IT Industry for 18 years. Deep knowledge of GSM, WCDMA, LTE, 5G Technology as a domain expert of RF, RAN and Virtualized RAN, Cloud and Edge Computing, NFV, Automation and Machine Learning.

pp. 191-196

PS3-ICT2.4 ***LC-MS Analysis: Mini Review Frequently Used Open Source Softwares***

Iwan Binanto, Bahtiar Saleh Abbas, Harco Leslie Hendric Spits Warnars and Nesti Sianipar

Presenter bio: Lecturer at Department of Informatics, Sanata Dharma University, Yogyakarta, Indonesia.

pp. 197-201

PS3-ICT2.5 ***Geometric Verification Method of Best Score Increasing Subsequence for Object Instance Recognition***

I Gede Putra Kusuma Negara, Kristopher David Harjono and Muhammad Taufik Dwi Putra

pp. 202-206

PS3-ICT2.6 ***Augmented Reality Technology as One of the Media in Therapy for Children with Special Needs***

Kurniawan Martono

pp. 207-211

PS3-ICT2.7 ***Implementation of Neural Network Classification for Diabetes Mellitus Prediction System Through Iridology Image***

Rievanda Putri and Adhi Harmoko Saputro

pp. 212-217

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	Thursday, September 26		Friday, September 27
7:30 - 8:00	*Registration*		
8:00 - 8:10	*Welcoming Speech by General Chair of ICITACEE 2019*		
8:10 - 8:20	*Welcoming Speech by IEEE Indonesia Section*		
8:20 - 8:40	*Welcoming Speech and Opening by Dean of Engineering Faculty, Diponegoro University*		
8:40 - 8:50	*Photo Session*		
8:50 - 9:00	*IEEE at glance by Representative of IEEE Indonesia Section*		
9:00 - 9:15			*City Tour*
9:15 - 9:30	*Coffee Break*		
9:30 - 10:00	*Invited Speaker Session 1*		
10:00 - 10:30	*Invited Speaker Session 2*		
10:30 - 11:00	*Invited Speaker Session 3*		
11:00 - 11:30	*Parallel Session 1 (Telecommunication and Vehicular Technology and Green Applications and Interdisciplinary Topic)*	*Parallel Session 1 (Power Systems)*	
11:30 - 11:40			
11:40 - 11:50			
11:50 - 12:00	*Lunch Break*		
12:00 - 13:00			
13:00 - 14:10	*Parallel Session 2 (Information and Computer Technologies 1)* *Parallel Session 2 (Telecommunications and Vehicular Technologies)*		
14:10 - 14:20			
14:20 - 14:30	*Coffee Break*		
14:30 - 15:40	*Parallel Session 3 (Information and Computer Technologies 2)*	*Parallel Session 3 (Control and Circuits)*	
15:40 - 16:00			
16:00 - 18:30	*Break*		
18:30 - 20:00	*Gala Dinner*		

Thursday, September 26

Invited Speaker Session 3

Room: Amarta 2 and Amarta 3

IS3.1 ***Backward Compatible Low PAPR Preamble for Very High Throughput WLAN IEEE802.11ac***

Wahyul Amien Syafei, Achmad Hidayatno and Ajub Ajulian Zahra

Presenter bio: B.Eng 95 Electrical Engineering Faculty of Engineering Diponegoro University, Indonesia. M.Eng 02 Multimedia Telecommunication Faculty of Engineering Sepuluh Nopember Institute of Technology, Indonesia. Ph.D 09 Department of Electronics and System Engineering Computer Science and Electronics Kyushu Institute of Technology, Japan. Field: Wireless Telecommunication and Mutimedia, MIMO, OFDM, Familiar with IEEE 802.11a/b/g/n/ ac, 3rd-Dan in Karate, 3rd-Dan in Kobudo, Instructor of Okinawan Kobudo, Gold Medal Shorinji Kempo. Speaking: Bahasa Indonesia, Java, Sunda, English, Japanese, Arabic

pp. 1-6

Parallel Session 1 (Power Systems)

Room: Amarta 2

PS1-PS.1 ***Performance Improvement of Scalar Feedback Control for Induction Motors by Using Third Harmony Injection SPWM***

Alif Nabiel Luqman, MIftah Adiguna, Abdul Fandi, Mochammad Facta, Trias Andromeda, Hermawan Hermawan and Iwan Setiawan

pp. 7-12

PS1-PS.2 ***Dynamic Power Injection for Solar PV Constant Power Generation***

Muhammad Kuncoro, Rudi Darussalam, Chandra Budi Sukmono and Iwa Garniwa

pp. 13-17

PS1-PS.3 ***Fast-Charging LTO 18650 Batteries Using a DC PS-3005D Power Supply***

Anggakara Syahbi Syagata, Angga, Trias Andromeda, Iwan Setiawan, Hermawan Hermawan, Abd. Rahim Mat Sidek and Imam Sumpono

pp. 18-22

PS1-PS.4 ***Power Consumption Analysis in Resonant Converter***

Mochammad Facta, Hermawan Hermawan and Muhammad Amjad

pp. 23-26

PS1-PS.5 ***Design of Temperature and Humidity Control Devices in the Leakage Current Test Chamber of 20kV Insulator***

Lastoni Wibowo, Abdul Syakur and Trias Andromeda

pp. 27-32

PS1-PS.6 ***Design of Monitoring Remote Terminal Unit(RTU) Panel Supply Based on IOT Case Study at PLN***

Fikri Shalahudin and Budi Setiyono

Presenter bio: Born in Tegal, 24 June 1995, now become student at Electrical Engineering Diponegoro University

pp. 33-38

Parallel Session 1 (Telecommunication and Vehicular Technology and Green Applications and Interdisciplinary Topic)

Room: Amarta 3

PS1-TG.1 ***Centralized Dynamic Host Configuration Protocol and Relay Agent for Smart Wireless Router***

Wahyul Amien Syafei, Yosua Alvin Adi Soetrisno and Agung Prasetijo

Presenter bio: B.Eng 95 Electrical Engineering Faculty of Engineering Diponegoro University, Indonesia. M.Eng 02 Multimedia Telecommunication Faculty of Engineering Sepuluh Nopember Institute of Technology, Indonesia. Ph.D 09 Department of Electronics and System Engineering Computer Science and Electronics Kyushu Institute of Technology, Japan. Field: Wireless Telecommunication and Mutimedia, MIMO, OFDM, Familiar with IEEE 802.11a/b/g/n/ ac, 3rd-Dan in Karate, 3rd-Dan in Kobudo, Instructor of Okinawan Kobudo, Gold Medal Shorinji Kempo. Speaking: Bahasa Indonesia, Java, Sunda, English, Japanese, Arabic

pp. 39-43

PS1-TG.2 ***Diabetes Prediction System Based on Iridology Using Machine Learning***

Ratna Aminah and Adhi Harmoko Saputro

pp. 44-49

PS1-TG.3 ***Analysis of the Effect of the Wax Coating on Firmness Prediction Model in Malang Apples Based on Visible and Near-Infrared (VNIR) Imaging***

Risti Dwi Putri and Adhi Harmoko Saputro

pp. 50-54

PS1-TG.4 ***Development Conceptual Model Smartphone Adoption for Use Mobile Banking***

Erick Fernando, Surjandy Surjandy and Meyliana Meyliana

pp. 55-59

Parallel Session 2 (Information and Computer Technologies 1)

Room: Amarta 3

PS2-ICT1.1 ***Understanding Digital Skill Use from the Technology Continuance Theory (TCT)***

Nurdin Nurdin, Sagaf S Pettalongi and Mansur Mangasing

Presenter bio: I am a senior Lecturer in Information System at IAIN Palu and the Director of STMIK Bina Mulia Palu- Indonesia. Currently I got a PhD degree in Information TeChnology at Swinburne University of Technology Australia. I have published a number of journal papers and proceedings. My skill related to information systems, e-government and social media.

pp. 60-65

PS2-ICT1.2 ***Analysis Social Media Application Message Trust Factor a Case Study University Student in Indonesia***

Surjandy Surjandy, Wanda Wandoko, Meyliana Meyliana and Erick Fernando

Presenter bio: Phd Student and researcher, Reserach Topic area - Blockchain for Enterprise System Solution (e.g. SCM) - Technology Risk Management - Financial Technology - IT Governance

pp. 66-70

PS2-ICT1.3 ***Early Warning System of Landslide Disaster Using Generalized Neural Network Algorithm***

Aghus Sofwan and Sumardi Sumardi

pp. 71-74

PS2-ICT1.4 ***Intelligent Multiple-Vehicular-Attributes (iMVA) Broadcast Protocol for VANETs***

Agung Prasetijo

pp. 75-80

PS2-ICT1.5 ***Data Privacy Factor of Female Passenger's Data in Indonesia Online Transportation System***

Surjandy Surjandy, Erick Fernando, Meyliana Meyliana, Yuli Eni, Alexandra Joya and Dimitrij Dharma

Presenter bio: Phd Student and researcher, Reserach Topic area - Blockchain for Enterprise System Solution (e.g. SCM) - Technology Risk Management - Financial Technology - IT Governance

pp. 81-85

PS2-ICT1.6 ***Success Factor of the Implementation Blockchain Technology in Pharmaceutical Industry: A Literature Review***

Erick Fernando, Meyliana Meyliana and Surjandy Surjandy

pp. 86-90

PS2-ICT1.7 ***Hierarchical Multi-label Classification to Identify Hate Speech and Abusive Language on Indonesian Twitter***

Faizal Adhitama Prabowo, Muhammad Okky Ibrohim and Indra Budi

pp. 91-96

Parallel Session 2 (Telecommunications and Vehicular Technologies)

Room: Amarta 2

PS2-TVT.1 ***Uplink Boost Eliminate User in Massive MIMO System Using Reinsch Algorithm***

Soraya Mustika, Eko Noerhayati, Anik Nur Handayani, Siti Sendari and Langlang Gumilar

Presenter bio: • Name : Soraya Norma Mustika • Place/ Date of Birth: Malang, Indonesia. August 9th1992 • Resident Address: Jalan Cikaso 16 Malang, East Java, Indonesia 65122 Mobile. +6281944811922.

pp. 97-100

PS2-TVT.2 ***Accuracy Comparison of Radio Direction Finder with 6 and 4 of Log Periodic Dipole Array Antennas***

Kartiko Nugroho, Azli Yahya, Nor Hisham Khamis, Nuramirah M Nor, M Razman Shaari and Abd. Rahim Mat Sidek

pp. 101-104

PS2-TVT.3 ***Design and Construction of Helical Antenna in GSM 900***

Yuli Christyono

pp. 105-109

PS2-TVT.4 ***Bandwidth Enhancement Using Stacked Patch MIMO Antenna with Low Mutual Coupling for 3.5 GHz***

Subuh Pramono

pp. 110-114

PS2-TVT.5 ***The Track Characteristics and the Propagation Model in Train Traffic for Automatic Traffic Door System***

Elfira Nureza Ardina

pp. 115-120

PS2-TVT.6 ***Multi-hop Uplink for Low Power Wide Area Networks Using LoRa Technology***

Misbahuddin Misbahuddin, Muhamad Syamsu Iqbal and Giri Wahyu Wiriasto

pp. 121-125

PS2-TVT.7 ***Automatic Sprinkler System for Water Efficiency Based on LoRa Network***

Arif Nursyahid, Tholud Aprilian, Thomas Agung S, Helmy Helmy, Ari Sriyanto Nugroho and Deddy Susilo

pp. 126-131

Parallel Session 3 (Control and Circuits)

Room: Amarta 2

PS3-CC.1 ***Design of Fabric-Based Soft Robotic Glove for Hand Function Assistence***

Rifky Ismail

Presenter bio: An assistant professor in Department of Mechanical Engineering, Diponegoro University, Indonesia. A researcher in Center for Biomechanics, Biomaterial, Biomechatronics and Biosignal Processing (CBIOM3S) Diponegoro University. I conduct a research on biomechanics, biomaterial, biomechatronics, tribology and engineering design.

pp. 132-137

PS3-CC.2 ***Spark Gap System of Electrical Discharge Machining (EDM)***

Betantya Nugroho, Azli Yahya, Trias Andromeda, Abd. Rahim Mat Sidek and Nor Hisham Khamis

pp. 138-142

PS3-CC.3 ***Development of Omni-Wheeled Mobile Robot Based-on Inverse Kinematic and Odometry***

Aghus Sofwan, Hafidz Mulyana, Hadha Afrisal and Abdul Goni

pp. 143-148

PS3-CC.4 ***Three-Fingered Soft Robotic Gripper Based on Pneumatic Network Actuator***

Mochammad Ariyanto and Rifky Ismail

Presenter bio: I am working on the area of dynamics system and control in Department of Mechanical Engineering, Diponegoro University. My expertises are: - Biomechatronics and biomedical Engineering - Unmanned vehicles, VTOLs and rotorcraft - Flight dynamic modeling, simulation, Navigation, and control - Hardware in-the loop simulation (HILS) & Pilot in-the loop simulation (PILS) - Flying Robot/Aerial robot - object interaction - Control system design, optimization design, Artificial Neural Network (ANN), & Genetic Algorithm (GA) - Biorobotics, robotic hand, supernumerary robotic limbs, exoskeleton robot

pp. 149-153

PS3-CC.5 ***MFCC Feature Extraction and KNN Classification in ECG Signal***

Siti Agrippina Alodia Yusuf and Risanuri Hidayat

pp. 154-158

PS3-CC.6 ***Design Semi-Automatic Control System Using PLC for Stalling Materials in the Forming Machine***

Syahril Ardi

pp. 159-162

PS3-CC.7 ***Designing a Fuzzy Controller of Crude Oil Dilution in Palm Oil Mills***

Enda Wista Sinuraya

pp. 163-168

PS3-CC.8 ***Inertial Navigation System of Quadrotor Based on 10-DOF IMU and GPS Sensors***

Sumardi Sumardi, Taufik Rahmadani and Hadha Afrisal

Presenter bio: Taufik Rahmadani was born on August 19th, 1997 in Semarang city, Middle Java province, Indonesia. In 2015, he joined the Department of Electrical Engineering, University Diponegoro, as a student specially in Control and instrumentation. His current research interests include inertial measurement unit, quadcopter, IoT, and power electronics. he has collaborated actively with researchers in several other disciplines of science and technology.

pp. 169-174

PS3-CC.9 ***Design of Data Acquisition System for Position and Attitude Quadcopter***

Aris Triwiyatno, Sumardi Sumardi, Hadha Afrisal, Dhamastya Adhi Putra and Taufik Rahmadani

pp. 175-178

Parallel Session 3 (Information and Computer Technologies 2)

Room: Amarta 3

PS3-ICT2.1 ***Towards Smart LMS to Improve Learning Outcomes Students Using LenoBot with Natural Language Processing***

Dina Fitria Murad, Dfm, Adhi Iskandar, Erick Fernando, Deryan Maured and Tica Octavia

pp. 179-184

PS3-ICT2.2 ***Using Minimum Distance to Classify Uttered Arabic Words into Subject - Object Name***

Salam Hamdan, Arafat A. Awajan and Akram Al-kouz

Presenter bio: I am a PhD candidate in Computer Science at Princess Sumaya University for Technology. I received my bachelor's degree in Computer Engineering from Al-Balqa Applied University, 2012.I received my master's degree in Information System Security and Digital Criminology from PSUT, 2015. My research interests include hardware security, network security and vehicular ad hoc networks.

pp. 185-190

PS3-ICT2.3 ***MEC Deployment with Distributed Cloud in 4G Network for 5G Success***

Andika Hairuman, Amalia Zahra, I Gede Putra Kusuma Negara and Dina Fitria Murad, Dfm

Presenter bio: Andika Hairuman received his Bachelor degree in Information Systems from Bina Nusantara University, Indonesia in 2019. He is currently pursuing the Master degree in Computer Science at Bina Nusantara University, Indonesia. He is working as a consultant for 15 years and been working in Telecommunication and IT Industry for 18 years. Deep knowledge of GSM, WCDMA, LTE, 5G Technology as a domain expert of RF, RAN and Virtualized RAN, Cloud and Edge Computing, NFV, Automation and Machine Learning.

pp. 191-196

PS3-ICT2.4 ***LC-MS Analysis: Mini Review Frequently Used Open Source Softwares***

Iwan Binanto, Bahtiar Saleh Abbas, Harco Leslie Hendric Spits Warnars and Nesti Sianipar

Presenter bio: Lecturer at Department of Informatics, Sanata Dharma University, Yogyakarta, Indonesia.

pp. 197-201

PS3-ICT2.5 ***Geometric Verification Method of Best Score Increasing Subsequence for Object Instance Recognition***

I Gede Putra Kusuma Negara, Kristopher David Harjono and Muhammad Taufik Dwi Putra

pp. 202-206

PS3-ICT2.6 ***Augmented Reality Technology as One of the Media in Therapy for Children with Special Needs***

Kurniawan Martono

pp. 207-211

PS3-ICT2.7 ***Implementation of Neural Network Classification for Diabetes Mellitus Prediction System Through Iridology Image***

Rievanda Putri and Adhi Harmoko Saputro

pp. 212-217

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LC-MS ANALYSIS: MINI REVIEW FREQUENTLY USED OPEN SOURCE SOFTWARES

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***Abstract*— This paper provides information about open source softwares that most often used as a tool to analyze data generated from the Liquid chromatography-mass spectrometer (LC-MS) instrument and including a little discussion about how LC-MS works. LC-MS consists of Liquid Chromatography and Mass Spectrometer analytical instruments. This device extensively used in Metabolomics, because it provides more comprehensive information about the metabolites. It also shows the breadth of the diversity of chemical compounds in metabolites that make difficult and time-consuming to identification of metabolite's structures. This is an obstacle in efficient and accurate identification. So, many open source softwares developed to simplify and speed up the analysis and interpretation of LC-MS result. There are popular open source softwares. We compiling mini review of this open source softwares. The conclusion is open source softwares quite helpful in terms of data analysis and interpretation of compounds contained, but no one has provided a single interpretation, still need experts for reliable interpretation.**

Keywords—LC-MS, Chromatography, LC-MS Software, Preprocessing data LC-MS, Frequently Used Software

I. INTRODUCTION

Many medicinal plants are efficacious to cure diseases of mild to severe, such as cancer. However, the content of their chemical compounds not known yet. Many technologies were developed as tools to find out their compounds, although complex analysis is needed.

Analysis of data for metabolomics and identification of compounds progressed rapidly due to new applications and standardization of existing frameworks [1], [2]. Metabolomic data are obtained from at least three technologies which usually complement each other for analyzing metabolites, namely LCMS, GCMS, and NMR [3], [4], [5], [6]. Weber et al. provided information from international respondents that the percentage of technology utilized is LC-MS (83%), GC-MS (30%), NMR (26%), the rest use technology that is not very popular [7].

LC-MS is widely utilized because it allows the physical separation of thousands of metabolites, so it provides more comprehensive information about the tested metabolites [1], [4], [6]. This also shows the breadth of the diversity of chemical compounds in metabolites that make identification of structures, difficult and time-consuming [8]. This is an obstacle in efficient and accurate identification [1], [9], [10]. Therefore to simplify and speed up the analysis and interpretation of LC-MS results, it is necessary to use computation and algorithms as software or application to extract meaningful information from existing active compounds [11]. There are already many stand-alone and web-based applications available and used to analyze the output of LC-MS, as summarized and published in [1], [5], [7], [12], [13].

Weber et al. [7] also provided information that the widely used open-source software was XCMS (70%), MZmine and MZmine2 (26%). Whereas according to [3], [13], [14] there are other software named MS-DIAL [3], [15], MAVEN and MetaboAnalyst [13] and agree that XCMS and mzMine software are commonly used. This software requires raw data from the instrument as an open format file. The open format file is needed because each instrument vendor provides a different closed format (proprietary) file. Open format file that is widely used is mzXML (70%) and mzML (41%) [7].

II. BASIC PRINCIPLES OF LIQUID CHROMATOGRAPHY-MASS SPECTROMETER (LC-MS)

Chromatography is a method of separating components in a mixture in which the components to be separated are distributed selectively between two incompatible phases: the mobile phase through the stationary phase [16]. The mobile phase is described as "a fluid that seeps through or along with a pile of stationary phases in a definite direction." This can be liquid, gas, or supercritical fluid, while the stationary phase can be solid, gel, or liquid. If it is a liquid, the liquid can be

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distributed to solids, which may not contribute to the separation process [17]. This technique is named as the mobile phase used, namely gas chromatography (GC), liquid chromatography (LC), or supercritical fluid chromatography (SFC) [16].

The chromatographic process occurs as a result of repeated absorption or release steps during the movement of the analyte throughout the stationary phase. This separation is caused by differences in the distribution coefficients of each analyte in the sample [16]; so it is said that Liquid chromatography uses the liquid as the mobile phase to transport sample molecules through stationary phase [11] which is the basic technique of separation in the fields of chemistry and related natural sciences.

Liquid chromatography is a universal technique used for the separation of compounds from mixtures [18] which safely separates various organic compounds, from small molecules drug metabolites to peptides and proteins [19]. Now modern liquid chromatography commonly utilizing high-performance liquid chromatography (HPLC) instruments [20]. HPLC facilitates analysis of chemical compounds with higher polarity and lower volatility in the broader mass range without derivatization [21].

It is challenging to ensure certain chemicals at a peak in Liquid Chromatography, even if the sample contains only a single chemical. Therefore it is necessary to add Mass Spectrometry, which will provide information about the mass of all chemicals in the peak, so it can be used to identify them [20].

Mass Spectrometry (MS) is based on the analysis of ions that move through a vacuum. The result is a mass spectrum, which provides valuable information about the molecular weight, structure, identity, number, and purity of the sample [20], [22]. The Mass Spectrometer usually consists of three main parts: ion source, mass analyzer, and detector. When the source ion converts the sample molecule into an ion, the mass analyzer resolves these ions both in a tube when flying or in an electromagnetic field before being measured by a detector. Several options are available for ion sources, namely Electrospray Ionization (ESI), Atmospheric Pressure Chemical Ionization (APCI), Atmospheric Pressure Photoionization (APPI), and Fast Atom Bombardment (FAB). Mass analyzers can be categorized as quadrupole, ion trap, Time-Of-Flight (TOF), orbit, and Fourier Transform Ion Cyclotron (FTICR) [23]. Quadrupole tends to be the simplest and cheapest mass analyzer [19].

Mass Spectrometry technology enables the development of flexible and reliable methods and simultaneous quantification of low and high analyte molecular weights in various concentrations [18]. In summary, Mass Spectrometry is used to measure mass to charge ratio of charged particles called mass-to-charge (m/z) ratio [20].

The combination of Liquid Chromatography with Mass Spectrometry (LC-MS) allows more definitive identification and facilitates the quantitative determination of compounds [17]. Figure 1 shows an overview diagram of the LC-MS device in general.

This device have four vacuum stage and allows filtering from the beginning, which is from the spray chamber where most solvents never enter the capillary. Only ions, gas dryers, and a small portion of solvents can passing through the capillary. At the exit of capillary, the skimmer do filtering. Heavier ions with greater momentum can pass through the skimmer apperture. The ions passing through the skimmer and move to the second stage of the vacuum system. In the second stage, the ions immediately focused to pass through on two vacuum stages using octopole. The ions can pass through the octopole because of the momentum that they receive from atmospheric pressure through capillary sampling. The ions coming out of this stage then pass through on two focusing lenses to fourth stage vacuum systems. In the fourth vacuum stage, a quadrupole mass analyzer separates ions from the mass ratio to the charge. The quadrupole has an electromagnetic field that determines the ratio of mass to charge that can pass through the filter at a certain time. The passing ions are focused on the detector [22]. The detector capture this data.

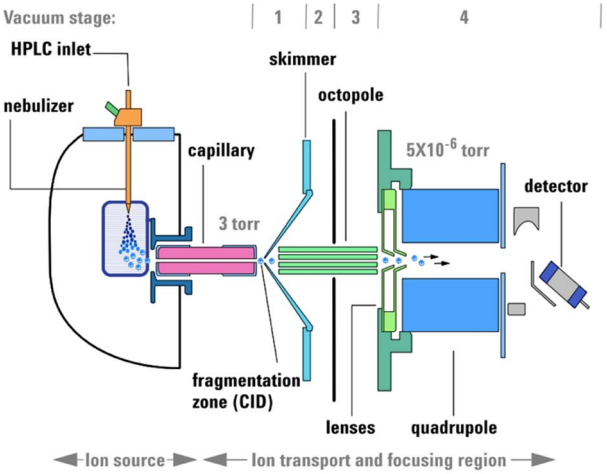

Fig. 1. Diagram of a quadrupole LCMS device for mass analysis [22]

The output of the LC-MS tool is 3D signals that are scattered with dimensions of intensity, m/z, and retention time for each detected feature (peak mass) [11] as shown in figure 2. In that figure, the height describes the exact intensity in a unit; the horizontal axis is m/z which is detected, while the other axis is the retention time in seconds.

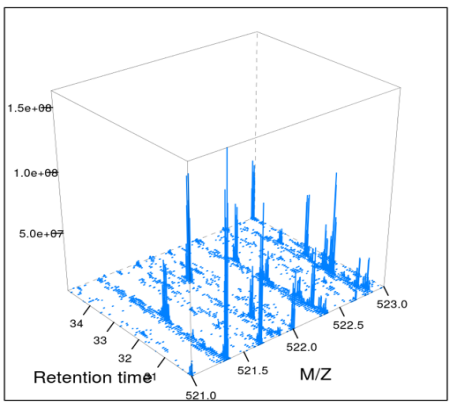

Fig. 2. Visualization of 3D LC-MS-generated data [24]

III. FREQUENTLY USED OPEN SOURCE SOFTWARES

This chapter provides brief information about assistive software that is frequently used in processing LC-MS data based on Weber et al. [7].

A. XCMS

This is the most often used tool in the first order, according to Weber et al. [7]. Clasquin et al. [26] stated that XCMS is a significant milestone in the development of metabolomics software. Its features are Noise filtering, peak detection, and alignment for LC-MS and GC-MS data [6]. XCMS focuses on preprocessing data to produce essential peaks visualization. XCMS developed into XCMS2; it adds a similarity search to identify with a connection to the METLIN database [27].

There are three essential things from XCMS, which are their advantages, namely design, availability, and flexibility because they are independent of machine vendors and are developed with R Language which is free [28].

The next development namely XCMS online, which is an online implementation of XCMS and complements existing shortcomings, such as providing several parameters for different instrument setups, PCA and univariate statistical analysis and direct links to METLIN databases for putative metabolite annotation [5].

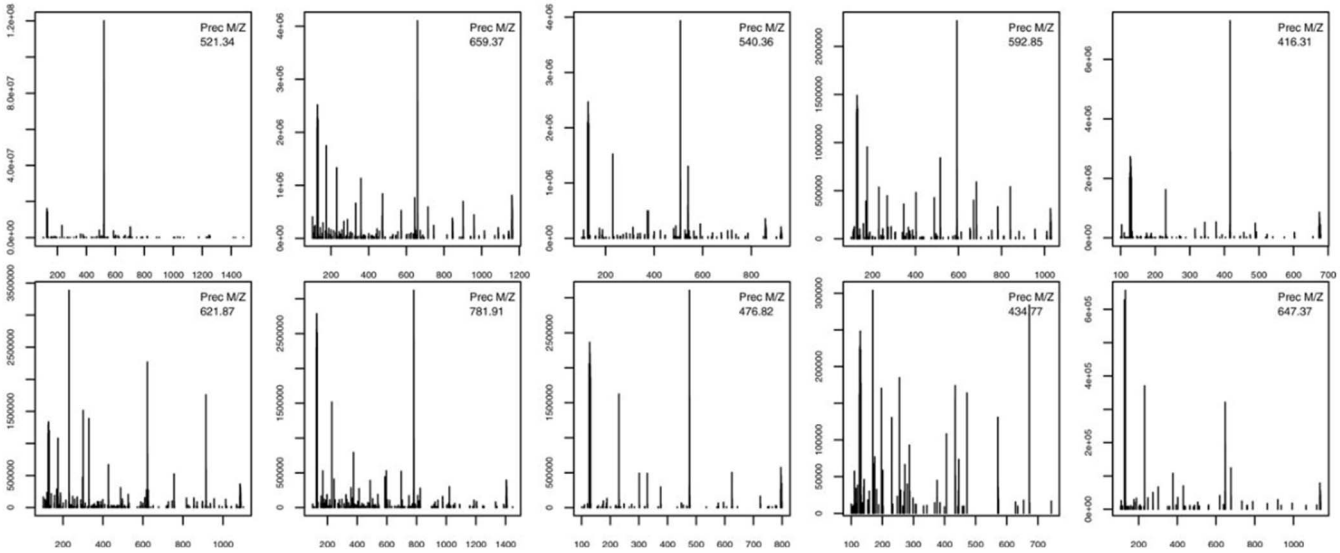

Fig. 3. 2D signal m/z vs. intensity of 3D LC-MS generated data [24]

```
#!/usr/bin/env python2
# -*- coding: utf-8 -*-
"""
Created on Wed Apr 17 21:45:02 2019

@author: iwanbinanto



"""
import numpy as np
import pyopenms
from mpl_toolkits.mplot3d import Axes3D
import matplotlib.pyplot as plt
from matplotlib import cm

exp = pyopenms.MSExperiment()
fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')


pyopenms.FileHandler().loadExperiment("/Users/iwanbinanto/OneDrive - Bina Nusantara University/
                    Desertasi/Hasil LCMS_GCMS/convert-DataLCMS/D-BM 8-9_170818_10.mzXML", exp)

x=[]
y=[]
z=[]
for spectrum in exp:
    for peak in spectrum:

        x.append(spectrum.getRT())
        y.append(peak.getMZ())
        z.append(peak.getIntensity())


ax.plot_trisurf(np.array(x), np.array(y), np.array(z), cmap=cm.coolwarm,linewidth=0, antialiased=False)

ax.set_xlabel('Retention Time')
ax.set_ylabel('m/z')
ax.set_zlabel('Intensity')

plt.title('Grafik D-BM 8-9_170818_10')


plt.savefig('coba3surf.png',dpi=800)

```

Fig. 4. Source code visualization of LC-MS data

To get 3D data and visualize it as in Figure 2 from raw data, can be done with Python programming using the pyOpenMS library [25], such as the source code in Figure 4. This 3D signal then converted into 2D signal to facilitate analysis and interpretation as seen on Figure 3. Commonly, they are m/z vs. intensity, although it does not close the possibility of m/z vs. retention time.

B. *MZmine dan MZmine2*

MZmine was developed with Java and was first introduced in 2005 as open-source software for LC-MS data processing [29], [30]. Development of MZmine is motivated by the need software that facilitates mass spectrometry data processing and implementation of new normalization algorithms that can handle multiple spectra from the same sample and allows it to connect with a database [29]. Briefly, Pluskal et al. [30] said that MZmine provides workflow data analysis and implementation of a simple method for data processing and visualization. The open format file that is supported is netCDF, mzXML.

Together with its predecessor version, it is the second most frequently used tool, according to Weber et al. [7]. MZmine2 was also developed with Java and to overcome the shortcomings in the previous version, namely modularity. Without modularity, it will limit the development when new methods were developed by the scientific community. Therefore the MZmine2 software architecture was seen in Figure 4 [30].

MZmine2 is a tool for preprocessing LC-MS data even though it also includes the whole analysis workflow. Feature detection is available for high-resolution liquid chromatography-mass spectrometry (HRLC-MS) data using the GridMass algorithm [30] from Trevino et al. [31]. Postprocessing, metabolite identification, and statistical analysis have also been added [5].

Peak identification is done by searching in the existing database from the m/z value and retention times or can be done directly online because MZmine2 is already connected to an online database such as PubChem, KEGG, METLIN, or HMDB, and the interface has been provided. So it can be said that MZmine predicts the chemical compounds in a sample. It is just not mentioned what algorithm is used for the interpretation.

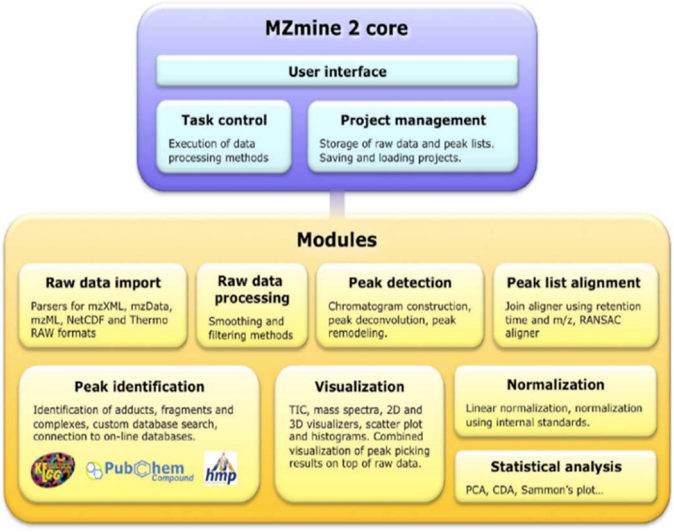

Fig. 5. software architecture and playing modules of MZmine2

MZmine2 supported file formats such as mzML (1.0 and 1.1), mzXML (2.0, 2.1 and 3.0), mzData (1.04 and 1.05), NetCDF, and the usual RAW format produced by Thermo Fisher Scientific instruments (requires the installation of Thermo Xcalibur) [30].

C. *MS-DIAL*

Designed explicitly for preprocessing data with data deconvolution functions of untargeted MS/MS Data-Independent Acquisition (DIA) using the MS2Dec algorithm. Data-Independent Acquisition (DIA) in LC-MS/MS provides untargeted molecular data information comprehensively. MS-DIAL uses an algorithm based on Joint Aligner [5] from Pluskal et al. [30] for Peak Alignment, which is implemented on MZmine.

D. *MAVEN*

It stands for Metabolomics Analysis and Visualization Engine, which was first introduced in 2010 by Melamud et al. [32]. MAVEN is built on the capabilities of existing opensource software, such as XCMS [26], [32]. MAVEN provides preprocessing, identification of different datasets. Peaks are selected, refined, and grouped, followed by retention time alignment. Peak quality scores are reported so that users can identify high-quality peaks [5]. Clasquin et al. [26] call MAVEN as Menu-driven, click-based navigation allows visualization of raw and analyzed data. The output of MAVEN is not yet a single prediction of a chemical compound; it is still a table that the expert will interpret but has been considered easily interpreted and reliable [26].

E. *MetaboAnalyst*

MetaboAnalyst was developed with Java Server Faces as its web interface and the R language for its backend. Integration between Java and R uses the Reserve package. MetaboAnalyst is one of the applications that continue to be developed, starting from the initial version in 2009, which was later developed into version 2.0, version 3.0, version 4.0.

MetaboAnalyst 3.0 provides a collection of tools for analyzing metabolites from MS and NMR data with statistical focus, enrichment, and pathway analysis. It consists of eight independent analysis modules, which consist of three main categories, namely exploratory statistical analysis, functional analysis, and advanced methods for translational studies. XCMS algorithms are also used for peak picking, grouping, and retention time alignment, with additional parameters that are often used [5].

Consider the web version has limitations, the R package version was developed called MetaboAnalystR, and then MetaboAnalystR 2.0 [33] - [38].

IV. CONCLUSION

There are many softwares that attempted facilitate biologists and chemists to interpret the compounds contained in a plant. Mostly, they developed based on existing one, especially on open source software.

However, no one can provide an interpretation of a single chemical compound contained in a plant as output. Therefore, needed developing software to accommodate it.

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