IQRAC2018

International Quantitative Research and Applications Conference 2018

5 - 8 August 2018
Kuching, Sarawak, MALAYSIA

"Mathematical Challenges in Big Data Analytics"

PROGRAMME & ABSTRACT BOOK

Jointly Organised by:

UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

AISMM
AKADEMI ILMUWAN SAINS MATEMATIK MALAYSIA
(MALAYSIAN ACADEMY OF MATHEMATICAL SCIENTISTS)

Main Supporter:

SARAWAK
CONVENTION BUREAU

IQRAC2018

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Kuching | Sarawak | MALAYSIA

Silverlake Axis provides financial services technology to the Banking, Insurance, Payments, Retail and Logistics industries. Founded in 1989, we have built an impeccable track record of successful core banking implementations. After years of successes across the region, Silverlake Axis was listed on Singapore's Stock Exchange (SGX) SESDAQ in 2003 and moved up to SGX Mainboard in 2011.

Today, we are the core system platform partner of choice for 3 of the 5 largest ASEAN super regional financial institutions. Over 40% of the top 20 largest banks in South-East Asia run Silverlake Axis' core banking solutions.

Together with our acquired subsidiaries and associates, we have transformed and created value for over 300 customers and their ecosystems. Our geographical presence spans across Asia, Africa, Australia, Central Europe, Middle East and New Zealand.

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Supported by:

SARAWAK CONVENTION BUREAU

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AKADEMI SAINS MALAYSIA

MS/OR SOCIETY OF MALAYSIA
ADVANCING THE MANAGEMENT Sciences

MSCR

SILVERLAKE SYMMETRY AT WORK

Microsoft

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WOLFRAM MATHEMATICA
OEMS INTIPAKAR CORP SDN BHD

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Where Business & Adventure Meet

Sarawak is one of the last gastronomical Edens left in the world. Only in Sarawak can one get the original laksa. Only in Kuching does the home of the kolomee reside. From our forests the pansuh manok emerged. There is no better incentive than food after a round of corporate meetings and conventions.

The wonder of Sarawak is the way it so naturally syncs to the exotic rhythms of nature and the full speed flow of international business. Sarawak has it all – high tech infrastructure for international conventions and one-of-a-kind incentive experiences in the most unique tropical island in the world.

Traditions form cultures. Cultures make the world. Take time out to explore the richness of indigenous culture in Sarawak after the busyness of the corporate one.

Whether in the world's oldest rainforest or in the concrete jungles of Sarawak, adventures never cease. Away from the intensity of international business affairs, unwind in the embrace of mother nature right at your doorstep.

The Sarawak Convention Bureau (SCB) helps connect associations, corporate organizations and government bodies with all the necessary elements to ensure your meetings is a success. Our services include convention bidding, developing new meetings, venue and vendor selection, support to convention and incentive groups and delegate boosting. For more information including how you can access financial support from the Sarawak State and Federal Governments to bid for regional and international association conventions, please call +6 082 242 516 or visit us at www.businesseventssarawak.com

BUSINESS EVENTS SARAWAK

BY SARAWAK CONVENTION BUREAU

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MESSAGE FROM VICE CHANCELLOR OF UPM

Assalamualaikum W.B.T. and Greetings

First and foremost, it is a great privilege and pleasure for me to welcome the Keynote Speakers, Plenary Speakers and all participants of the International Quantitative Research and Applications 2018 (IQRAC2018). I congratulate the organisers, Institute for Mathematical Research (INSPEM) and Malaysian Academy of Mathematical Scientists (AISMM) for their great first collaborative effort in putting together this event and further promoting mathematical sciences as an interesting area of research.

Universiti Putra Malaysia (UPM) being the premier institution of higher education in the country and as a Research University, will continue to work together with other world leading universities, agencies and industries to give meaningful impact towards wealth creation, nation building and universal human advancement, through exploration and dissemination of knowledge, involving experts and researchers within the country and abroad. In this respect, IQRAC2018 will provide a platform for the expansion of the exploration and research in the field of mathematical sciences. IQRAC2018 conference theme reflects the relevance of the mathematical sciences in accepting the challenges of Big Data: "**Mathematical Challenges in Big Data Analytics**".

I hope this conference and workshops will provide an avenue for the participants to discuss new ways and innovative approaches in the compilation and usage of Mathematical Sciences especially in Big Data Analytics to produce dynamic inference, analysis and decision-making.

I believe that fruitful discussions will be achieved during these four days, and I am sure that this conference and workshops will strengthen collaborative research and networking among the participants. Finally, have a wonderful and meaningful conference!

Thank you and best wishes.

"With Knowledge We Serve"

PROF. DATIN PADUKA DATO' DR. AINI IDERIS, *FASc.*
Vice Chancellor
Universiti Putra Malaysia

MESSAGE FROM DIRECTOR OF INSPEM

Assalamualaikum W.B.T.

Welcome to the International Quantitative Research and Applications Conference 2018 (IQRAC2018).

The Institute for Mathematical Research (INSPEM) is one of the research institutes in Universiti Putra Malaysia (UPM) that has been undertaking the responsibility of spearheading high-end research in mathematical sciences. Mathematical sciences are important disciplines which carry out advanced analytical approaches to help solve related problems and make better decisions. This is our first collaboration with Malaysian Academy of Mathematical Scientists (AISMM), one of the NGO bodies that provides full support in ensuring the development of mathematical sciences in Malaysia in line with current developments.

In this respect, I would like to congratulate both INSPEM and AISMM, for taking the initiative in jointly organising the IQRAC2018. It is hoped that the hosting of this conference and workshops would serve as a platform for sharing ideas and research findings as well as to strengthen research collaboration among the participants of IQRAC2018. This conference and workshops provide room to the participants to discuss the challenges and applications in mathematical sciences and big data analytics in line with the theme "**Mathematical Challenges in Big Data Analytics**".

To the distinguished keynote and plenary speakers, I would like to express my appreciation for sharing their research experiences with the participants. I would like to congratulate the committee members of IQRAC2018 for organising this conference and workshops.

Finally, I wish all the participants will have a meaningful conference and workshops and pleasant stay in Sarawak, Malaysia.

"With Knowledge We Serve"

PROF. DR. NOOR AKMA IBRAHIM
Director
Institute for Mathematical Research (INSPEM)
Universiti Putra Malaysia

MESSAGE FROM IQRAC2018 CO-CHAIRMEN

Assalamualaikum W.B.T. and Good Day

Firstly, we would like to welcome the delegates to the International Quantitative Research and Applications Conference 2018 (IQRAC2018).

The Institute for Mathematical Research (INSPEM), Universiti Putra Malaysia with the Malaysian Academy of Mathematical Scientists (AISMM) are delighted to co-organise IQRAC2018. This is the first conference which they co-organise together. The focus and objectives of IQRAC2018 is striving to uplift mathematical sciences to higher levels of knowledge and research in various field of mathematics.

We are working towards a fruitful conference where fertile exchange of information on the latest findings in the ever changing field of mathematical sciences will take place. The conference is being held in Kuching, the capital city of Sarawak. As Sarawak pledges to embrace Big Data technology in their efforts for the Sarawak Digital Economy Transformation, it is apt that the IQRAC2018 conference theme reflects the relevance of the mathematical sciences in accepting the challenges of Big Data: "**Mathematical Challenges in Big Data Analytics**".

This conference aims to provide a platform for academicians, researchers and students to present latest advances and new ideas in Mathematical Sciences. We hope that all participants will take this opportunity to immerse and participate actively in the exchange between themselves and distinguished speakers and researchers. This knowledge sharing presents opportunities for potential research collaborations among local and international participants.

We would like to express our gratitude to the Sarawak Convention Bureau, Universität der Bundeswehr München, Academy of Sciences Malaysia, Malaysian Society of Mathematical Sciences, Management Science/Operations Research Society of Malaysia, Malaysian Society for Cryptology Research, Silverlake Sdn. Bhd., DESANS Solutions Sdn. Bhd., Microsoft Malaysia, OEMS Intipakar Corporation Sdn. Bhd. and Pustaka Prinsip Sdn. Bhd for all the support generously given by them. We also wish to express our thanks to all committee members for their immense efforts in making this conference a possibility.

Thank you.

EMERITUS PROF. DATO' DR. KAMEL ARIFFIN MOHD. ATAN, *FASc.*
ASSOC. PROF. DR. LEE LAI SOON
Co-Chairmen
International Quantitative Research and Applications Conference 2018 (IQRAC2018)

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		Ms. Siti Radziah Othman

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SCIENTIFIC COMMITTEE

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- Assoc. Prof. Dr. Muhammad Rezal Kamel Ariffin (UPM)
- Assoc. Prof. Dr. Norazak Senu (UPM)
- Assoc. Prof. Dr. Mohd Bakri Adam (UPM)
- Assoc. Prof. Dr. Rosnaini Mahmud (UPM)

Language	Lunches	Refreshments
Official language is English. No simultaneous translation will be provided.	Lunches will be served at the Imperial Garden Restaurant. You are kindly required to wear your badge. Vegetarian food is available.	Coffee, tea and bottled waters will be available during the conference. Refreshments will be served twice daily.

GUIDELINES FOR SESSION CHAIRS

The role of the Chair is to coordinate and ensure the smooth running of the session. The Chair shall:

♦ Contact the presenter before the session, to verify who will present and to preempt any technical problems.

♦ Begin and end each session on time.

♦ Introduce the presenter and the title of each presentation.

♦ Ensure that presentations are made in the order shown in the program, to allow participants to move between sessions. If a presenter cancels or does not attend, schedules should be respected rather than pushing every talk forward.

♦ Complete the session attendance form.

♦ When appropriate, produce visual warnings to presenters as to the number of minutes (e.g., 5, 2) left by using simple gestures or prepared cards.

♦ Provide time for Q&A and thank the presenters.

IMPORTANT NOTE:

We ask Session Chairs to notify us about last minute changes or cancellations; these changes will be posted outside the session rooms.

GUIDELINES FOR PRESENTERS

Audio - Visual Services

All session rooms will be equipped with LCD video projectors and laptops. You may use your own laptop to ensure that you will make your presentation with the right version of the software and fonts installed, so that it looks like what you have planned and designed.

Please follow these guidelines to ensure a successful presentation:

♦ Bring your laptop along with power supply cord to your session.

♦ You may need an adapter to connect your computer to the local voltage and wall plug type.

♦ If your laptop is a MAC, bring the required adapter for the external video output.

♦ Arrive at your session at least 10 minutes before it begins. All presenters in a session should set up and test the connection to the projector before the session begins.

♦ We encourage presenters to put their presentations on a USB pen drive as a backup.
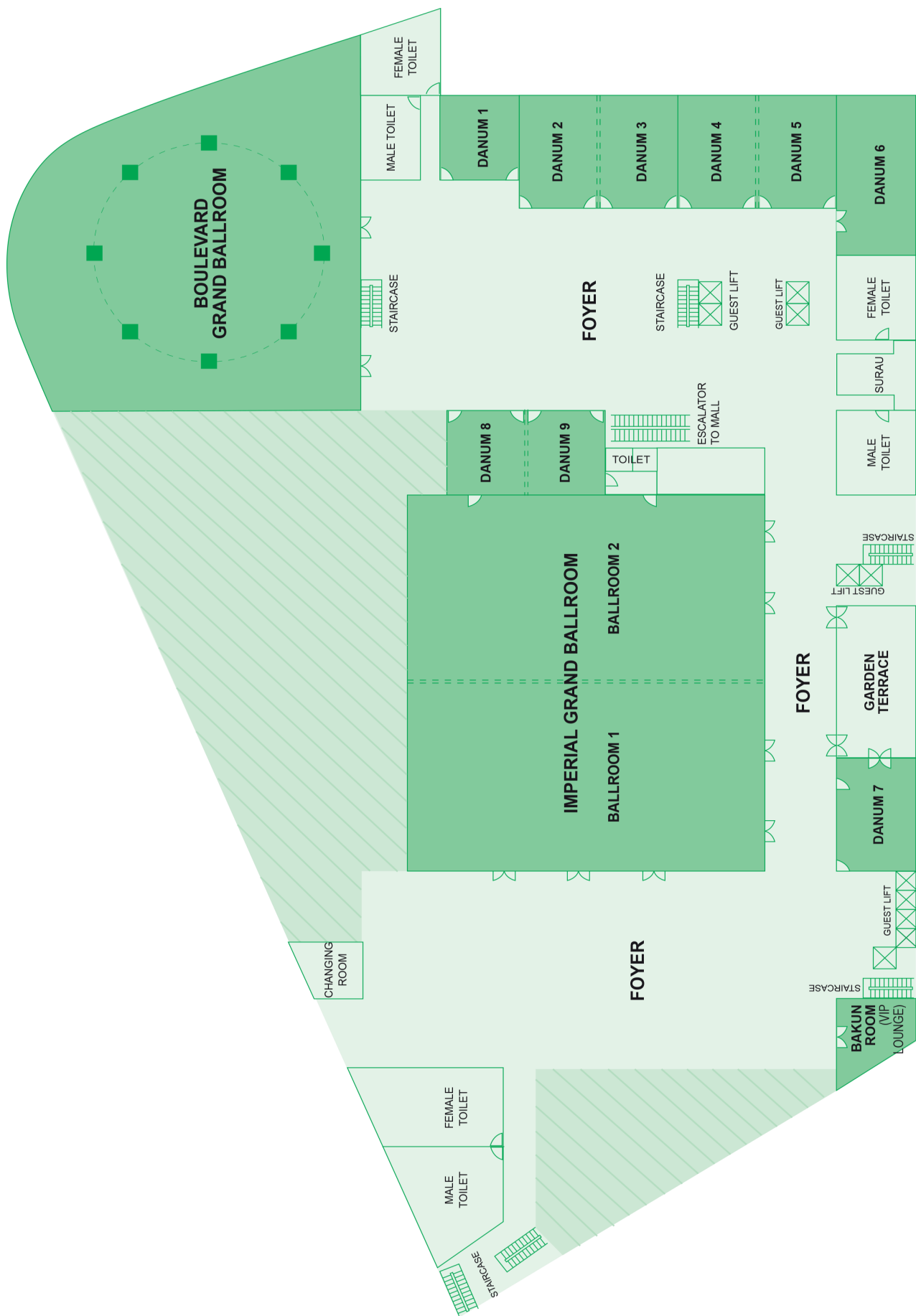
Presenter Information

The location of your session is shown in the Parallel Session Schedule section of this book. Please be on time for your session, checking-in with the session chair, and testing the AV equipment.

Time your presentation to fit the allocated time, including time for questions and audience participation. Presentations should be limited to key issues along with a brief summary. Feel free to bring along copies of your paper to distribute or to provide a handout with related information.

For assistance during your session

One or more session assistants will be available at the foyer of the parallel rooms. If you have any problems in your session room related to AV needs or if you have any other requests, address a session assistant in the area to ask for assistance.

FLOOR PLAN

BOULEVARD GRAND BALLROOM

FEMALE TOILET

MALE TOILET

DANUM 1

DANUM 2

DANUM 3

DANUM 4

DANUM 5

DANUM 6

STAIRCASE

FOYER

STAIRCASE

GUEST LIFT

GUEST LIFT

FEMALE TOILET

SURAU

MALE TOILET

DANUM 8

DANUM 9

ESCALATOR TO MALL

TOILET

IMPERIAL GRAND BALLROOM

BALLROOM 1

BALLROOM 2

STAIRCASE

GUEST LIFT

FOYER

GARDEN TERRACE

DANUM 7

CHANGING ROOM

FOYER

GUEST LIFT

STAIRCASE

BAKUN ROOM (VIP LOUNGE)

FEMALE TOILET

MALE TOILET

STAIRCASE

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GENERAL INFORMATION

Climate

The Equator cuts through Borneo less than 100 km south of Sarawak. Kuching has a tropical rainforest climate, moderately hot but very humid at times and receives substantial rainfall. The average temperature in Kuching is around 23 °C (73 °F) in the early hours of the morning and rises to around 33 °C (91 °F) during mid afternoon. Comfortable clothing of natural fiber is best worn in our climate.

Time Difference: GMT +8:00

Electricity

The voltage used in Malaysia is 230/240 volts -50hz. If your electrical appliance uses 110/120 volts, you need to use a transformer/converter to step down the 230/240 volts Malaysian voltage to your 110/120 volt appliances. Failing to do so will damage your electrical appliances. Malaysia uses the British Standard BS1363 domestic AC power plugs and sockets.

Currency

Ringgit Malaysia or MYR is the official currency of Malaysia with note available in RM100, RM50, RM20, RM10, RM5 and RM1 while 50sen, 20sen, 10sen, and 5sen are available in coins. Banks, 24-hour ATMs and money changers are found in main airports and urban centres. Major credit card (VISA and MasterCard) are widely accepted, but cash is preferred for small amounts. International Banks like HSBC, Citi Bank, Standard Chartered and OCBC can be found in larger cities.

Language

Even though *Bahasa Malaysia* is the national language, English is widely spoken throughout the country. In the local market in Sarawak, local Malay and other ethnic languages are being used daily. A variety of native tongues such as *Iban, Bidayuh, Melanau, Kayan, Kenyah, Lun Bawang, Kelabit, Penan,* and *Bisayah* are spoken. Meanwhile, although Mandarin is the medium of instruction in Chinese medium schools, the Chinese also speaks several dialects such as *Hokkein, Hakka, Foochow, Teochew,* and *Cantonese.*

Religion

The official religion in Sarawak is Islam. Even though the residents of Sarawak are of different races and belief, they are able to live in peace and harmony. As a multi-religious society, it is common to see mosques, churches and temples built close to each other. Some of the major religious structures in Kuching are the Masjid Jamek mosque in Petra Jaya, the St Thomas and St Joseph's cathedrals in the City centre and the Tua Pek Kong temple on the waterfront. There are also several Hindu, Sikh, Buddhist and Taoist temples in and around the city.

Working Hours Which All Malaysians Follow

Most business premises are open on Mondays to Fridays from 9am to 5pm. Shopping centres and arcades are usually open from 10am to 10pm on a daily basis.

GENERAL INFORMATION

Medical

Sarawak government hospitals, clinics and dispensaries are located in all towns and larger villages. There are numerous private medical clinics, as well as pharmacies and Chinese medicine shops.

Tipping

In Sarawak, service charges are included in billings for food, beverages and accommodation. Though tipping is not customary, but is welcomed.

Clothing

Visitors are advised to remove their shoes before entering home or long houses of the local folk. They are encouraged to wear long sleeved shirts and long pants or skirts when visiting places of worship. Tourists who wish to swim or sun bathe must wear appropriate attire. Light and casual clothes as well as a good pair of walking or trekking shoes would suffice for day activities. If you plan to explore the jungle or participate in outdoor activities, the use of mosquito repellant and sun block is advised.

Souvenirs For Home

Sarawak is a famous pepper producer so make sure to obtain some for your friends. Visitors also purchase frozen seafood and caviar of a local fish. Local food such as "*Belacan*" shrimp paste, birds' nests, fruit preserves and pickles allow you to share a taste of Sarawak's local delicacies. "*Kain Songket*", "*Batik*", beaded jewelry, woven mats and rattan baskets are reminders of the native's ingenious use of natural products. The musically inclined may wish to bring home a variety of traditional instruments, such as the "*Sape*", "*Jatung Utang*" wooden xylophone and native gongs and drums. One of the most popular items sought by tourists is locally manufactured Sarawak pottery.

Mobile Communications

Mobile telecommunications cover many parts of Sarawak except for very remote areas. Public phones are available in most shopping malls, street corridors and villages in the outskirts of town. In Malaysia, mobile phones use the following frequency bands: GSM-900/1800, 3G 2100, and 4G 2300. An overview of the available mobile networks are listed in the table below:

Operator	Technology
MAXIS	GSM-900/1800 (GPRS, EDGE) 2100 MHz UMTS, HSPA 2600 MHz FD-LTE
CELCOM	GSM-900/1800 (GPRS, EDGE) 900/2100 MHz UMTS, HSPA 2600 MHz FD-LTE
DIGI	GSM-900/1800 (GPRS, EDGE) 2100 MHz UMTS, HSPA
UMOBILE	GSM-900/1800 (GPRS, EDGE) 2100 MHz UMTS, HSPA
P1	2300 MHz WiMAX
YES 4G	2300 MHz WiMAX

MASTER PROGRAMME

MASTER PROGRAMME

5 AUGUST 2018 (SUNDAY)

Time		Venue
14:00 - 16:00	Pre-Conference Workshop	Danum 2, 3, 4, 5
16:00 - 18:00	Early Registration	Foyer @ Level 5

6 AUGUST 2018 (MONDAY)

Time		Venue
08:00 - 09:00	Registration	Foyer @ Level 5
09:00 - 10:40	Parallel Session 1A Parallel Session 1B Parallel Session 1C	Imperial Grand Ballroom 1 Danum 2 Danum 3
10:40- 11:00	Refreshment	Foyer @ Level 5
11:00 - 12:00	**Keynote Address 1** : **Prof. Dr. Abdellah Salhi** University of Essex, United Kingdom **DATA PRIVACY: A NEW APPROACH AND A CASE STUDY IN CLUSTER ANALYSIS** *Chairperson: Emeritus Prof. Dato' Dr. Kamel Ariffin Mohd. Atan*	Imperial Grand Ballroom 1
12:00 - 12:45	**Opening Ceremony**	Imperial Grand Ballroom 1
12:45 - 14:30	Lunch	Imperial Garden Restaurant
14:30 - 15:10	**Plenary Session 1** : **Prof. Dr. Stefan Pickl** Universität der Bundeswehr München, Germany **RESILIENCE OF COMPLEX NETWORKS - BIG DATA ANALYTICS AND OPTIMIZATION WITHIN CRITICAL INFRASTRUCTURES SYSTEMS THE ROLE OF EXECUTIVE CONTROL UNITS** *Chairperson: Assoc. Prof. Dr. Hishamuddin Zainuddin*	Imperial Grand Ballroom 1
15:15 - 17: 35	Parallel Session 2A Parallel Session 2B Parallel Session 2C	Imperial Grand Ballroom 1 Danum 2 Danum 3
17:35 - 18:00	Refreshment	Foyer @ Level 5

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MASTER PROGRAMME

7 AUGUST 2018 (TUESDAY)

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Time		Venue
08:30 - 10:10	Parallel Session 3A Parallel Session 3B Parallel Session 3C	Imperial Grand Ballroom 1 Danum 2 Danum 3
10:10 - 10:30	Refreshment	Foyer @ Level 5
10:30 - 11:30	**Keynote Address 2** : **Dr. Dzaharudin Mansor** Microsoft Malaysia **4ᵀᴴ INDUSTRIAL REVOLUTION – DEMOCRATIZING ADVANCED ANALYTICS AND AI** *Chairperson: Assoc. Prof. Dr. Muhammad Rezal Kamel Ariffin*	Imperial Grand Ballroom 1
11:35 - 12:55	Parallel Session 4A Parallel Session 4B Parallel Session 4C	Imperial Grand Ballroom 1 Danum 2 Danum 3
12:55 - 14:30	Lunch	Imperial Garden Restaurant
14:30 - 15:10	**Plenary Session 2** : **Prof. Dr. Partha Lahiri** University of Maryland, United States of America **BIG DATA, BIG PROMISE, BIG CHALLENGE: CAN SMALL AREA ESTIMATION PLAY A ROLE IN THE BIG DATA CENTRIC WORLD?** *Chairperson: Prof. Dr. Noor Akma Ibrahim*	Imperial Grand Ballroom 1
15:15 - 17:35	Parallel Session 5A Parallel Session 5B Parallel Session 5C	Imperial Grand Ballroom 1 Danum 2 Danum 3
17:35 - 18:00	Refreshment	Foyer @ Level 5
19:45 - 22:00	Conference Dinner	Boulevard Grand Ballroom

MASTER PROGRAMME

8 AUGUST 2018 (WEDNESDAY)

Time		Venue
08:30 - 09:50	Parallel Session 6A Parallel Session 6B Parallel Session 6C	Danum 10 Danum 2 Danum 3
09:50 - 10:05	Refreshment	Foyer @ Level 5
10:05 - 11:25	Parallel Session 7A Parallel Session 7B Parallel Session 7C	Danum 10 Danum 2 Danum 3
11:30 - 12:10	**Plenary Session 3** : **Assoc. Prof. Dr. Zaleha Ismail** Universiti Teknologi Malaysia **THE MANIFESTATIONS OF OUR CREATOR IN MATHEMATICS** *Chairperson: Assoc. Prof. Dr. Norazak Senu*	Danum 10
12:10 - 12:20	**Closing Ceremony**	Danum 10
12:20 - 13:30	Lunch	Imperial Garden Restaurant
13:30 - 18:00	Social Visit	Sarawak Cultural Village

OPENING CEREMONY

6 AUGUST 2018 (MONDAY)
IMPERIAL GRAND BALLROOM 1

Time	
12:00-12:10	Arrival of VIP and Guests
12:10-12:15	National Anthem of Malaysia, "NEGARAKU'
12:15-12:20	Doa Recitation
12:20-12:25	**Welcoming Address by Emeritus Prof. Dato' Dr. Kamel Ariffin Mohd. Atan** *President, Malaysian Academy of Mathematical Scientists*
12:25-12:35	**Officiating Speech by Prof. Dr. Zulkifli Idrus** *Deputy Vice Chancellor (Research and Innovation), Universiti Putra Malaysia*
12:35-12:45	Photography Session

KEYNOTE AND PLENARY SESSIONS

KEYNOTE ADDRESS 1

Prof. Dr. Abdellah Salhi
University of Essex, United Kingdom

Abdellah Salhi is a Professor of Operational Research. He was educated at the University of Constantine, in Algeria. He obtained his PhD on Karmarkar's algorithm for Linear Programming at the University of Aston in Birmingham, UK. His research interests are in the design, analysis, implementation and application of mathematical programming algorithms. Application areas include optimisation, scheduling, decision making under partial information, data-mining and forecasting. He is active on a number of research projects. Recent and current projects he is leading or involved in include Workforce Scheduling in Container Ports, in conjunction with the Port of Felixstowe, UK, the Beeswax Project on Optimum Location of beehives, bare earth patches and other nest sites of domestic and wild pollinators for optimum pollination in conjunction with Simulsys Ltd, and the Smart Town Centre which explores the network of relationships between different agents and stakeholders operating in the social, economic and environmental spaces of towns and cities, in conjunction with EBS, SNE and the Colchester Borough Council. He is about to start a new project on Data Analytics with the automotive insurance company MSXi. Of particular interest to him recently, is the simplification, pruning and summary of graphs/networks for cheaper storage, easier manipulation and analysis. He has introduced the Plant Propagation Algorithm for global and multi-objective optimisation, a heuristic inspired by the way strawberry plants propagate using runners. He has authored/co-authored over 80 referred papers. He was Head of the Department of Mathematical Science of Essex University, UK, from 2010 to 2016.

DATA PRIVACY: A NEW APPROACH AND A CASE STUDY IN CLUSTER ANALYSIS

Data Privacy (DP) has always been an issue in data analysis. This is more so today than ever before because of the advanced tools available to take advantage of data for all sorts of reasons including unethical. It has, therefore, become one of the big challenges that Big Data has thrown about in recent years. A number of attempts at dealing with DP and confidentiality preservation have been made. They mainly rely on data encoding, homomorphic encryption in particular, and other mathematical devices that allow datasets to be worked on in place of others for the benefit of getting the same or equivalent solutions. They do, however, have limitations often due to the high dimensionality of these datasets and their extremely large volumes. The curse of dimensionality and volume are of course inherent to the concept of Big Data. In my talk, I will suggest a new approach that relies on complexity theory and NP-Completeness in particular. We describe this approach and illustrate it on a very common problem in data science, namely clustering. Results will be provided and discussed.

KEYNOTE ADDRESS 2

Dr. Dzaharudin Mansor
Microsoft Malaysia

Dr. Dzaharuddin Mansor received a First Class Honors Degree in Computer Systems Engineering from Monash University, Australia in 1985, and completed his PhD in Computer Science in 1988. Dr. Dzaharuddin Mansor joined Microsoft in 2005 and has more than 32 years of professional experience in ICT and telecommunications in senior leadership, engineering, research as well as academic roles. In 2010, he had the honor of leading the Business Services Economic Transformation Program (ETP) Labs. He also presently is an Adjunct Professor at International Islamic University Malaysia (IIUM) and member of Industrial Advisory Panels at several other universities where he works closely with academia and research on topics such as Software Engineering, Computer Architectures, Cyber Security, Telecommunications, Data Science and AI. He also holds several associate positions at, PIKOM, MQA, FMM and others. Dr. Dzaharuddin Mansor is passionate about technology and aspires to contribute towards the nation's Digital Economy initiative.

4ᴛʜ INDUSTRIAL REVOLUTION – DEMOCRATIZING ADVANCED ANALYTICS AND AI

Are we really transitioning into another industrial revolution? The speaker will address why many think we are and discusses what are the underlying technologies driving the disruptions we see. Very key to this is his view that it is not about the fast-changing ICT technologies, but the impact brought about the by the rapid evolution on technology use as they become affordable and usable by the wider masses. In other words, it is the democratization of technologies that powers advanced analytics and AI that are accelerating the digital transformation we see today. The presenter will then share his views on the opportunities and challenges, as well as what he sees as missing skills in computing and STEM disciplines to prepare our students jobs in this new era.

PLENARY SESSION 1

Prof. Dr. Stefan Pickl
Universität der Bundeswehr München
Germany

Stefan Pickl studied mathematics, electrical engineering, and philosophy at TU Darmstadt and EPFL Lausanne 1987-93. He obtained his Dipl.-Ing. In 1993 and his doctorate in 1998 with award. He was an assistant Professor at Cologne University (Dr. Habil. 2005; venia legendi "Mathematics"). He went to University of New Mexico in USA, University Graz in Austria, University of California at Berkeley and Naval Postgraduate School NPS Monterey in USA as a visiting professor and was a visiting scientist at SANDIA, Los Alamos National Lab, Santa Fe Institute for Complex Systems and MIT. He was associated with Center for Information Technology and Algorithms (CITA) in USA, Center for Network Innovation and Experimentation (CENETIX) and Vice-Chair of EURO group "Experimental OR". He was also involved in Highly Gifted Pupils programme and Research Program "Intelligent Networks and Security Structures" (INESS). He also obtained International Best Paper Awards from his various presentations in '03, '05, '07 and '15. He was the chair of the Advisory Board of the German Society for Operations Research (GOR) and chair of the GOR working group "Simulation and Optimization of Complex Systems". His research interests are Optimization of Complex Systems, IT Based Decision Support Systems/Reachback Architectures, Strategic Management. The Core Competence Center C3 for Operations Research, Management, Tenacity, Excellence, Safety and Security Alliance (COMTESSA) was founded by Stefan Pickl and he is a member of Munich Aerospace (an aviation management) and House of Logistics and Mobility (HOLM) Frankfurt, Germany.

RESILIENCE OF COMPLEX NETWORKS - BIG DATA ANALYTICS AND OPTIMIZATION WITHIN CRITICAL INFRASTRUCTURES SYSTEMS: THE ROLE OF EXECUTIVE CONTROL UNITS

Our modern society relies more and more on increasingly interconnected technological infrastructures. Communication systems control terrestrial and air traffic which requires electrical power supply to assure the logistic of industrial production and consumption of goods. These many mutually dependent networks are vulnerable towards a multitude of external and internal risks. Therefore, there is a great interest in the characterization and analysis of dynamic resilience concepts and the development of adaptive security structures for an holistic risk management. We introduce the main concepts and present actual examples of control and optimization theory in that challenging context. We characterize the behavior ("Big Data Analytics") and present some new optimization approaches which could be embedded in reach back processes. As an innovative approach, we introduce the concept and characterization of a control tower. In an "executive way", we optimize and control the process. We present the underlying mathematical theory and first numerical results. We refer mainly to Predictive Analytics and Big Data Approaches & Optimization Techniques specially within Critical Infrastructures Systems.

PLENARY SESSION 2

Prof. Dr. Partha Lahiri
University of Maryland
United States of America

Partha Lahiri is a Professor of Survey Methodology and Mathematics at the University of Maryland, College Park and an Adjunct Research Professor at the Institute of Social Research, University of Michigan, Ann Arbor. Before coming to Maryland, he was the Milton Mohr Distinguished Professor of Statistics at the University of Nebraska-Lincoln. His research interests include big data, Bayesian statistics, record linkage, and small-area estimation. He has served on a number of advisory committees, including the U.S. Census Advisory committee and U.S. National Academy panel. Over the years, he advised various local and international organizations such as the United Nations Development Program, the World Bank, and the Gallup Organization. He is a fellow of the American Statistical Association and the Institute of Mathematical Statistics and an elected member of the International Statistical Institute.

BIG DATA, BIG PROMISE, BIG CHALLENGE: CAN SMALL AREA ESTIMATION PLAY A ROLE IN THE BIG DATA CENTRIC WORLD?

The demand for various socio-economic, transportation, and health statistics for small geographical areas is steadily increasing at a time when survey agencies are desperately looking for ways to reduce costs to meet fixed budgetary requirements. In the current survey environment, the application of standard sample survey methods for small areas, which require a large sample, is generally not feasible when considering the costs. One of the key factors that lead to the success of small area estimation (SAE) methodology is the availability of strong auxiliary variables. The accessibility of big data from different sources is now bringing new opportunities for statisticians to develop innovative SAE methods. In this talk, I will provide an outline of how SAE methods can be adapted to incorporate big data in improving local area statistics. Then I will discuss my recent collaboration with my UMD colleagues --- Professor Cinzia Cirillo of Department of Civil and Environmental Engineering, and Professor Joseph JaJa of Department of Electrical and Computer Engineering, and the University of Maryland Institute for Advanced Computer Studies (UMIACS). Finally, as an example from our different collaborative research projects, I will explain how SAE can help solve a seemingly different problem of predicting in real-time traffic by exploiting rich vehicle probe big data.

PLENARY SESSION 3

Assoc. Prof. Dr. Zaleha Ismail
Universiti Teknologi Malaysia

Zaleha Ismail is currently an associate professor at the Department of Educational Science, Mathematics and Multimedia Creative at Universiti Teknologi Malaysia. She also holds the position of chairperson for Association of Mathematics and Science Education of Johor (Persatuan Pendidikan Sains dan Matematik Johor/PPSMJ). Her research interests include teaching and learning of mathematics, mathematical thinking, statistical reasoning, mathematics teacher education, technology integration in mathematics education, STEM and engineering education. She has worked as a researcher, primary and secondary teacher educator, supervisor of graduate research and as a consultant to the Malaysian Ministry of Education for the STEM education and HOTS (high order thinking skills) projects. She is the chairperson for Geogebra Institute of Johor Bahru and directly involve with the training of teachers and conducting research in the usage of Geogebra for improving mathematics teaching and learning.

THE MANIFESTATIONS OF OUR CREATOR IN MATHEMATICS

The nature of mathematics is widely discussed among scholars since Aristotle and Plato. An individual conception of mathematics is considered important as it reflects how teachers teach and students learn the discipline. Some views mathematics is created by The Creator and humans make discovery. This view does not necessarily reject that mathematics is a dynamic tool involving new discoveries in various applications. We witness mathematics exist around us in almost every objects such as plants, animals and leaves. Mathematics can be as simple as counting and shapes up to complex as neural networks. Natural phenomena like the movement of the sun and moon as well as the fall of an apple can be explained through mathematics. Surprisingly, how humans behave can also be explained with mathematics. Hopefully, the more we understand mathematics, our relationship with the Creator getting stronger.

ABSTRACTS OF WORKSHOPS

WORKSHOP 1

RECENT DEVELOPMENTS IN NATURE-INSPIRED ALGORITHMS FOR OPTIMISATION: THE CASE OF THE PLANT PROPAGATION ALGORITHM

Prof. Dr. Abdellah Salhi
University of Essex, United Kingdom

The class of Nature-Inspired Algorithms (NIAs) has expanded tremendously in the last few years. There is a good reason for that: they are powerful tools that work on the most difficult problems often with no assumptions, unlike traditional gradient-based approaches. They are also easy to understand and implement. Their attraction, therefore, is obvious. The downside of this growth is that such algorithms keep on coming and often, little attention is paid to previous related work, leading to similarities and overlaps which contribute to the confusion of the novice and particularly the potential user with little expertise in the domain and in OR as a discipline.

The Plant Propagation Algorithm or PPA, also known as the Strawberry Algorithm, has been introduced by Salhi and Fraga in 2010. Initially, it has been applied to continuous global optimisation. However, it has since been extended to discrete global optimisation with or without constraints and to multi-objective optimisation. Moreover, some theoretical work on the conditions under which it converges has also been carried out.

In this talk, I will review the most prominent NIAs and highlight the mistakes and traps to avoid when designing such algorithms. I will provide situations where there is indeed overlap and repetition. But, I will concentrate on PPA as a potent tool for a variety of problem classes in optimisation. Variants of it will be presented and computational results will be provided.

WORKSHOP 2

EXPERIENCING DATA SCIENCE

Dr. Dzaharudin Mansor
Microsoft Malaysia

The objectives of the workshop are to provide hands-on introduction to Applied Data Science using Microsoft Azure Machine Learning tools and how this can be used for teaching and learning topics such as AI, ML, Analytics and Data Mining. The topics covered here include:

- Introduction to Applied Data Science
- Data Preprocessing
- Applied Machine Learning
- Deploying Machine Learning models

WORKSHOP 3

STATISTICAL DATA INTEGRATION

Prof. Dr. Partha Lahiri
University of Maryland
United States of America

There is a growing demand to produce reliable estimates of various socio-economic and health characteristics at both national and sub-national levels. To avoid high costs of collecting new data in such cases, there is a growing need to combine different existing structured and unstructured databases such as surveys, administrative/register records, social media data, mobile phone data, sensor data, satellite date, etc. We shall discuss various issues and classical and Bayesian methods in statistical data integration. In particular, we shall cover various methods that use a few common variables in combining multiple data sources with no or negligible overlapping units. In another important data integration situation, we have a complete or significant overlap in units from different data sources and the common variables in different datasets are often misreported. The goal of this pre-conference workshop is to provide a broad overview of the subject and will avoid derivations of complex results.

WORKSHOP 4

CRAFTING MATHEMATICS PROBLEMS FOR 21ST CENTURY EDUCATION

Assoc. Prof. Dr. Zaleha Ismail
Universiti Teknologi Malaysia

21st century mathematics learning experiences are expected to encourage students to be creative, innovative, critical, and good problem solvers. The usual procedural and artificial mathematics problems no longer can support the new 21st century learning spirits. Too often teaching in the mathematics classrooms have been designed for instructional efficiency that is content oriented, and not to sustain authentic learning. Authentic learning experiences which can provide students' ownership of their learning path with choice, application, discovery, struggle, success, and feedback can be driven by quality mathematics problems. A new framework on crafting mathematics problems is needed. Some examples of realistic problems will be shared and discussed. The participants of the workshops will be guided to attain some skills on how to select as well as create problems that can engage students to be productive and active.

PARALLEL SESSIONS SCHEDULE

	PARALLEL SESSION 1 **6 August 2018** **09:00-10:40**		
Time	**Parallel Session 1A** **Imperial Grand Ballroom 1** **Chairperson :** *Dr. Joseph Boon Zik Hong*	**Parallel Session 1B** **Danum 2** **Chairperson :** *Dr. Anwar Fitrianto*	**Parallel Session 1C** **Danum 3** **Chairperson :** *Assoc. Prof. Dr. Ahmad Fauzi Mohd Ayub*
09:00 to 09:20	**A NUMERICAL SOLVER FOR SECOND ORDER STIFF ORDINARY DIFFERENTIAL EQUATIONS** Asma Izzati Asnor Siti Ainor Mohd Yatim Zarina Bibi Ibrahim	**MEDIAN BASED ROBUST CORRELATION COEFFICIENT UNDER CONTAMINATED DATA** Nor Aishah Ahad Suhaida Abdullah Nur Amira Zakaria Sharipah Soaad Syed Yahaya Norhayati Yusof	**EFFECTIVENESS OF PROBLEM BASED LEARNING STRATEGY ON STUDENTS' MATHEMATICAL VALUE AMONG SECONDARY SCHOOL STUDENTS** Fatimah Ramli Ahmad Fauzi Mohd Ayub Kathiresan Gopal
09:20 to 09:40	**SOLVING BOUNDARY VALUE PROBLEMS WITH MIXED BOUNDARY CONDITIONS USING DIRECT DIAGONALLY BLOCK METHOD** Nadirah Mohd Nasir Zanariah Abdul Majid Fudziah Ismail Norfifah Bachok	**STRUCTURAL BREAKS AND OUTLIERS IN THE GARCH MODEL: THE IMPULSE INDICATOR SATURATION APPROACH** Ida Normaya Mohd Nasir Mohd Tahir Ismail	**AN EMPIRICAL STUDY OF GAMIFICATION IMPACT IN LEARNING MATHEMATICS** Nurul Hafizah Zainal Abidin Samsiah Ahmad Mahani Ahmad Kardri Nor Liza Saad
09:40 to 10:00	**TWO-POINT BLOCK METHOD FOR SOLVING NEUTRAL DELAY DIFFERENTIAL EQUATION** Nur Inshirah Naqiah Ismail Zanariah Abdul Majid Norazak Senu	**TREE-BASED THRESHOLD SELECTION METHOD IN GENERALIZED PARETO MODEL WITH THE PRESENCE OF COVARIATE** Afif Shihabuddin Norhaslinda Ali	**IMPROVING THE ABILITY OF MATHEMATICAL CONNECTION BASED ON PRIOR KNOWLEDGE AND STUDENTS LEARNING STYLE** Putriaji Hendikawati Nuriana Rachmani Dewi
10:00 to 10:20	**ANALYSIS OF SENSITIVITY PARAMETER ON CERVICAL CANCER MATHEMATICAL MODELING** Tri Sri Noor Asih Widodo Lina Aryati Fajar Adi Kusumo	**BAYESIAN HIERARCHICAL MODELLING OF THE CONSISTENCY OF SYMPTOMS REPORTED DURING HYPOGLYCAEMIA FOR INDIVIDUAL PATIENTS** Hani Syahida Zulkafli George Streftaris Gavin J. Gibson Nicola N. Zammitt	**INFLUENCE OF STUDENTS' BELIEFS ON MATHEMATICAL PROBLEM SOLVING ON ACADEMIC ACHIEVEMENT AMONG MALAYSIAN MATRICULATION STUDENTS** Suriati Abu Bakar Ahmad Fauzi Mohd Ayub Rosnaini Mahmud
10:20 to 10:40	**DOUBLE REDUCTION OF MODIFIED HUNTER SAXTON EQUATION** Lim Kheng Roy Joseph Boon Zik Hong	**APPLICATION OF RESAMPLING TECHNIQUES IN ORTHOGONAL REGRESSION** Anwar Fitrianto Tan Sin Yun Wan Zuki Azman Wan Muhamad	**EFFECTS OF HIGHER ORDER THINKING MODULE APPROACH ON PUPILS' PERFORMANCE AT PRIMARY RURAL SCHOOLS** Noorashikim Noor Ibrahim Ahmad Fauzi Mohd Ayub Aida Suraya Md. Yunus Rosnaini Mahmud Kamariah Abu Bakar

Time	**Parallel Session 2A** **Imperial Grand Ballroom 1** **Chairperson :** *Asst. Prof. Dr. Faranak Rabiei*	**Parallel Session 2B** **Danum 2** **Chairperson :** *Dr. Nur Syarafina Mohamed*	**Parallel Session 2C** **Danum 3** **Chairperson :** *Dr. Nurzatulshima Kamarudin*
		PARALLEL SESSION 2 **6 August 2018** **15:15-17:35**	
15:15 to 15:35	**DIRECT MULTISTEP METHOD FOR SOLVING DELAY DIFFERENTIAL EQUATION WITH BOUNDARY CONDITIONS** Nur Tasnem Jaaffar Zanariah Abdul Majid Norazak Senu	**CONSTRUCTION OF A NEW MODEL: A BASIC MODEL FOR TRAFFIC SYSTEMS (BASIC TRAFFIC UNITS) WITH CONSIDERATIONS FOR QUEUEING SYSTEMS** Khairani Abd. Majid Zaharin Yusoff Abdul Aziz Jemain	**THE MATHEMATICS EDUCATION DEPARTMENT STUDENTS' ABILITY IN MATHEMATICAL LITERACY FOR UNCERTAINTY PROBLEMS ON PISA ADAPTATION TEST** Febi Sanjaya Ant. Yudhi Anggoro Hongki Julie M. Andy Rudhito
15:35 to 15:55	**RATIONAL METHOD FOR SOLVING FIRST ORDER INITIAL VALUE PROBLEM** A'in Nazifa Fairuz Zanariah Abdul Majid Zarina Bibi Ibrahim	**FORMULATE A RELATIONSHIP BETWEEN SADDLE POINTS ON SURFACES AND INFLECTION POINTS ON CURVES** Ismail Mohd Yosza Dasril	**THE MATHEMATICS EDUCATION DEPARTMENT STUDENTS' ABILITY IN MATHEMATICAL LITERACY FOR THE CHANGE AND RELATIONSHIP PROBLEMS ON THE PISA ADAPTATION TEST** Yudhi Anggoro Hongki Julie Febi Sanjaya M. Andy Rudhito
15:55 to 16:15	**SUMUDU-VARIATIONAL ITERATION METHOD FOR EXACT SOLUTIONS OF NONLINEAR PANTOGRAPH DELAY DIFFERENTIAL EQUATIONS** Subashini Vilu Rokiah @ Rozita Ahmad Ummul Khair Salma Din	**Z-NUMBER A-CUT USING TRAPEZOIDAL FUZZY NUMBERS** Irdayu Ibrahim Noraida Abdul Ghani Norazura Ahmad	**THE TEACHERS' ABILITY IN MATHEMATICAL LITERACY FOR SPACE AND SHAPE PROBLEMS ON PISA ADAPTATION TEST** Hongki Julie Febi Sanjaya Ant. Yudhi Anggoro M. Andy Rudhito
16:15 to 16:35	**SOLVING SECOND ORDER VOLTERRAINTEGRO-DIFFERENTIAL EQUATIONS USING DIRECT TWO-POINT HYBRID BLOCK METHOD** Mohd Razaie Janodi Zanariah Abdul Majid Fudziah Ismial Norazak Senu	**SINGLE-MACHINE-BASED INTEGRATED PRODUCTION PREVENTIVE MAINTENANCE SCHEDULING** Nurul Nadiah Abdul Halim S. Sarifah Radiah Shariff Siti Meriam Zahari	**AWARENESS OF HIGHER ORDER THINKING SKILLS: LECTURERS AND UNDERGRADUATES** Marsyita Hanafi Syamsiah Mashohor
16:35 to 16:55	**TRIGONOMETRICALLY-FITTED DIAGONALLY IMPLICIT TWO DERIVATIVE RUNGE-KUTTA METHOD FOR THE NUMERICAL SOLUTION OF PERIODICAL IVPS** Nur Amirah Ahmad Norazak Senu	**NEWTON-MSOR ITERATION FOR UNCONSTRAINED OPTIMIZATION PROBLEMS WITH A TRIDIAGONAL HESSIAN MATRIX** Khadizah Ghazali Jumat Sulaiman Yosza Dasril Darmesah Gabda	**THE EFFECT OF RADIATION ON MIXED CONVECTION BOUNDARY LAYER FLOW PAST A HORIZONTAL CIRCULAR CYLINDER WITH CONSTANT HEAT FLUX IN VISCOELASTIC NANOFLUID** Rahimah Mahat Noraihan Afiqah Rawi Abdul Rahman Mohd Kasim Sharidan Shafie

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6 August 2018
15:15-17:35</td></tr>
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Time	**Parallel Session 2A** **Imperial Grand Ballroom 1** **Chairperson :** *Asst. Prof. Dr. Faranak Rabiei*	**Parallel Session 2B** **Danum 2** **Chairperson :** *Dr. Nur Syarafina Mohamed*	**Parallel Session 2C** **Danum 3** **Chairperson :** *Dr. Nurzatulshima Kamarudin*
16:55 to 17:15	**NUMERICAL SOLUTION OF FUZZY VOLTERRAINTEGRO-DIFFERENTIAL EQUATION USING IMPROVED RUNGE-KUTTA METHOD** <u>Faranak Rabiei</u> Fatin Abd Hamid Fudziah Ismail Zanariah Abdul Majid M. M. Rashidi	**A NEW HYBRID COEFFICIENT OF CONJUGATE GRADIENT METHOD** <u>Nur Syarafina Mohamed</u> Mustafa Mamat Mohd Rivaie	**THE EFFECTS OF SELF-EFFICACY TOWARDS STUDENT ACHIEVEMENTS IN ALGEBRA** <u>Nurzatulshima Kamarudin</u> Syamsiah Hj. Abdullah
17:15 to 17:35	**FROM LIMITS IN MATHEMATICS TO LIMITS OF MATHEMATICS** Muhammad Ikhwan Azlan	**EXTREMES RAINFALL INTENSITY-DURATION-FREQUENCY RELATIONSHIP FOR PENINSULAR MALAYSIA** <u>Iszuanie Syafidza Che Ilias</u> Abdul Aziz Jemain	**STRENGTHENING THE SECURITY OF AN ENCRYPTION ALGORITHM BASED ON THE LAPLACE TRANSFORM** Roberto P. Briones

Time	Parallel Session 3A Imperial Grand Ballroom 1 Chairperson : *Dr. Noorhelyna Binti Razali*	Parallel Session 3B Danum 2 Chairperson : *Dr. Hawa Hishamuddin*	Parallel Session 3C Danum 3 Chairperson : *Dr. Normahirah Nek Abd Rahman*
08:30 to 08:50	**NEW HIGHLY ACCURATE ITERATIVE METHOD OF THIRD ORDER CONVERGENCE FOR FINDING THE MULTIPLE ROOTS OF NONLINEAR EQUATIONS** Nur Alif Akid Jamaludin Nik Mohd Asri Nik Long Fudziah Ismail	**OPTIMIZATION OF AIR- CONDITIONING AND MECHANICAL VENTILATION (ACMV) PROJECT USING PERT WITH LINEAR PROGRAMMING** Pang Chuan Kian Noor-Ajian Mohd-Lair Chua Yi Sheng	**GENERALIZED CLASS OF TIME FRACTIONAL BLACK SCHOLES EQUATION WITH CAPUTO-FABRIZIO OPERATOR AND NUMERICAL ANALYSIS** Rodrigue Gnitchogna Batogna
08:50 to 09:10	**A MATHEMATICAL MODELLING OF AN INTRA-HOST DYNAMICS OF TOXOPLASMA *GONDII* WITH INTERMEDIATE AND DEFINITIVE HOST INDIRECT INTERACTIONS** Fajar Adi-Kusumo Meri Harri Yanni Etna Rizky Muliardhini	**MULTIPLE TABU SEARCH FOR MULTIOBJECTIVE URBAN TRANSIT SCHEDULING PROBLEM** Vikneswary Uvaraja Lai Soon Lee	**THE REPRESENTATION OF EARLY EXERCISE BOUNDARY FOR ASIAN OPTION UNDER JUMP-DIFFUSION PROCESS** Mohamed Faris Laham Siti Nur Iqmal Ibrahim Leong Wah June
09:10 to 09:30	**AN EFFICIENT NUMERICAL TECHNIQUE FOR SOLVING FRACTIONAL INTERVAL DIFFERENTIAL EQUATIONS** Ali Ahmadian Norazak Senu Fudziah Ismail Soheil Salahshour	**A LOCATION-INVENTORY-ROUTING PROBLEM FOR ECONOMIC PRODUCTION QUANTITY IN REVERSE LOGISTICS** Farahanim Misni Lai Soon Lee	**EXTENDED BOUNDS OF BEATTY SEQUENCE ASSOCIATED WITH PRIME** F. Deraman S. H. Sapar M. A. M. Johari K. A. Mohd Atan A. F. N. Rasedee
09:30 to 09:50	**IMPLEMENTATION OF EXTRAPOLATION WITH SMOOTHING TECHNIQUE IN SOLVING STIFF ODES** N. Razali N. A. Zainuri	**A RECOVERY MODEL FOR A PRODUCTION-INVENTORY SYSTEM SUBJECT TO TRANSPORTATION DISRUPTION WITH ENVIRONMENTAL CONSIDERATION** Mohd. Azizi Abd Aziz Hawa Hishamuddin Nuramilawahida Mat Ropi	**CLASS-WISE GLOBAL-LOCAL PRESERVING PARTIAL LEAST SQUARES** Muhammad Aminu Noor Atinah Ahmad Norhashidah Awang
09:50 to 10:10	**COLLABORATIVE AND COMMUNITY STRUCTURE OF UPM CO-AUTHORSHIP NETWORK IN JOURNAL PUBLICATION FROM 2007-2010** Zurita Ismail Hishamudin Zainuddin Chan Kar Tim	**DYNAMICAL PROCESS ON GROWING GEOMETRICAL NETWORK BASED ON MODULAR GROUP** N. N. A. S. Kamal K. T. Chan N. M. Shah	**WEAK INSTANCES UPON A GENERALIZED RSA KEY EQUATION** Normahirah Nek Abd Rahman Muhammad Rezal Kamel Ariffin Muhammad Asyraf Asbullah

PARALLEL SESSION 3
7 August 2018
08:30-10:10

PARALLEL SESSION 4
7 August 2018
11:35-12:55

Time	Parallel Session 4A Imperial Grand Ballroom 1 Chairperson : *Mr. Mohamad Mustaqim Junoh*	Parallel Session 4B Danum 2 Chairperson : *Dr. Nur Haizum Abd Rahman*	Parallel Session 4C Danum 3 Chairperson : *Dr. Siti Nur Iqmal Ibrahim*
11:35 to 11:55	**MHD MIXED CONVECTIVE STAGNATION POINT FLOW WITH HEAT GENERATION PAST A SHRINKING SHEET** Najiyah Safwa Khashi'ie Norihan Md Arifin Mohd Ezad Hafidz Hafidzuddin Nadihah Wahi	**RANK REGRESSION FOR MODELING STRETCHING EXERCISE TRAINING DATA IN THE PRESENCE OF INTERVAL CENSORED OBSERVATIONS** Mostafa Karimi Noor Akma Ibrahim Mohd. Rizam Abu Bakar Jayanthi Arasan	**EXPLORING 10 YEARS OF CRIMES CASES IN MALAYSIA: THE VISUALIZATION** Zetty Ain Kamaruzzaman
11:55 to 12:15	**MHD BOUNDARY LAYER FLOW OF CARREAU FLUID OVER A SHRINKING SHEET WITH CONVECTIVE BOUNDARY CONDITION** Rusya Iryanti Yahaya Norihan Md Arifin Siti Suzilliana Putri Mohamed Isa	**BINS IMPROVEMENT FOR CONSTRUCTION OF HISTOGRAM WITH REMOTE OUTLIERS** Mohd Bakri Adam Yong Luo	**NUMERICAL APPROXIMATION OF DUFFING TYPE DIFFERENTIAL EQUATIONS USING A THREE-POINT BLOCK METHOD** Ahmad Fadly Nurullah bin Rasedee Mohamad Hasan Abdul Sathar Hazizah Mohd Ijam Bachok M. Taib Norizarina Ishak Siti Raihana Hamzah
12:15 to 12:35	**MHD BOUNDARY LAYER FLOW AND HEAT TRANSFER OVER SHRINKING SHEET WITH SUCTION AND STABILITY ANALYSIS** Nurul Shahirah Mohd Adnan Norihan Md Arifin Norfifah Bachok Fadzilah Md Ali	**ADJUSTED COMPOUND SMOOTHER USING ADAPTIVE MEAN IN RECOVERING SIGNAL FROM NOISE** Nurul Nisa' Khairol Azmi Mohd Bakri Adam Norhaslinda Ali Mohd Shafie Mustafa	**MODIFIED BAPTISTA TYPE CHAOTIC CRYPTOSYSTEM VIA A NEW EFFICIENT ANALYTICALLY PROVEN LOSSLESS DATA COMPRESSION FOR DATA TRANSMISSION TECHNIQUE IDEA** Muhamad Azlan Daud Zahari Mahad Mohd Mughti Hasni Nur Anneliza Abd. Latip
12:35 to 12:55	**STAGNATION POINT FLOW OVER A STRETCHING/SHRINKING SHEET IN NANOFLUIDS: A STABILITY ANALYSIS** Mohamad Mustaqim Junoh Fadzilah Md Ali Norihan Md. Ariffin Norfifah Bachok	**HYBRID SEASONAL ARIMA AND ARTIFICIAL NEURAL NETWORK MODELS IN FORECASTING SOUTHEAST ASIA CITY AIR POLLUTANT INDEX** Nur Haizum Abd Rahman Muhammad Hisyam Lee Suhartono Mohd Talib Latif	**SIMULATING GOLD PRICES USING GEOMETRIC BROWNIAN MOTION** Zawin Najah Hamdan Siti Nur Iqmal Ibrahim

	PARALLEL SESSION 5 7 August 2018 15:15-17:35		
Time	**Parallel Session 5A** **Imperial Grand Ballroom 1** **Chairperson :** *Dr. Haliza Rosali*	**Parallel Session 5B** **Danum 2** **Chairperson :** *Ms. Nurulhuda Ramli*	**Parallel Session 5C** **Danum 3** **Chairperson :** *Dr. Denis Wong Chee Keong*
15:15 to 15:35	**A STABILITY ANALYSIS OF SOLUTIONS ON BOUNDARY LAYER FLOW PAST A MOVING THIN NEEDLE IN NANOFLUID WITH SLIP EFFECT** Siti Nur Alwani Salleh Norfifah Bachok Norihan Md Arifin Fadzilah Md Ali	**EVALUATING HISTOGRAM BINNING METHODS** Mohd Bakri Adam Demudu Naganaidu	**IDENTITY BASED SIGNATURE SCHEME USING DIHEDRAL GROUP OF ORDER 2pq** Denis Wong Chee Keong
15:35 to 15:55	**ONSET OF CONVECTION IN A DIELECTRIC NANOFLUID SATURATED ANISOTROPIC POROUS MEDIUM** Nur Aisyah Maisara Shamsudin Nor Fadzillah Mohd Mokhtar	**THE IMPLEMENTATION OF DOUBLE BOOTSTRAP METHOD IN STRUCTURAL EQUATION MODELING** Nor Iza Anuar Razak Zamira Hasanah Zamzuri Nur Riza Mohd Suradi	**PARAMETERIZATION OF NICE AND Q-NICE POLYNOMIALS WITH FIVE ROOTS** Hozjee Anton Siti Hasana Sapar Mohamat Aidil Mohamat Johari Muhammad Rezal Kamel Ariffin Muhammad Asyraf Asbullah
15:55 to 16:15	**STAGNATION POINT FLOW WITH CHEMICAL REACTION PAST A STRETCHING VERTICAL SURFACE IN A COPPER-WATER NANOFLUID** Mahani Ahmad Kardri Norfifah Bachok Norihan Md. Arifin Fadzilah Md. Ali	**PARAMETER ESTIMATION FOR FIXED EFFECT PANEL DATA MODEL IN THE PRESENCE OF HETEROSCEDASTICITY AND HIGH LEVERAGE POINTS BY ROBUST METHOD** Muhammad Sani Habshah Midi Mohd Shafie Mustafa	**ELLIPTIC NET SCALAR MULTIPLICATION FORKOBLITZ CURVE** Norliana Muslim Mohamad Rushdan Md. Said
16:15 to 16:35	**EFFECT OF NONLINEAR TEMPERATURE PROFILE AND MAGNETIC FIELD ON THERMAL CONVECTION IN A BINARY FLUID SATURATED AN ANISOTROPIC POROUS MEDIUM** Nor Fadzillah Mohd Mokhtar Nur Zarifah Abdul Hamid Norihan Md Arifin Mohammad Hasan Abdul Sathar	**ESTIMATING THE PROPORTION OF NON-FATALITY UNREPORTED ACCIDENTS IN MALAYSIA** Nik Sarah Nik Zamri Zamira Hasanah Zamzuri	**PROPERTIES AND NUMERICAL COMPUTATIONS OF Θ-CONVERGENT RELATED TO REGULAR CONTINUED FRACTION (RCF)-CONVERGENT** Khairun Nisak Muhammad Hailiza Kamarulhaili
16:35 to 16:55	**SUCTION EFFECT ON STAGNATION POINT FLOW AND HEAT TRANSFER OVER AN EXPONENTIALLY SHRINKING SHEET IN A POROUS MEDIUM** Haliza Rosali Nirwana Binti Japili Norfifah Bachok	**ELICITATION OF BAYESIAN BELIEF NETWORK (EBBN) USING Z-NUMBER APPROACH** Nurulhuda Ramli Noraida Abdul Ghani Nazihah Ahmad Irdayu Ibrahim	**RESULTS ON EXHAUSTION SETS IN ABELIAN GROUP** Denis Wong Chee Keong

	PARALLEL SESSION 5 **7 August 2018** **15:15-17:35**		
Time	**Parallel Session 5A** **Imperial Grand Ballroom 1** **Chairperson :** *Dr. Haliza Rosali*	**Parallel Session 5B** **Danum 2** **Chairperson :** *Ms. Nurulhuda Ramli*	**Parallel Session 5C** **Danum 3** **Chairperson :** *Dr. Denis Wong Chee Keong*
16:55 to 17:15	**NUMERICAL SOLUTION FOR CIRCULAR ARC CRACKS IN HALF PLANE ELASTICITY** N. R. F. Elfakhakhre N. M. A. Nik Long Z. K. Eshkuvatov N. Senu	**EFFECTS OF USING RSTUDIO ON STATISTICS PERFORMANCE OF MALAYSIAN UNDERGRADUATES** Nur Raidah Salim Kathiresan Gopal Ahmad Fauzi Mohd Ayub	**A NEW MODIFIED CONJUGATE GRADIENT METHOD UNDER THE STRONG WOLFE LINE SEARCH** Muhammad Izwan Ishak Siti Marhani Marjugi Leong Wah June
17:15 to 17:35			

Time	PARALLEL SESSION 6 8 August 2018 08:30-09:50		
	Parallel Session 6A **Danum 10** **Chairperson :** *Ms. Nurul Hafizah Zainal Abidin*	**Parallel Session 6B** **Danum 2** **Chairperson :** *Dr. Syafrina A. H*	**Parallel Session 6C** **Danum 3** **Chairperson :** *Prof. Dr. Priscilla S. Macansantos*
08:30 to 08:50	**MARANGONI CONVECTION IN A DOUBLE DIFFUSIVE BINARY FLUID WITH TEMPERATURE DEPENDENT VISCOSITY, CORIOLIS FORCE AND INTERNAL HEAT GENERATION** <u>Nurul Hafizah Zainal Abidin</u> Nor Fadzillah Mohd Mokhtar Zanariah Abdul Majid	**THE PERFORMANCE OF ROBUST ESTIMATION IN RESPONSE SURFACE DESIGN WITH HETEROSCEDASTIC CONDITIONS** <u>Mohd Shafie Mustafa</u> Habshah Midi	**GENERALIZED INTERVAL-VALUED INTUITIONISTIC HESITANT FUZZY SOFT SET** <u>Admi Nazra</u> Yudiantri Asdi Hafizah Ramadhani Sisri Wahyuni Rischa Devita Zulvera
08:50 to 09:10	**RICCI-PSEUDO-SYMMETRIC GENERALIZED S-SPACE-FORMS** <u>Belkhelfa Mohamed</u> Kaid Rachida	**COMPARING O'BRIEN TEST ON MEAN, MEDIAN, SYMMETRIC AND ASYMMETRIC TRIMMED MEAN USING USUAL VARIANCES** <u>Munirah Kamal</u> Nazihah Mohd Ali	**TWO AND THREE POINT IMPLICIT SECOND DERIVATIVE BLOCK METHODS FOR SOLVING FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS** <u>Mohammed Yousif Turki</u> Fudziah Ismail Norazak Senu Zarina Bibi Ibrahim
09:10 to 09:30	**SYMMETRIC GROUP AND ITS COMMUTING GRAPH FOR ELEMENTS OF ORDER THREE** Athirah Nawawi	**COMPARISON ON O'BRIEN PROCEDURE USING WELCH F TEST** <u>Nuramalina Abdullah</u> Nazihah Mohd Ali	**THE CONVERGENCE OF THE HARD SAMPLING OPERATOR WITH RAPIDLY DECREASING WAVELET FUNCTIONS** <u>Raghad Sahib Shamsah</u> Anvarjon A. Ahmedov Hishamuddin Zainuddin Adem Kilicman Fudziah Ismail
09:30 to 09:50		**WEATHER GENERATOR APPLICATION WITH MIXED EXPONENTIAL DISTRIBUTION REPRESENTING RAINFALL INTENSITY** Noor Shazwani O. <u>Syafrina A. H</u> Norzaida A.	**MULTI-VALUED MAPPINGS IN QUASI-PARTIAL B-METRIC SPACES: A FIXED POINT THEOREM** Priscilla S. Macansantos

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Time	**PARALLEL SESSION 7** **8 August 2018** **10:05-11:25**		
	Parallel Session 7A **Danum 10** **Chairperson :** *Ms. Nurul Hafizah Hadani*	**Parallel Session 7B** **Danum 2** **Chairperson :** *Dr. Norazzila Shafie*	**Parallel Session 7C** **Danum 3** **Chairperson :** *Dr. Elenchothy Davrajoo*
10:05 to 10:25	**ENHANCED AA_β CRYPTOSYSTEM –** **A COMPARATIVE ANALYSIS** Zahari Mahad Muhammad Asyraf Asbullah Muhammad Rezal Kamel Ariffin	**MULTIVARIATE HIGH LEVERAGE** **DETECTION IN BINARY RESPONSE** **MODEL FOR DEFECT CLASSIFICATION** Syaiba Balqish Ariffin Nor Fadzillah Mohd. Mokhtar Habshah Midi	**PERCEPTIONS OF LEARNING** **MATHEMATICS AMONG LOWER** **SECONDARY STUDENTS IN** **MALAYSIA: STUDY ON STUDENTS'** **ENGAGEMENT USING FUZZY** **CONJOINT ANALYSIS** Kathiresan Gopal Nur Raidah Salim Ahmad Fauzi Mohd Ayub
10:25 to 10:45	**ORIGINS OF ONE DIMENSIONAL** **INSTABILITY IN STATIONARY SHOCK** **AND SLOWLY MOVING SHOCK** Nadihah Wahi Farzad Ismail	**ROBUST BOOTSTRAPPING FOR PANEL** **DATA** Nor Mazlina Abu Bakar Habshah Midi	**WHAT MAKES READING MOBILE** **E-BOOK IS DIFFICULT FOR** **UNIVERSITY MATHEMATICS** **STUDENTS** Malathi Letchumanan Mariam Mohamad Elenchothy Davrajoo
10:45 to 11:05	**STOCHASTIC INVESTMENT** **MODELLING: A STUDY OF SHARE** **DIVIDEND YIELD IN MALAYSIA** Nur 'Amirah Syuhada Ismail Norizarina Ishak Ahmad Fadly Nurullah Rasedee	**PRODUCTION OF STATISTICALLY** **SELF-SIMILAR ATTRACTOR: A NEW IDEA** **OF IMPROVED FRACTAL IMAGE CIPHER** **AND DECIPHER** Md. Ahadullah Mohamad Rushdan Md Said Nadia M. G. Al-Saidi Siti Khairunniza Bejo Santo Banerjee	**SCHOOL IMPROVEMENT** **SPECIALIST COACH PLUS (SISC+)** **PROGRAM: IMPACT ON TEACHERS'** **PEDAGOGICAL SKILLS AND** **STUDENTS' PERFORMANCE IN** **MATHEMATICS CLASSROOM** Elenchothy Davrajoo Malathi Letchumanan
11:05 to 11:25	**ALTERNATIVE METHOD TO FIND** **THE NUMBER OF POINTS ON** **KOBLITZ CURVE** Nurul Hafizah Hadani Faridah Yunus Muhammad Rezal Kamel Ariffin Siti Hasana Sapar Normahirah Nek Abd Rahman	**STUDENTS SATISFACTION ON ONLINE** **MATHEMATICS LEARNING: A** **LITERATURE REVIEW** Norazzila Shafie Tengku Noorainun Tengku Shahdan Mohd Shahir Liew	**IMPLEMENTATION INTEGRAL** **CALCULUS TEXTBOOK THAT** **SUPPORTED WITH GEOGEBRA TO** **ENHANCING STUDENTS'** **MATHEMATICAL REPRESENTATION** Nuriana Rachmani Dewi Florentina Yuni Arini

ABSTRACTS OF PARALLEL SESSIONS 1A, 1B AND 1C

6 August 2018
Monday
09:00 - 10:40

SESSION 1A

A Numerical Solver for Second Order Stiff Ordinary Differential Equations

Asma Izzati Asnor[1, a)], Siti Ainor Mohd Yatim[1] and Zarina Bibi Ibrahim[2]

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Abstract. This paper emphasizes on a new numerical solver of second order ordinary differential equations (ODEs). We developed this solver using block backward differentiation formula (BBDF) method with strategy on step size selection and the solver is known as direct variable step block backward differentiation formula (DVS-BBDF2). Throughout the numerical experiments conducted, this method has proven its validity to solve a few problems considered directly while showing its good performance on accuracy and total number of steps when compared to two ODE solver in MATLAB, ode15s and ode23s.

Keywords: backward differentiation formulae, block backward differentiation formulae, ordinary differential equations, stiff ordinary differential equations, second order ordinary differential equations.

Solving Boundary Value Problems with Mixed Boundary Conditions using Direct Diagonally Block Method

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Abstract. Two point diagonally block method with constant step size is presented to obtain the numerical solution for boundary value problems (BVPs) with mixed boundary conditions directly. Shooting technique adapted with Newton divided difference interpolation as the iterative strategy is employed for generating the guessing values. Numerical examples are given to demonstrate the efficiency and effectiveness of the proposed method. The computed results will be compared with the existing method to validate the performances of the present diagonally block method.

Keywords: boundary value problems, mixed boundary conditions, shooting method, Newton divided difference interpolation, block method.

SESSION 1A

Two-point Block Method for Solving Neutral Delay Differential Equation

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Abstract. In this research, the initial-value problem for first order neutral delay differential equation (NDDE) of constant delay type is considered. To solve the problem, a two-point block method is developed using Taylor series polynomial. The method obtained will solve NDDE problem at two points simultaneously using constant step size. The implementation is based on multistep method formulas. Numerical results presented have shown that the proposed method is effective and suitable for solving NDDE of constant type.

Keywords: neutral delay differential equation, initial-value problem, multistep method, block method, constant delay.

Analysis of Sensitivity Parameter on Cervical Cancer Mathematical Modeling

Tri Sri Noor Asih[1, a)], Widodo[2], Lina Aryati[2] and Fajar Adi Kusumo[2]

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Abstract. The previous research already given mathematical modeling as the dynamic of HPV infection on cervical cancer. Also given five scenarios for the existence of equilibrium points and their local stability. From the analysis of the system it is found the basic reproduction number is depends on the infection rate, the number of new virion that produce by infected cells, the death rate of virus, the growth rate of infected cells and progression rate. The existence and the local stability of equilibrium points are depend on basic reproduction number, the growth rate of pre-cancer cells and invasion rate. The basic reproduction number also depends on some other parameters. So we predict that there are some bifurcation parameters on that model. While we do some simulation by continuing those parameters we found some bifurcation such as Fold Bifurcation, Cusp Bifurcation and Zero Hopf Bifurcation. Further we analyze domain of each bifurcation parameter.

Keywords: sensitivity parameter, cervical cancer, mathematical modeling.

SESSION 1A

Double Reduction of Modified Hunter Saxton Equation

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Abstract. Modified Hunter-Saxton equation was considered in this paper. This equation is an integrable nonlinear partial differential equation (PDE) that is commonly applied in the field of nematic liquid crystal. Liquid crystal elements normally have few common properties including strong dipole and molecular structure. In this paper, Modified Hunter Saxton Equation was analysis by using its Lie symmetry and conserved vector. Conserved vector of the equation obtained by multiplier approach, which also presented in this paper. Finally, equation was solved by using Double reduction which is obtain from association of Lie symmetry and conserved vector of the equation.

Keywords: Modified Hunter Saxton equation, partial differential equation, Lie symmetry, double reduction.

SESSION 1B

Tree-Based Threshold Selection Method in Generalized Pareto Model with the Presence of Covariate

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Abstract. Most real life data are non-stationary, where they are affected by covariates. The typical method of modelling non-stationary extremes are by setting a constant high threshold, where the threshold exceedances are modelled by Generalized Pareto distribution (GPD) and covariates model is incorporated in the GPD parameters to account for the non-stationarity. However, the asymptotic basis of the GPD model might be violated, where threshold might be high enough for GPD approximation on certain covariates but not on others. In this paper, a covariate-varying threshold selection method based on regression tree is suggested and applied on simulated non-stationary data sets. The tree is used to partition data sets into stationary groups with similar covariate condition. Hence, constant high threshold can be fixed within each group. The tree-based threshold exceedances can be modelled by stationary GPD which is simpler compared to the non-stationary GPD. Simulation study is done to demonstrate and assess the efficacy of this method. The results show that the proposed method perform better than the traditional method.

Keywords: extreme value theory, Generalized Pareto distribution, non-stationary process, regression tree.

Median Based Robust Correlation Coefficient under Contaminated Data

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Abstract. Pearson correlation coefficient is the most frequently used statistical technique to measure the strength of a relationship between two variables. This coefficient is very powerful when there is linear relationship between the two variables and data is normally distributed. However, in the existence of outliers which will lead to the violation of normality, the coefficient will not perform optimally. The computation of the coefficient which involves mean and standard deviation as the location and scale estimators respectively is sensitive to outliers. In alleviating the problem, this study highlights a few highly robust median based correlation coefficients as alternatives to Pearson correlation. The performance of all the coefficients was evaluated using real data as well as simulated data under various conditions in terms of correlation value, average bias and standard error. Both simulated and real data study show better results when compared to Pearson correlation under violation of normality.

Keywords: average bias, outlier, Pearson correlation, robust correlation.

SESSION 1B

Bayesian Hierarchical Modelling of the Consistency of Symptoms Reported During Hypoglycaemia for Individual Patients

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Abstract. The aim of the present study was to develop a hierarchical model which able to estimate the individual consistency of hypoglycaemic symptoms reporting and to investigate which factors affects the consistencies in one setting, and to select the best predictive model for predicting patients' consistency. We develop the model within a Bayesian framework using Markov chain Monte-Carlo methodology and then implement a stepwise regression procedure to identify important covariates among age, gender, type and duration of diabetes, body mass index (BMI), retinopathy and others that should be included in a predictive model. The analysis was performed with the symptoms of hypoglycaemia classified into groups, i.e. autonomic, neuroglycopenic, autonomic/neuroglycopenic and general malaise. Results show that autonomic and neuroglycopenic groups are important in detecting the onset of hypoglycaemia and no covariate appears to be significantly affecting patients' consistency. The best predictive model obtained contains covariates gender, type of diabetes, retinopathy, C-peptide, and serum angiotensin converting enzyme.

Keywords: Bayesian modeling, hierarchical modeling, stepwise regression, latent threshold models, Markov chain Monte Carlo.

Structural Breaks and Outliers in the GARCH model: The Impulse Indicator Saturation Approach

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Abstract. It is commonly accepted that financial time series are affected with the present of extreme events (outliers) such as financial crisis and wars, which may change the estimation parameter (breaks). These criteria need to be consider in the modelling of financial time series. However, current practice is to correct the outliers before structural breaks can be detected. This study aims to assess the joint detection of outliers and structural breaks in the Dow Jones Market Index using the impulse indicator saturation approach (IIS). These detected outliers and structural breaks are then incorporate into GARCH (1,1) model to examine their impact on the estimation parameter. This study found that the estimation of GARCH (1,1) parameter improves when both of the outliers and structural breaks are taken into consideration.

Keywords: structural breaks, outliers, GARCH (1,1), IIS, DJIM.

SESSION 1B

Application of Resampling Techniques in Orthogonal Regression

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Abstract. The classical Orthogonal Regression analysis relies heavily on the normality assumption. However, sometimes we might be uncertain of the underlying distribution of our dataset or the sample size might be small, which would cause an inaccurate inference on the parameter if the data is not normally distributed. This leads to the main objective of this paper which is to examine alternative methods to the parametric orthogonal regression (OR) analysis which do not rely on the normality assumption. In this paper, the nonparametric jackknife and bootstrap resampling techniques were applied to assess the bias, standard errors and confidence intervals for the parameters of the model. We studied on the method of delete-one jackknife and bootstrapping the observations and made comparisons between the two methods as well. Under bootstrapping, three methods were considered to construct the confidence intervals which include percentile interval, bias-corrected (BC) interval and bias-corrected and accelerated (BCa) interval. Based on the results, it was found that the bootstrap estimators were closer to the values of classical OR analysis compared to jackknifed estimators. Besides, the jackknife estimates of bias and standard errors were slightly larger than that of bootstrap. Furthermore, we also found that the confidence intervals for the parameters constructed from jackknife have longer lengths and closer to that of OR. This showed that jackknife performed better in constructing confidence interval than the bootstrap.

Keywords: resampling, orthogonal regression, jackknifing, bootstrapping, bias-corrected and accelerated.

SESSION 1C

Effectiveness of Problem Based Learning Strategy on Students' Mathematical Value among Secondary School Students

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Abstract. This study examined the effectiveness of implementing Problem Based learning (PBL) strategy on the mathematical values of the mathematics secondary school. A quasi-experimental nonrandomized control group post-tests design was conducted consists of 62 students on two intact groups. 35 students were placed in the experimental group while 27 students in the control group participated in this study. Students in the experimental group underwent PBL instruction strategy, while the control group learned mathematics using conventional instructional (CI) in class over a period of eight weeks. Students mathematical value were measured using a set of questionnaire consists of nine mathematics educational. The results of this study showed the students from the PBL strategy group acquired significantly higher scores than the CI strategy group in the overall mathematical values and the subscales of accuracy, conjecturing, consistency, creativity, effective organization, efficient working/strategies, flexibility, persistence, and systematic working. Therefore, it is recommended that by using PBL strategy would help students to understand mathematical values better compare to conventional instruction.

Keywords: problem based learning (PBL) strategy, conventional instructional (CI) strategy, mathematical value, accuracy, conjecturing, consistency, creativity, effective organization, efficient working/strategies, flexibility, persistence, systematic working.

An Empirical Study of Gamification Impact in Learning Mathematics

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Abstract. Interactive teaching has become a trend since digital technology is more update nowadays. Educators need to upgrade their style of teaching by integrating technology into their conventional teaching. It is important to create a more motivated and fun lesson for the student especially when teaching mathematics. Game-based learning tool is one of the alternative approaches that can be used. A game-based learning on a mathematics topic which is the indices and logarithm have been developed and introduced to a group of undergraduate students. The game development framework is explained thoroughly step by step. This paper presents the gamification impact on learning indices and logarithm where the empirical data was obtained from the gamified and control group. The student's feedback is also supported by an assessment done on the mathematics topic.

Keywords: gamification, perception, learning mathematics, interactive teaching, game development.

SESSION 1C

Improving the Ability of Mathematical Connection Based on Prior Knowledge and Students Learning Style

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Abstract. The purpose of this study is to examine the achievement and improvement of students' mathematical connections based on mathematical prior knowledge and students' learning style. Design of his research is a posttest only control group which was done on one group university students in Mathematics majors. The results of this study are the achievement of students' mathematical connection ability had increased due to the application of learning by using ICT-supported Statistics textbook with portfolio based assessment; the implementation of learning using Statistics textbook had proved significantly can improve students' mathematical connection ability in medium ability category so that they can obtain mathematical connection ability scores which were not different from those with high prior knowledge students; Statistics textbook can be used by all students with different types of learning styles and provide achievement and enhancement of students' mathematical connection capabilities who were equally well.

Keywords: mathematical connection, early mathematical ability, learning style, Statistics.

Influence of Students' Beliefs on Mathematical Problem Solving on Academic Achievement among Malaysian Matriculation Students

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Abstract. The purpose of this study was to investigate beliefs on mathematical problem solving among matriculation students. Five factors of students' beliefs, i.e., difficult problems, steps, understanding, word problems and effort were investigated to predict factors that influence their academic achievement. The sample of the study consisted of 312 matriculation students from four matriculation colleges. The data were adopted from Indiana Mathematics Beliefs Scale (IMBS) and a mathematics test. The results of the data analysis indicated that students had a high level of beliefs on mathematical problem solving. A positive significant relationship was obtained between overall beliefs with academic achievement. Three sub-factors, i.e., difficult problems, steps and understanding were found to have positive significant relationship with academic achievement. Further analysis from multiple regression analysis revealed that difficult problems, steps and understanding had a positive contribution to the study.

Keywords: difficult problems, steps, understanding, Mathematics Beliefs, academic achievement.

SESSION 1C

Effects of Higher Order Thinking Module Approach on Pupils' Performance at Primary Rural Schools

Noorashikim Noor Ibrahim[1, a)], Ahmad Fauzi Mohd Ayub[1, 2], Aida Suraya Md. Yunus[1, 2], Rosnaini Mahmud[1, 2] and Kamariah Abu Bakar[2]

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Abstract. This study was to investigate the use of HOTS-based module approach on the performance of primary school pupils. For the purpose of the study. A quasi- experimental, nonrandomized control group, pre-test-post-test delayed post-test design was conducted on two intact groups. This study was conducted in two schools in the rural area in one of the states in Malaysia. Two primary schools was selected to get a better view on the effects of using HOTS-based module in teaching and learning mathematics. For school 1, a total of 76 pupils (38 pupils for each group). Meanwhile, for school2, 51 pupils (28 pupils in the treatment group and 23 pupils in the control group) participated in this study. The analysis of covariate (ANCOVA) indicated that no significant difference in the post test and post delayed test for both schools. This study showed that using the HOTS based Module is still new in Malaysia especially for those pupils in rural area. More time need to be given to the teachers and pupils in rural area school to be familiar and practice using HOTS. Hence it is recommended this approach should be continued in teaching and learning in the future.

Keywords: Higher Order Thinking Skills (HOTS), module approach, conventional approach, rural school, post-test, post delayed test.

ABSTRACTS OF PARALLEL SESSIONS 2A, 2B AND 2C

6 August 2018
Monday
15:15 - 17:35

SESSION 2A

Direct Multistep Method For Solving Delay Differential Equation with Boundary Conditions

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Abstract. This study will consider the implementation of direct multistep method for solving Delay Differential Equation (DDE) with boundary conditions. The approach of this method is solving DDE directly using the proposed method without reducing to the system of first order. To execute the direct multistep method to solve Boundary Value Problem (BVP), we apply the shooting technique by using Newton's method to compute the guessing value. Some numerical examples are presented to show that the proposed method are capable for solving DDE with boundary conditions.

Keywords: delay differential equation, boundary value problem, direct method, shooting method, constant-dependent delay.

Rational Method for Solving First Order Initial Value Problem

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Abstract. In this paper, an explicit rational method of second order of accuracy is developed. The proposed rational method is A-stable and suitable in solving singular, singularly perturbed and stiff initial value problem. The method is not self-starting and therefore require a suitable one-step method to calculate the starting approximation values. The numerical results obtained by this method are compared to the existing rational methods and the results are comparable.

Keywords: rational function, rational method, initial value problem, stiff problem, singular problem, singular perturbation problem.

SESSION 2A

Sumudu-Variational Iteration Method for Exact Solutions of Nonlinear Pantograph Delay Differential Equations

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Abstract. Delay differential equations of pantograph type (PDDEs) is a special type of functional differential equation with proportional delay. This study introduces a new approach which is a combination of the variational iteration method and Sumudu transform (SVIM). Objective of this research is to find solutions of nonlinear pantograph DDEs using SVIM. There equations are solved to demonstrate the application of SVIM. Results obtained shows that SVIM successfully provides exact solutions of the nonlinear PDDEs which is comparable to the existing method with less computational cost. This method also possesses a simple procedure which is straightforward.

Keywords: pantograph equations, delay differential equations, Sumudu transform, variational iteration method, Lagrange multiplier.

Solving Second Order Volterra Integro-Differential Equations using Direct Two-Point Hybrid Block Method

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Abstract. Direct methods are implemented for the numerical solution of second-order Volterra integro-differential equations (VIDEs). The formulation of two-point hybrid block method will be discussed in this paper to solve second order VIDEs directly without reducing the equations into first order system. The proposed method of order four will calculate the computing solutions using constant step size. The quadrature rule has been used to approximate the integral part. Numerical results of linear and nonlinear VIDEs are presented and show that the hybrid block method is appropriate for solving second order VIDEs directly.

Keywords: direct method, hybrid block method, Volterra integro-differential equations.

SESSION 2A

Trigonometrically-Fitted Diagonally Implicit Two Derivative Runge-Kutta method for the Numerical Solution of Periodical IVPs

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Abstract. A Trigonometrically-Fitted Diagonally Implicit Two Derivative Runge-Kutta (TFDITDRK) method for the numerical solution of first order Initial Value Problems (IVPs) which possesses oscillatory solutions is derived. We present a fourth-order two stage Diagonally Implicit Two Derivative Runge-Kutta (DITDRK) method designed using the trigonometrically-fitted property. The numerical experiments are carried out to show the efficiency of the derived methods in comparison with other existing Runge-Kutta (RK) methods of the same order and properties.

Keywords: Diagonally Implicit methods, IVPs, ODEs, TDRK methods, Trigonometrically-Fitted.

Numerical Solution of Fuzzy Volterra Integro-Differential Equation Using Improved Runge-Kutta Method

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Abstract. In this paper, we proposed the numerical solution of fuzzy Volterra integro-differential equations (FVIDEs) using a fourth-order Improved Runge-Kutta method with three stages. Fuzzy Improved Runge-Kutta method is developed for numerical solution of FVIDEs of second kind under the concept of generalized Hukuhara differentiability. Simpson's rule and Lagrange interpolation polynomials are applied to approximate the integral part. To illustrate the efficiency of this method numerical test problems are carried out. The numerical results are compared with the fourth-order Runge-Kutta method, variational iteration method and homotopy perturbation method. Based on the numerical result, it is clear that fourth-order Improved Runge-Kutta method with better accuracy and using less number of stages which leads the less number of computational cost is more efficient than other existing methods for solving FVIDEs.

Keywords: fuzzy Volterra integro-differential equations, Improved Runge-Kutta method, fuzzy differential equations, generalized Hukuhara differentiability, quadrature rules.

SESSION 2A

From Limits in Mathematics to Limits of Mathematics

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Abstract. The notion of a limit lies at the core of human cognition. This is because the knowledge of the reality of a thing begins when the concept of the thing is distinguished from what it is not. The act of defining a thing is a process of getting at the precise boundary or limit that separates the concept of that thing from what it is not. Mathematics, known for its rigorously precise definitions of concepts via formal axiomatic systems, eventually through the works of Bolzano (1781-1848), Cauchy (1789-1857) and Weierstrass (1815-1897) in the 19th century, gave birth to a formal definition of the notion of a limit, the famously known epsilon-delta definitions. Although the motivation behind it was to provide rigorous formal foundation for Newtonian or Leibnizian Calculus especially in its definitions of continuity and continuous functions, it implicitly strengthens the idea of approaching a fixed end without necessarily having to achieving it. In the history of ideas, this is precisely the age-old conversation in the theory of definitions whether or not a perfect definition is possible and in either way its implication to our epistemology. This paper is a reappraisal of some of these ideas through the lens of the structurally more well-developed definitions of limit in mathematics to discuss the limit of science as a mathematical description of phenomena and in consequence the limit of mathematics itself in understanding reality.

Keywords: History and Philosophy of Mathematics, limits, definitions, theory of universals.

SESSION 2B

Construction of a New Model: A Basic Model for Traffic Systems (Basic Traffic Units) with Considerationsfor Queueing Systems

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Abstract. In studying traffic congestions, a basic model for traffic systems is developed and introduced. This model will hopefully contribute towards the solution with the ability to explain and predict congestions. It is targeted to be used along for traffic congestions with a more specific operations research approach, based on a simulation and queueing theory model. Interpreting the representation as a network to take advantage of network modeling techniques. It is taken as an approach to develop applications. The representation of this model can forma platform for work on planning for the development of relief/escape roads; planning alternative routes to avoid congestions; and navigating through traffic jams.

Keywords: basic traffic unit, queueing theory, simulation, network modeling, congestion.

Formulate a Relationship Between Saddle Points on Surfaces and Inflection Points on Curves

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Abstract. It is known that there is a very closed relationship between saddle and inflection points. It was shown in one of the research papers that a connection between the saddle points of functions of two variables with the inflection points of functions of one variable and the researcher claimed that he has not found any references to this result in the literature. However, the author himself worried by asking whether there always exists such a one variable function that is differentiable at the saddle point or not. In this paper, it will be proposed two results for relationship between the saddle and inflection points through the quadratic functions of two variables and two linear and non-linear functions of one variable. These results will be supported with several numerical examples.

Keywords: saddle, inflection, differentiation, quadratic, linear.

SESSION 2B

Z-number α-Cut Using Trapezoidal Fuzzy Numbers

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Abstract. Data envelopment analysis (DEA) is a powerful tool for measuring efficiency of multiple inputs and outputs of a set of decision making units (DMUs). It is pioneered by M. J Farrell (1957) but recent series of discussion started with Charnes, Cooper and Rhodes (1978). In real life, data is usually vague especially when it is characterized by linguistic information given by experts. Hence, several methods have been proposed to deal with the vagueness. Currently, the most popular method to capture the vagueness of data is the fuzzy data envelopment analysis (FDEA) which based on α-cut. However, the limitation of this method is that the α-cut value is a crisps value given by the experts but it does not include the uncertainty of the expert judgement. In this paper, we propose the Z-number α-cut technique using the trapezoidal fuzzy numbers that includes some uncertainty information on the judgement given by the experts. A numerical example on portfolio selection in IS/IT (Information Systems/ Information Technology) is presented to demonstrate the proposed method and to find the best portfolio by ranking them according to their efficiency score.

Keywords: α-cut method, data envelopement analysis (DEA), fuzzy data envelopment analysis (FDEA), Z-number.

Single-machine-based Integrated Production Preventive Maintenance Scheduling

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Abstract. Preventive maintenance is important to all industries in order to maintain the optimum level of production and minimize its investment. This study focuses on multiple jobs with the single production line. The aims of this study are to propose an appropriate integration production and preventive maintenance scheduling for multiple jobs by using single line production and to evaluate the effect of preventive maintenance on the average of weighted tardiness. Three different cases of production scheduling; the production scheduling without maintenance planning, production scheduling with machine breaks down and integrated production with preventive maintenance scheduling are considered in this study. The best outcome of the production schedule without maintenance planning is chosen based on the smallest value of average tardiness time and used as a guide to schedule the production scheduling with machine breaks down and integrated production with preventive maintenance scheduling. Then, the average of weighted tardiness for production scheduling with machine breaks down and the proposed integrated production and preventive maintenance scheduling are compared. The analysis using Excel Solver shows that the proposed integrated production and preventive maintenance scheduling is able to reduce the average of weighted tardiness as compared to the production schedule with machine breakdowns.

Keywords: scheduling, single line, multiple-production, machine's failure, preventive maintenance planning.

SESSION 2B

Newton-MSOR Iteration for Unconstrained Optimization Problems with a Tridiagonal Hessian Matrix

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Abstract. In this paper, we maintained the advantages and discarded the disadvantages of Newton method for solving large scale unconstrained optimization problems by combining the method with modified successive over-relaxation (MSOR) iterative method. This is due to the fact that the MSOR iterative method is one of the numerical methods that has an advantage of the efficient point iterative method for solving any linear systems. In addition, we considered large linear system with a tridiagonal Hessian matrix. The combinations of Newton method with Gauss-Seidel iteration (Newton-GS) and Newton method with successive-over relaxation iteration (Newton-SOR) are used to verify the performance of Newton-MSOR method. As conclusion, the numerical example are listed to approve the efficiency of the proposed method.

Keywords: unconstrained optimization problems, Newton method, modified successive-over relaxation iteration.

A New Hybrid Coefficient of Conjugate Gradient Method

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Abstract. Hybridization is one of the popular approaches in modifying the conjugate gradient method. In this paper, a new hybrid conjugate gradient is suggested and analyzed in which the parameter β_k is evaluated as a convex combination of β_k^{RMIL} and β_k^{SMR} by while using exact line search. The proposed method is shown to possess both sufficient descent and global convergence properties. Numerical performances show that the proposed method is promising and has overpowered other hybrid conjugate gradient methods in its number of iterations and central processing unit per time.

Keywords: conjugate gradient method (CG), exact line search, hybrid conjugate gradient method.

SESSION 2B

Markov Decision Processes Approach for Stochastic Vehicle Routing Problem in Humanitarian Logistics

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Abstract. Recent disaster events mark yet another increase of disaster frequency that has been rising as of late. In this scenario, efficient humanitarian logistics (HL) operations becomes more relevant in playing crucial parts in saving life and reducing mortality rate. Emergency medical supply delivery for example serve as a pivoting role in ensuring critical medical care throughout the disaster event. However, delivering medical supply during disaster where the environment is chaotic prove to be difficult. This study proposes an optimization approach in delivering medical supply by taking into account the uncertainties of the route conditions based on the reinforcement learning approach in addressing the stochastics vehicle routing problem (SVRP). The Markov Decision Processes (MDP) served as a framework in modeling the chaotic environment of the routes as well as providing optimized solution based on the dynamic programming approach.

Keywords: disaster, Markov Decision Processes, stochastic, humanitarian, routing.

Extremes Rainfall Intensity-Duration-Frequency Relationship for Peninsular Malaysia

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Abstract. Rainfall Intensity Duration Frequency (IDF) is one of the most commonly used tools in water resources engineering particularly to identify design storm event of various magnitude, duration and return period simultaneously. The present study is aimed at developing rainfall IDF relationship for entire Peninsular Malaysia based on selected thirty (30) rainfall gauging stations.. The gauging stations have been selected based on reliable rainfall records representing the different geographical locations varying for 18 years of record length. Daily annual maximum rainfall data has been disaggregated into sub-daily values such as 0 hr, 3 hr, 6 hr, 9 hr, 12 hr, 15 hr and 18 hr and fitted to the probability distributions. Quantile estimation has been made for different return periods and best fit distribution is identified based on least square standard error of estimate. At-site and regional IDF parameters were computed and subsequent curves were established for different return period. The moment ratio diagram (MRD) and L-moment ratio diagram (LMRD) methods have been used to fit frequency distributions and identify homogeneous regions for observed 24-hr maximum annual rainfall. The results of present analysis can be used as useful information for future water resources development planning purposes.

Keywords: Intensity-Duration-Frequency, extreme rainfall, moment ratio, L-moment ratio.

SESSION 2C

The Mathematics Education Department Students' Ability in Mathematical Literacy for Uncertainty Problems on PISA Adaptation Test

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Abstract. One of goals of this research was to describe students' work result on PISA adaptation test. In this research, there were several steps to achieve the goal, that is (1) creating test questions by adjusting the existing PISA problem with the Indonesian context, (2) validating test questions using expert validation, (3) asking the students to do the test, and (4) describing the students' work result. The mathematics PISA adaptation test consist of 4 scopes, that is quantity, space and shape, change and relationship, and uncertainty. This test contained 13 questions, that is: 3 questions for quantity, 3 questions for uncertainty, 3 questions for change and relationship, and 4 questions for space and shape. This research used 7 students of Mathematics Education Department of Sanata Dharma University as subject research. This research was a design research which developed by Cobb and Koeno. In the uncertainty area, all students answer correctly at the level 1 problem, six students answer correctly at the level 4 problem, two students answer correctly at the level 5 problem, two students answer correctly at the level 5 second problem, one student answers correctly at the level 6 problem.

Keywords: mathematical literacy, uncertainty problems, adaptation PISA test.

The Mathematics Education Department Students' Ability in Mathematical Literacy for The Change and Relationship Problems on The PISA Adaptation Test

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Abstract. In this paper, we try to describe the bachelor students' ability in mathematics literacy for change and relationship problem on PISA test. To achieve this goal, we applied the following procedure: 1) made PISA adaptation test, 2) Validating the PISA adaptation test, 3) Asking some collages student to solve PISA adaptation test, and 4) Describing bachelor students' solution profile. From first procedure, we got 3 change and relationship problems, 4 space and shape problems, 2 uncertainty problems, and 4 quantity problems. The type of this research is design research. Subjects of this research were 7 bachelor students of Mathematics Department Sanata Dharma University. The results were as follows: Level 4 achieved by one student (14.29%) in problem number 2b.4. Level three at most achieved by six students at problem number 1a. Level two at most achieved by four students at problem number 3.

Keywords: mathematical literacy, change and relationship problem, collage student, PISA, PISA adaptation test.

SESSION 2C

The Teachers' Ability in Mathematical Literacy for Space and Shape Problems on PISA Adaptation Test

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Abstract. One of purposes of this study was to describe the junior high school teacher ability for the PISA adaptation test in the quantity area. The procedures conducted by researchers to achieve this objective were (1) to adapt the PISA test, (2) to validate the adapting PISA test, (3) to ask junior high school teachers to solve the adapting PISA test, and (4) to make the teachers' solution profile, and the teachers' ability for space and shape problems. In the adapting PISA test, there were 13 questions, namely: (1) 4 questions for quantity, (2) 3 questions for uncertainty, (3) 3 questions for change and relationship, and (4) 4 questions for space and shape. Subjects were 7 teachers from 7 junior high schools in Yogyakarta and surrounding areas. The research type that used by the researchers was a design research developed by Cobb and Koeno. The results of this research were (1) 7 teachers could achieve level 3 for problem 1a, (2) 6 teachers could achieve level 5 for problem 1b, (3) 1 teacher could achieve level 5 for problem 2, (4) 1 teacher could achieve level 6 for problem 3, and (4) 6 teachers could achieve level 6 for problem 4.

Keywords: mathematical literacy, space and shape problems, and adaptation PISA test.

Awareness of Higher Order Thinking Skills: Lecturers and Undergraduates

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Abstract. The advance in technology has made Higher Order Thinking Skills (HOTS) to receive great attention from the scholars. In Malaysia, the implementation of HOTS is seriously taken into consideration and has been implemented at universities. Inspired by this fact, we investigated the awareness of engineering lecturers on the use of HOTS in measuring student performance. The investigation was also performed on students, in terms of the awareness on the use of HOTS in solving problems. The study was conducted among 17 lecturers and 171 undergraduate students from Department of Computer and Communication Systems Engineering, Faculty of Engineering, Universiti Putra Malaysia. Besides, the awareness on the cognitive levels by Bloom's taxonomy and assessments based on rubric are also considered. Quantitative analysis of the collected data indicates that majority of lecturers and students aware about HOTS but the result shows a significant difference between lecturers and students in terms of implementation and assessment.

Keywords: Higher Order Thinking Skills, critical thinking skills, awareness, Bloom's taxonomy, cognitive levels.

SESSION 2C

The Effect of Radiation On Mixed Convection Boundary Layer Flow Past a Horizontal Circular Cylinder with Constant Heat Flux in Viscoelastic Nanofluid

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Abstract. In this paper, the problem of steady two-dimensional mixed convection boundary layer flow of an incompressible viscoelastic nanofluid past a horizontal circular cylinder with constant heat flux with a presence of radiation. The Tiwari and Das model had been considered in this study with Carboxymethyl cellulose solution (CMC) selected as the base of fluid and copper (Cu) as a nanoparticle. The governing boundary layer equations are reduced into ordinary differential equations by a similarity transformation. The transformed equations are solved numerically using an implicit finite- difference scheme known as the Keller-box method. The numerical solutions for the wall skin friction coefficient, the heat transfer coefficient, and the velocity and temperature profiles are examined by plotting the graphs. The effect of increasing values of the viscoelastic parameter is seen to enhance the velocity field. But the temperature is suppressed with increasing viscoelastic parameter. Thermal radiation enhances the effective thermal diffusivity and as a results the temperature increases. It is found that the skin-friction coefficient increases with the increase in nanoparticles volume fraction.

Keywords: viscoelastic, nanofluid, radiation, constant heat flux, mixed convection.

The Effects of Self-Efficacy towards Student Achievements in Algebra

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Abstract. The concept of Algebra is one of the basic skills in Mathematics that need to be accomplished among the students in order to build their mathematical problem-solving skill. Self-efficacy are needed in increasing student's motivation and achievement in academics. The purpose of this study is to identify the effect of self-efficacy on student achievement in Algebra. This study is a descriptive survey and use quantitative methods. Two types of instruments used in this study which are self-efficacy questionnaire and Algebra test. There are 206 respondents and the samples are Form Two students that selected randomly from a selected school in urban area. The findings indicated that self-efficacy for the entire student was on mid-low positive level mean= 3.00 (sd= 0.40). The average of student achievement mean= 49.05 (sd= 12.75) in Algebra test was at a low level and satisfied. Overall, the study has also shown that the students' self-efficacy in Algebra has a positive strong correlation and significant with students' achievement (r = .416, p< .01). This study suggested that educational stakeholders should implement high self-efficacy among students in order to demonstrate high ability in algebraic problems solving as well as providing a better performance at the international level.

Keywords: algebra, self-efficacy, academic achievement.

SESSION 2C

Strengthening the Security of an Encryption Algorithm Based on the Laplace Transform

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Abstract. Hiwarekar (2012) introduced a new encryption scheme whose construction is based on the Laplace transform. The encryption process starts with pre-selecting an underlying C^∞ function $f(rt)$, writing out its Maclaurin series, multiplying it with t^k, then multiplying term-wise the number codes of the letters of a plaintext with the coefficients of the first terms of the resulting series, and finally determining the Laplace transform of the subsequent finite series, with a view of utilizing the initial coefficients of the last series as the basis of the cyphertext. This paper examines the conditions that give rise to the Hiwarekar encryption scheme based on the Laplace transform, and will discuss a way of strengthening the purported source of weakness of such cryptographic process. A modification of the initial step of the encryption scheme is then offered, giving rise to two passwords for a single iteration procedure, hence increasing the security of the encryption.

Keywords: Laplace transform, Maclaurin expansion, plaintext, cyphertext, security key.

ABSTRACTS OF PARALLEL SESSIONS 3A, 3B AND 3C

7 August 2018
Tuesday
08:30 - 10:10

SESSION 3A

New Highly Accurate Iterative Method of Third Order Convergence for Finding the Multiple Roots of Nonlinear Equations

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Abstract. We present a new third order convergence iterative method for *m* multiple roots of nonlinear equation. The proposed method requires one evaluation of function and two evaluations of the first derivative of function. In numerical tests exhibit that the present method provides high accuracy numerical result as compared to other methods. The stability of the dynamical behavior of iterative method is investigated by displaying the basin of attraction. Basin of attraction displays less black points which give us wider choices of initial guess in computation.

Keywords: multi-point iterative methods, multiple roots, nonlinear equations, order of convergence and basin of attraction.

A Mathematical Modelling of an Intra-Host Dynamics of Toxoplasma *Gondii* with Intermediate and Definitive Host Indirect Interactions

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Abstract. Toxoplasma is a disease caused by parasites called Toxoplasma *gondii*. (T. *gondii*) that have three forms, i.e., tachyzoites and bradyzoites, and oocyst. The parasite uses feline species for reproduction and then sheds the oocyst to the environment. The oocyst can be ingested by the human, animals, or birds and lead the transmission of the parasites. In the human population, the parasites can also be transmitted from mother to fetus. The feline species plays role as the definitive host for the parasites while the human, animals, and birds have role as the intermediate host. In this paper, we consider a mathematical model involves the indirect transmission between the intermediate hosts and the definitive hosts with the interactions between the parasites, the normal cells, and the effector cells as parts of the host's immune system. We use bifurcation analysis to study the parameters that have important role for the system and determine some possibilities to inhibit the transmission of the parasites.

Keywords: Toxoplasma *gondii*, intermediate host, definitive host, bifurcation analysis, reproduction ratio.

SESSION 3A

An Efficient Numerical Technique for Solving Fractional Interval Differential Equations

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Abstract. In this study a fractional type of predictor-corrector method is developed for solving fractional interval differential equations. The method is employed for solving Atangana-Baleanu type fractional differential equations under interval arithmetic. An example is solved to demonstrate the accuracy of the proposed approach. The results are compared with the existing methods in the literature.

Keywords: interval arithmetic, fractional differential equations, predicator-corrector method, Atangana-Baleanu derivative.

Implementation of Extrapolation with Smoothing Technique in Solving Stiff ODEs

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Abstract. Extrapolation is a process used to accelerate the convergence of a sequence of approximations to the true value. Different stepsizes are used to obtain approximate solutions which are combined to increase the order of the approximation by eliminating leading error terms. The smoothing technique is also applied to suppress order reduction and to dampen the oscillatory component in the numerical solution when solving stiff problems. The extrapolation and smoothing technique can be applied in either active, passive or the combination of both active and passive modes. In this paper, we investigate the best strategy of implementing extrapolation and smoothing technique and use this strategy to solve stiff ordinary differential equations.

Keywords: extrapolation. smoothing, ordinary differential equation, active, passive.

SESSION 3A

Collaborative and Community Structure of UPM Co-authorship Network in Journal Publication from 2007-2010

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Abstract. Co-authorship is one of the most tangible forms of research collaboration. A coauthorship network is a social network in which the authors through participation in one or more joint publications are linked (undirectedly) to each other. The present work used social network analysis to study coauthorship network of UPM journal publications database for the first four years Research University (2007-2010) with the aid of Mathematica 11. The collaborative and community structure of the coauthorship network of publications between 2007 till 2010 was analyzed using the micro-level indicators such as degree centrality, closeness centrality, betweenness centrality and assortativity to observe changes of structure in the network over the early research university years. The study also determines the most connected authors and their influence among coauthors.

Keywords: combinatorics, graph theory, complex networks, social networks.

SESSION 3B

Optimization of Air-Conditioning and Mechanical Ventilation (ACMV) Project Using PERT with Linear Programming

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Abstract. An air-conditioning and mechanical ventilation (ACMV) construction project involved many interrelated construction activities with varying durations and multiple dependencies. Review of literature shows that there are few or none of the studies for the ACMV project scheduling and planning being conducted. Thus, this research is important as it employs an analytical framework for the effective time and cost management of the ACMV project. The data on the time and cost of activities involved were collected from an ACMV project done by a construction company based in Kota Kinabalu. The program evaluation and review technique (PERT) with linear programming (LP) are applied in this case study. A mathematical LP model was developed to determine optimal project completion duration and the total cost for the ACMV project. The analysis revealed that the shortest possible project completion time is 72 weeks, with the optimized total cost of RM 1,552,530.00.

Keywords: ACMV, PERT Network, Project Planning and Scheduling, Linear Programming, Time and Cost Optimization.

A Recovery Model for a Production-Inventory System subject to Transportation Disruption with Environmental Consideration

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Abstract. Supply chain disruptions have a negative impact in terms of all the related costs in the supply chain system. It is crucial for companies to manage their resources efficiently during disruptions to reduce losses and negative effects to the environment. This research proposes a recovery model for supply disruptions at the production stage. This research also combines the environmental effects in the recovery model by including the cost of carbon emissions from transportation during the recovery period. LINGO software is used to solve the mathematical model, of which numerical analysis was performed to determine the optimal lot sizing decisions during recovery. The results of the study indicate that the cost of the carbon footprint was closely related to the capacity and distance of the carrier. The contribution of this research is a decision support tool for supply chain disruption recovery, while incorporating environmental aspects in the decision-making process.

Keywords: supply chain, disruption, recovery, carbon emission, transportation.

SESSION 3B

Multiple Tabu Search for Multiobjective Urban Transit Scheduling Problem

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Abstract. The study of urban public transportation is essential in building an efficient transit system that can minimize the traffic congestion, reduce pollutions and increase the mobility of the community. Urban Transit Scheduling Problem (UTSP) considers the process of creating timely transit schedules that includes bus and drivers assignment based on the users' and operators' requirements. The problem is important as it can improve the overall performance of transit system, increase the ridership level and satisfaction of the users. It is also necessary to achieve a tradeoff between the interest of users and operators which lead to the multiobjective nature of UTSP to provide more choices for the decision-makers. This research studies multiobjective UTSP consisting of frequency setting, timetabling, simultaneous bus and driver scheduling by applying a Multiple Tabu Search (MTS) algorithm. The ability of MTS approach to exploit and explore the solution space effectively with adaptive memory property makes it more suitable to solve the multiobjective UTSP. In addition, a multiobjective set covering model is also used by including some real-world restrictions to find the number of buses and drivers as it can represent the problem clearly for implementation. The MTS algorithm is tested on benchmark instances from Mandl's Swiss Network and Mumford's larger data. Non-dominated solutions are produced to represent the tradeoff between the conflicting objectives of UTSP. The computational results shown that the algorithm is able to produce comparable results for most cases from the literature.

Keywords: Urban Transit Scheduling Problem, Multiple Tabu Search, multiobjective set covering model.

Dynamical Process on Growing Geometrical Network based on Modular Group

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Abstract. Many networks models have been proposed and constructed to mimic the underlying features of some complex network. Studying the dynamical process of a network gives a good platform to characterize the network in terms of transport and search mechanism. The dynamical process on the network is described by using random walks. From this process, some of the random walk transport properties are determine such as relaxation time, mean first passage time and the random walk centrality. We find that the MFPT grows linearly as the network grows. We also find that a node with a larger degree tends to attract the random walker more compared to a node with a lower degree. This study plays an important role in determining the performance of the network.

Keywords: complex networks, mean first passage time, random walk, random walk centrality.

SESSION 3B

A Location-Inventory-Routing Problem for Economic Production Quantity in Reverse Logistics

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Abstract. This study considers the forward and reverse flows of supply chain that combined the facility location with the inventory and routing decisions. The model assumed that the company produces their own products at the production plant and distributed through the depot to meet the demands at the customer points without backlogging. Green supply chain is important in a supply chain network design in reducing the effect of global warming. One of the practices in the green supply chain is the reverse logistics which control the environment and economic factors by involving the return product into the production process and network flows. Economic production quantity is often used in manufacturing to assist the company for generating the optimal production lot size that minimize total production inventory cost. We developed a mixed-integer linear programming model by integrating the strategic, tactical and operational decision making processes. The problem involved a single production plant, two depots and a set of customer points with a constant demand and a fleet of homogenous vehicle. The main objective is to minimize the total cost of forward and reverse flows by optimizing the location of depot, the production quantity and the routing of vehicle from depot to the customers. The model is validated using a LINGO solver and illustrated with a numerical example.

Keywords: facility location, production quantity, vehicle routing, reverse logistics.

SESSION 3C

The Representation of Early Exercise Boundary for Asian option under Jump-Diffusion Process

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Abstract. In this study, we derives approximation pricing formulas for American-style Asian options with arithmetic averaging when the underlying asset price evolves as a discontinuous process and the asset pays continuous proportional dividends. We establish the analytical solution of pricing the American option and its free boundary from the optimal stopping problem using probabilistic approach and conditioned expected values. We obtain the decomposition of a floating strike American-style Asian option value as the sum of its corresponding price of European option and the early exercise premium when the asset follows a jump-diffusion process and pays continuous proportional dividends. It appears that, this premium has a complex term due to the fact that the stock price can jump without crossing the exercise boundary from the exercise region to the continuation region. It is important to understand the impact of jumps on the early exercise feature and value these options accurately and efficiently. Numerical examples are presented.

Keywords: American style Asian option, early exercise boundary, option pricing, jump-diffusion.

Generalized Class of Time Fractional Black Scholes Equation with Caputo-Fabrizio Operator and Numerical Analysis

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Abstract. It is well known now, that a Time Fractional Black Scholes Equation (TFBSE) with a time derivative of real order can be obtained to describe the price of an option, when for example the change in the underlying asset is assumed to follow a fractal transmission system. Fractional derivatives were introduced in option pricing in a bid to take advantage of their memory properties to capture both major jumps over small time periods and long range dependencies in markets. This work derives a new TFBSE. A numerical scheme solution is also derived. The stability is discussed, graphical simulations are presented for a double barriers call option.

Keywords: Time Fractional Black-Sholes, numerical analysis, option pricing.

SESSION 3C

Extended Bounds of Beatty Sequence Associated With Prime

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Abstract. This paper discusses an estimation of character sums with respect to non-homogeneous Beatty sequences, $\lfloor \alpha p + \beta \rfloor$ over prime $p \leq x$ where $\beta \in \mathbb{R}$, $x \in \mathbb{N}$ and $\alpha > 0$ is irrational. In particular, the bounds found by extending several properties of character sums associated with composite moduli over prime. As a result, the bound $p^{1/4}N^{1/2} + ND_{\alpha, \beta}(N)$ is deduced.

Keywords: Beatty sequences, composite moduli, character sum, discrepancy.

Class-Wise Global-Local Preserving Partial Least Squares

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Abstract. Feature extraction techniques are methods widely used to reduce the dimensionality of a data while retaining most of the relevant information in the original data. Locality preserving partial least squares (LPPLS) is a recently developed feature extraction technique that aims at preserving the local structure information of data. However, LPPLS appears to have some shortcomings in classification tasks, this include ignoring the label information. In this paper, we propose a new feature extraction method called class-wise global-local preserving partial least squares. This new method makes use of class label information in performing feature extraction. The binary (0-1) weighting technique together with label information is used to construct the similarity matrix. The way we define the similarity matrix in this new method takes careful consideration of both the local structure information and the class label information of data points. Experimental results on various data sets demonstrate the effectiveness of the proposed method.

Keywords: feature extraction, dimensionality reduction, local structure, similarity matrix, locality preserving partial least squares.

SESSION 3C

Weak Instances upon a Generalized RSA Key Equation

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Abstract. This paper proposes three new attacks on the modulus of the form $N = p^2 q$. The first attack is based on the generalized key equation $eX - NY = (ap^2 + bq^2)Z$ with $\gcd(X,Y) = 1$ and $1 \leq |Z| < \frac{\sqrt{2}N^{1/2}}{\left|ap^2 - bq^2\right|}$. If $1 \leq Y < X < \frac{N}{2|Z|\left(ap^2 + bq^2\right)}$, then N can be factored in polynomial time. For the second and third attack, given k moduli $N_i = p_i^2 q_i$ for $k \geq 2$ and $i = 1, \ldots, k$, the attack works when there exist k relations of the form $e_i x - N_i y_i = (ap_i^2 + bq_i^2)z_i$ or of the form $e_i x_i - N_i y = (ap_i^2 + bq_i^2)z_i$ where the parameters x, x_i, y, y_i and z_i are suitably small in terms of the prime factors of the moduli. The proposed attacks utilizing the LLL algorithm enables one to factor the k moduli $N_i = p_i^2 q_i$ simultaneously.

Keywords: factorization, continued fraction, LLL algorithm, simultaneous Diophantine approximations.

ABSTRACTS OF PARALLEL SESSIONS 4A, 4B AND 4C

7 August 2018
Tuesday
11:35 - 12:55

SESSION 4A

MHD Mixed Convective Stagnation Point Flow with Heat Generation Past a Shrinking Sheet

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Abstract. This paper investigates the influence of MHD mixed convective stagnation point flow over a permeable shrinking sheet with the enhancement of heat generation/source. The model consists of nonlinear partial differential equations are converted into a system of linear equations using similarity transformations and then solved using MATLAB programme bvp4c. Numerical results are presented graphically for the distributions of velocity, temperature as well as the skin friction coefficient and the local Nusselt number. The findings revealed the dual solutions obtained within a particular range of the mixed convection parameter and shrinking parameter. It also was found that the fluid velocity increases with the increasing values of the magnetic parameter and mixed convection parameter while opposite results obtained for the fluid temperature. A stability analysis was performed using MATLAB bvp4c and has proven the first solution is physically realizable and stable whereas the second solution is unstable.

Keywords: mixed convection, stagnation point flow, shrinking sheet, dual solutions, stability analysis.

MHD Boundary Layer Flow of Carreau Fluid over a Shrinking Sheet with Convective Boundary Condition

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Abstract. This paper studies on two-dimensional magnetohdrodynamics (MHD) boundary layer flow of Carreau fluid towards a shrinking sheet with convective boundary condition and non-linear thermal radiation. Appropriate similarity transformations are introduced to convert the governing equations into non-linear ordinary differential equations and then solved numerically along the boundary conditions using shooting method in Maple. Results for various parameters involved in the flow equation are shown in table and graphs. Dual solutions are obtained at certain values of parameters and the higher the value of suction and magnetic parameter, the higher the heat transfer rate.

Keywords: MHD, Carreau fluid, shrinking sheet, suction, thermal radiation.

SESSION 4A

MHD Boundary Layer Flow and Heat Transfer over Shrinking Sheet with Suction and Stability Analysis

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Abstract. This case study seeks to examine the fluid flow over shrinking sheet towards suction. This works also investigate the heat transfer in the present of heat generation. The basic governing partial differential equations are reduced to a set of ordinary differential equations by using appropriate similarity transformation. We used Matlab software to obtain the numerical results. We notice the dual similarity solutions are available in certain range of shrinking sheet parameter. Thus, this results make us continue further in perform the stability analysis by using bvp4c solver in Matlab software. As expected, our study proved that the solution is stable only the first one and the second solution is not.

Keywords: MHD boundary layer flow, shrinking sheet, suction, dual solutions, stability analysis.

Stagnation Point Flow Over a Stretching/Shrinking Sheet in Nanofluids: A Stability Analysis

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Abstract. The steady stagnation-point flow of nanofluid over a stretching or shrinking sheet in its own plane is investigated. The governing nonlinear partial differential equations are transformed into nonlinear ordinary differential equations via similarity transformations before they are solved numerically using the bvp4c method. Three different types of nanoparticles (Cu, AL_2O_3, TiO_2) in the water-based fluid are analyzed in this paper. Effects of the solid volume fraction ϕ on the fluid flow and heat transfer are evaluated. There exist dual solutions for a certain range of velocity ratio parameter ε. Therefore, a stability analysis is performed to determine which solution is linearly stable and physically realizable.

Keywords: boundary layer, dual solutions, stagnation-point flow, nanoparticles, stability analysis.

SESSION 4B

Rank Regression for Modeling Stretching Exercise Training Data in the Presence of Interval Censored Observations

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Abstract. Parameter estimating procedure for the accelerated failure time model is problematic and complicated in the presence of interval censored data. The existing computational methods involve nonparametric estimation of the density function of the error terms for estimating the model parameters and evaluating the covariance matrices of rank estimators. Moreover, such inference procedure includes estimating functions that may have multiple roots. This paper proposes a two-step iterative algorithm for estimating the parameters of the accelerated failure time model in the presence of interval censored data on the basis of a class of asymptotically normally distributed rank estimators. The proposed methodology was applied on an stretching exercise training data set that were obtained from a musculoskeletal discomforts study that was conducted between August 2015 and April 2016 in Malaysia. The data set included range of motion of right hip and left hip of 142 participants, as well as their body mass index. The results of the numerical analysis indicate that participants with higher age and body mass index tend to require greater time to achieve a range of motion greater than 80 degrees. Application to real data sets illustrates that the proposed estimating procedure is reliable and efficient for analyzing medical science data that are collected at specific scheduled examination times while the actual survival times are unknown.

Keywords: rank regression, accelerated failure time model, interval censored data, weighted log-rank statistic, stretching exercise training.

Adjusted Compound Smoother Using Adaptive Mean in Recovering Signal from Noise

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Abstract. Compound smoother is a non-linear smoothing technique that has the ability to remove heavy noise from signal and at the same time resistant to sudden changes and impulse in the data series. In this study, the compound smoother of 4253HT has been adjusted in the algorithm specifically on estimating the middle point of running median for even span by applying the following types of means; geometric, harmonic, quadratic and contraharmonic. Simulations were conducted by generating special functions of Doppler, Bumps, Blocks and HeaviSine with noise that produced a few outliers and high volatility added. The regression coefficients show that adaptive 4253HT perform the best in removing long tailed and heavy noise. Results from estimated integrated mean square error show that adaptive 4253HT manage to extract signals of Doppler, Block and Bumps from noise with 10% outliers effectively. Adaptive 4253HT also works best in recovery the signal of Bumps with high volatility. Practical application on daily amount of rainfall was conducted and provide information that if heavy rain started to occur, it continued for another four days on the average.

Keywords: compound smoother, adaptive 4253HT, running median, signal, noise.

SESSION 4B

Hybrid Seasonal ARIMA and Artificial Neural Network Models in Forecasting Southeast Asia City Air Pollutant Index

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Abstract. The rise of air pollution has received much attention globally. As an early warning system for air quality control and management, it is important to provide precise future concentrations pollutant information. Using time series forecasting methods, the forecast of daily Air Pollution Index (API) is presented here. The hybrid method between seasonal autoregressive integrated moving average (SARIMA) and artificial neural network (ANN) are chosen. To verify, the accuracy are measured using error magnitude approach. However, evaluation of forecasting API is also influenced by the health classification based on the threshold value assigned in air quality guidelines. Thus, forecast accuracies based on index value, namely as true predicted rate (TPR), false positive rate (FPR), false alarm rate (FAR) and successful index (SI) are also used for forecast validation. As shown in the results, the hybrid model performs better in both model's evaluations group used. Hence, the hybrid method must be considered in the forecasting area due to the capability to analyze real data consisting of both linear and nonlinear patterns. Besides, using the appropriate measurement in accordance to the purpose of forecasting is important to produce an accurate forecast.

Keywords: hybrid, artificial neural network, air pollution index (API), forecasting evaluation, SARIMA.

Bins Improvement for Construction of Histogram with Existing Outliers

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Abstract. The histogram is a classical and widely-used statistical tool, it uses rectangles with areas proportional to the frequencies to show the distribution of the data. When most data concentrated on a small part of the range, the histogram sometimes contains rectangles that are not obvious enough to read. Some modifications to the traditionally used histogram was proposed in this analysis. To further investigate the data, the concept of multi-layer histograms was also introduced, which provides extra information about the original data.

Keywords: histogram, outliers, multi-layer histograms.

SESSION 4C

Numerical Approximation of Duffing Type Differential Equations using a Three-Point Block Method

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Abstract. This research proposes a three-point block method for solving Duffing type higher order ordinary differential equations (ODEs) which is also commonly referred as the Duffing oscillator. The research conducted implements a variable order step size technique for approximating the exact solution for the Duffing Oscillator. The proposed algorithm will be tested against various Duffing oscillators and numerical approximation will be compared with current viable methods. Numerical results will show advantages of the proposed method.

Keywords: Duffing equations, block method, ODEs.

Exploring 10 Years of Crimes Cases in Malaysia: The Visualization

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Abstract. An effective visual communication of data will help stakeholders to understand the data pattern in an easier and more effective way. This paper explores ten years of crime cases in Malaysia through data visualization. Data visualization is very useful in studying crime cases where it can provide a new insight in analyzing criminal cases and a good insight for technical and statistical analysis. The main objective of this paper is to visualize and explore ten years of Malaysia crime cases in an effective way. This study will contribute towards a better decision-making in reducing crimes rate in Malaysia.

Keywords: data visualization, Malaysia, crime, risk.

SESSION 4C

Modified Baptista Type Chaotic Cryptosystem via A new Efficient Analytically Proven Lossless Data Compression for Data Transmission Technique Idea

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Abstract. In 1998, M.S. Baptista proposed a chaos-based cryptography system using the ergodicity property of the simple low-dimensional and chaotic logistic equation. Each "letter" will have a particular site in the interval [0,1]. This cryptographic system is implemented by iterating the logistic map, $x_{i+1} = bx_i(1 - x_i)$, where the control parameter $b \in \mathbb{Z}^+$ is chosen to make the logistic map have a chaotic behavior. When the iteration is an element from a site of a specific alphabet, the number of iterations passed, n, where $n \geq 1$ will be taken. However, over the years research has shown that this cryptosystem is predictable and vulnerable to attacks and is widely discussed. Among the weaknesses are the non-uniform distribution of ciphertexts and succumbing to the one-time pad attack (a type of chosen plaintext attack). The objective of this paper is to modify the Baptista's chaotic scheme proposed previously. New efficient analytically proven lossless data compression for data transmission technique idea was employed such that the cryptosystem would no longer succumb to the one-time pad attack.

Keywords: chaotic logistic equation, chaotic cryptosystems, compression technique, ergodicity, one-time pad.

Simulating Gold Prices Using Geometric Brownian Motion

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Abstract. This study uses the dynamics of geometric Brownian motion (GBM) to simulate paths for gold prices, and tests whether the simulated gold prices align with actual gold prices. The sample for this study was based on Malaysian gold market. Daily gold price data was obtained from the Kuala Lumpur Stock Exchange (KLSE) database over the period of one month. Results show that within the period, the gold prices simulated using GBM moves in the same direction as actual gold prices.

Keywords: geometric Brownian motion, gold price, simulation, mean absolute percentage error.

ABSTRACTS OF PARALLEL SESSIONS 5A, 5B AND 5C

7 August 2018
Tuesday
15:15 - 17:35

SESSION 5A

A Stability Analysis of Solutions on Boundary Layer Flow Past a Moving Thin Needle in Nanofluid with Slip Effect

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Abstract. The aim of this paper is to study the effects of partial slip on the boundary layer flow and heat transfer past a moving horizontal thin needle in nanofluid. Three types of nanoparticles, namely, alumina, copper and titania are considered. The self-similar ordinary differential equations are obtained by adopting the similarity transformations and these equations are then solved numerically using bvp4c function in Matlab software. Special emphasis has been given to the parameters of interest which include the velocity ratio, nanoparticle volume fraction, slip and needle size. The effect of these parameters on the velocity and temperature profiles, skin friction coefficient and heat transfer rate are further discussed through graphs. The determination of the stability of the solutions obtain is done using a stability analysis. This analysis has shown that the upper branch solution is linearly stable and this means that there is no disturbance occur in the system. Meanwhile, for the lower branch solution, the result is invertible.

Keywords: stability analysis, dual solutions, slip, thin needle, nanofluid.

Onset of Convection in a Dielectric Nanofluid Saturated Anisotropic Porous Medium

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Abstract. The onset of thermal convection in a horizontal layer of a dielectric nanofluid saturated by anisotropic porous medium with vertical AC electric field has been studied. We considered Darcy model for porous medium while for nanofluid model used, it incorporates the effects of thermophoresis, electrophoresis and Brownian motion. A linear stability analysis based upon normal mode has been performed and the expression of thermal Rayleigh number is obtained using the Galerkin method. The results show that the effect of increasing AC electric Rayleigh number, Re and mechanical anisotropy parameter, ξ is to destabilize the system of nanofluid layer while the thermal anisotropy parameter, η has stabilizing effect on the onset of electroconvection.

Keywords: AC electric field, anisotropic, nanofluid, porous medium, Galerkin method.

SESSION 5A

Stagnation Point Flow with Chemical Reaction Past a Stretching Vertical Surface in a Copper-Water Nanofluid

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Abstract. The study deals with mixed convection boundary layer stagnation point flow with chemical reaction past a vertical stretching surface in a Copper-water nanofluid. By similarity transformation, the governing partial differential equations are transformed into ordinary differential equations. Then, the transformed equations were solved numerically using solver bvp4c in Matlab. The effects of the nanoparticle volume fraction φ, mixed convection parameter σ and chemical reaction parameter β on the skin friction coefficient, heat and mass transfer as well as velocity, temperature and concentration profiles are discussed. The study reveals that, the velocity, temperature and concentration profiles give the dual solutions for certain values of nanoparticle volume fraction φ, mixed convection parameter σ and chemical reaction parameter β.

Keywords: mixed convection, stagnation point flow, chemical reaction, stretching, nanofluid.

Effect of Nonlinear Temperature Profile and Magnetic Field on Thermal Convection in a Binary Fluid Saturated an Anisotropic Porous Medium

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Abstract. A linear stability analysis is applied to study the stationary thermal convection in a horizontal system consist of binary fluid saturated an anisotropic porous medium in the presence of nonlinear temperature profile and vertical magnetic field. The problem is solved numerically using the method of Galerkin with respect to rigid-rigid isothermal boundary condition. The effect of magnetic field, mechanical and thermal anisotropic parameter, solute Rayleigh number and Lewis number on the onset of convection in the system with the presence of six nonlinear temperature profile are shown graphically. We found that the system can be stabilize by the effect of magnetic field, thermal anisotropic parameter, solute Rayleigh number and Lewis number and destabilize by mechanical anisotropic parameter.

Keywords: anisotropic, binary fluid, Galerkin technique, magnetic field, nonlinear temperature profile.

SESSION 5A

Suction Effect on Stagnation Point Flow and Heat Transfer over an Exponentially Shrinking Sheet in a Porous Medium

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Abstract. An investigation has been conducted to study the steady stagnation point flow and heat transfer in a porous medium caused by an exponentially stretching/shrinking sheet. Using a similarity transformations, the governing system of partial differential equations are transformed into a system of ordinary differential equations. The system is then solved numerically using a shooting method in Maple software. The effect of the governing parameters on the skin friction coefficients and the local Nusselt numbers as well as the velocity and temperature profiles are analyzed and discussed. Results obtain in this study are illustrated graphically. The range of parameter c where the similarity solution exists for the steady stagnation point flow over an exponentially shrinking sheet in porous medium is larger than linear shrinking case.

Keywords: porous medium, exponentially shrinking sheet, stagnation point flow, suction/injection.

Numerical Solution for Circular Arc Cracks in Half Plane Elasticity

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Abstract. The numerical solution of an elastic half plane with circular arc cracks subjected to uniaxial tension $\sigma_x^\infty = p$ is presented. The free traction on the boundary of the half plane is assumed. Based on the modified complex potential and superposition method, the problem is formulated into singular integral equations with the distribution dislocation function as unknown. The final solution is obtained with help the curve coordinate method and the appropriate quadrature formula. The numerical examples exhibit the behavior of the stress intensity factor at the cracks tips for various positions. Our numerical results are in agreement with the existence results.

Keywords: stress intensity factor, singular integral equation, complex variable method, circular arc crack, half plane elasticity, numerical solution.

SESSION 5A

SESSION 5B

Evaluating Histogram Binning Methods

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Abstract. Histogram is a key tool used in Exploratory Data Analysis and is one of the oldest tools in graphical displays in understanding the distribution of a raw data. The histogram is helpful in summarizing continuous data or at times discrete data by grouping the observations into bins. The shape of the histogram would be decided by the number of bins or the bin width. Several methods are available in deciding the number of bins. The selection methods considered in this paper are the Sturge's rule, Scott's rule or the Doanne's rule and Freedman and Diaconis. The result from each rule varies and none is convincing. This study aims to use this mean and variance of raw data as guide to evaluate the binning methods that suitable for normal and skewed data. The result of these studies used to select the appropriate rule for binning histogram for given set of data.

Keywords: histogram, binning, exploratory data, frequency tables, statistics parameters.

The Implementation of Double Bootstrap Method in Structural Equation Modeling

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Abstract. Accuracy and reliability are fiery issues in Structural Equation Modeling (SEM). The single bootstrap method was outstanding, but double bootstrap method was overlooked. The purpose of this paper is to propose the double bootstrap raw data method in SEM (double BOOT SEM) through a Monte Carlo simulation study. Double BOOT SEM is an enhanced version of bootstrap raw data method in SEM (BOOT SEM), where we resample raw data from SEM. In detail, 1000 bootstrap samples of n persons with combination of data X, M, and Y were drawn randomly with replacement from the sample sizes (*original data set* as a population). The performance of double BOOT SEM, BOOT SEM and SEM are evaluated through point estimators and confidence intervals. Results indicate that the performance of double BOOT SEM is more efficient compared to BOOT SEM and SEM in terms of smaller point estimators values and narrowed bootstrap percentile intervals.

Keywords: structural equation modeling, double bootstrap raw data method, confidence intervals, accuracy.

SESSION 5B

Parameter Estimation for Fixed Effect Panel Data Model in the Presence of Heteroscedasticity and High Leverage Points by Robust Method

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Abstract. The fixed effect panel data regression model is estimated by Ordinary Least Squares (OLS) after demeaned transformation of the data. However, the existence of unknown heteroscedasticity structure and anomalous observations called High Leverage Points (HLPs) in the data causes inconsistency and bias variance-covariance matrix in OLS. In this case, OLS and Robust Heteroscedasticity Consistent Covariance Matrix (RHCCM) estimator with residuals from Weighted Least Square (WLS) are used. Nonetheless, weighting method based on HLPs detection measure is needed to efficiently down weight the HLPs. Three different weighting methods (RMD, DRGP and FMGt) in WLS based on HLPs detection measure were proposed. Moreover, MM-Centering was employed instead of Mean-Centering for the data transformation in order to reduce the effect of HLPs. The real data and simulation result indicates that the proposed method based on FMGt is more efficient and was found to be the best method.

Keywords: fixed effects, heteroscedasticity, high leverage point, Ordinary least squares, weighted least squares.

Estimating The Proportion of Non-Fatality Unreported Accidents in Malaysia

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Abstract. Unreported accidents have been the main concern nowadays in Malaysia as the vital information on the details of the accident will not be available. Accident reporting needs improvement so that there is an enhanced organizational culture of safety. The aims of this study were to gain insight into the accident reporting system and estimating the proportion of non-fatality unreported accidents in Malaysia. The data were divided according to the level of severity which are serious and slight injury for survey data and police data in the year 2013-2015. Beta distribution and empirical were fitted to survey data to estimate the proportion of unreported accidents in Malaysia. Results shown that for the proportion of unreported accidents, the best fitted distribution is Beta distribution with proportion estimation for serious injury is 0.20 and slight injury is 0.58.

Keywords: proportion, non-fatality, unreported accidents, distribution, severity.

SESSION 5B

Effects of using RStudio on Statistics Performance of Malaysian Undergraduates

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Abstract. This paper aims to study the effectiveness of using RStudio (an open source statistical package) in learning statistics among undergraduate students in Malaysia. A pre-post test quasi-experimental with control group design was employed. This study was conducted on 50 first year students from various fields of study taking the *Statistics for Applied Sciences* subject for selected topics from the syllabus. The students were equally assigned to the experimental and control groups respectively. Descriptive analysis showed that students performed better when using RStudio as compared to control group with higher means in post-test (M = 67.3; SD = 20.6) and post-delay-test scores (M = 76.5, SD = 14.0). Analysis of Covariance (ANCOVA) was employed with the pre-test scores as covariate, group as the independent variable while post-test and post-delay-test scores as the dependent variables. ANCOVA indicated that there is a significant difference in the post-test scores between the groups [F(1,47) = 51.8, p = 0.001] as well as in the post-delay-test scores between the groups [F(1,47) = 19.8, p = 0.001] where students who has been exposed to and using R-Studio achieved significantly better performance in pre-test and post-test. These findings imply that integration of a statistical package is effective in enhancing the learning process of statistics. In essence, statistical packages like RStudio would ease the learning process and help students to achieve better results in statistics.

Keywords: effectiveness, RStudio, open source package, pre-test, post-test, post-delay-test, analysis of covariance.

Elicitation of Bayesian Belief Network (EBBN) using Z-Number Approach

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Abstract: Bayesian Network (BN) is established in a wide variety of applications to provide cause-effect relationships of variables in a compact manner. It makes use of expert domain knowledge when actual data is not available. One of the available methods in reducing the expert burden in elicitation task of BN is an Elicitation of Bayesian Belief Network (EBBN). It requires only a limited amount of elicited probabilities from the expert to derive the conditional probability values of the target variables. While the probabilities are stated in a crisp way, the expert opinion is usually expressed in a linguistic terms to illustrate the judgment. This study proposes a new elicitation procedure by incorporating EBBN elicitation method with a Z-Number approach, a 2-tuple fuzzy numbers to represent the linguistic terms. Besides the human subjective judgment, the Z-Number has advantages of including the confidence of the evaluation, thus providing a more reliable final outcome. A case study example of elicitation on a well-known medical diagnostic network is presented to illustrate how the method works in practice.

Keywords: Bayesian Network, EBBN, expert elicitation, Z-Number, linguistic terms.

SESSION 5B

SESSION 5C

Identity Based Signature Scheme Using Dihedral Group of Order 2*pq*

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Abstract. The concept of identity based cryptography was initially introduced by Adi Shamir. An identity based cryptosystem allowed a publicly known identifier to be used as the public or private keys component in the system. There exists a trusted authority whose task is to compute and provide user's private signing key upon received user's identity. As a result, identity based cryptography significantly reduces the system complexity and the cost for establishing and managing the public key authentication framework known as public key infrastructure. The concept of identity based scheme removed the need for a requester or sender to be required look up the recipient's public key before sending out an encrypted message. In this paper, we proposed a new hardness problem known as the exhaustion set problem which relies on the hardness of computing the exhaustion set in dihedral group D_{2pq} of order $2pq$, where p and q are distinct large odd primes. We show that the exhaustion set problem is computationally equivalent to the well-known subset sum problem originated from the Knapsack problem. Furthermore, we construct a new family of hash function from the Cayley graph of the maximal cyclic subgroup $<r>$ of D_{2pq} and hence construct a new identity based signature scheme over D_{2pq}.

Keywords: signature scheme, identity based, dihedral group, exhaustion set, Cayley graph.

Parameterization of Nice and *Q*-nice Polynomials with Five Roots

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Abstract. A univariable polynomial $p(x)$ is said to be nice if all of its coefficients as well as all of the roots of both $p(x)$ and its derivative $p'(x)$ are integers. $p(x)$ is called Q-nice polynomial if the coefficients, roots and critical points are rational numbers. This paper concentrates on the problem of finding, constructing and classifying parameterized family of nice and Q-nice polynomials with five roots.

Keywords: critical points, nice polynomial, Q-nice polynomial, roots.

SESSION 5C

Elliptic Net Scalar Multiplication for Koblitz Curve

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Abstract. In recent times, pairing via elliptic net has attracted attention since no inversion is required in the method. Elliptic net theory was first introduced using division polynomials on the Weistrass equation. The present study is intended to propose scalar multiplication via elliptic net upon Koblitz curve. The objectives are to investigate the relationship between division polynomials, elliptic divisibility sequences and Koblitz curve. The study also proposed to examine new relationship in the elliptic net and its scalar multiplication. Interestingly, the proposed net can be extended to other cryptographic curves such as twisted Edward curve or hyper elliptic curve.

Keywords: polynomial, curve, divisible, point, sequence.

Properties and Numerical Computations of θ-Convergent related to Regular Continued Fraction (RCF)-Convergent

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Abstract. In this paper, we consideran expansion of real numbers $x \in (0, \theta)$ with $0 < \theta < 1$. Our concern is to provide the numerical computations of θ-expansions and Regular Continued Fraction (RCF) expansions for big sample of irrational number, x. Maple software is used to compute the value of θ-convergent more effectively and efficiently. Or otherwise, we can just apply the method of continued fraction algorithm intertwined with Euclidean algorithm to compute the convergent of a small sample. We defined the nth convergent for θ-expansions of a number $x \in (0, \theta)$ as $p_n/q_n = [a_0\theta, a_1\theta, ..., a_n\theta]$ with $0 < \theta < 1$ whereas from the previous study, the RCF-convergent was defined as $p_n/q_n = [a_0\theta, a_1\theta, ..., a_n\theta]$ with $\theta = 1$. Hence, from the programming results, we tend to compare the design and pattern of θ-convergent with RCF-convergent. In addition, throughout the numerical results, we have perceived the behaviors of θ-convergent. Most of the behaviors of θ-convergent were different with those properties of RCF-convergent since the value of θ gave a big impact to θ-expansions. By the end of this paper, we revealed several properties of θ-expansions related to RCF expansions.

Keywords: θ-expansions, θ-convergent, Euclidean algorithm, numerical computations, RCF-convergent.

SESSION 5C

Results on Exhaustion Sets in Abelian Group

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Abstract. Sumset was initially introduced by Cauchy almost two hundred years ago. His result was subsequently discussed by Davenport and the theorem was later known as Cauchy-Davenport's theorem. In this paper, we study a different form of combinatorial objects, which is analogue to sumset. Here, we are interested in studying product of sets in abelian group. More formally, for a nonempty subset S of a finite abelian group G, we say that S is exhaustive if there exists a positive integer n such that $S^n = G + X$ for some $X \in \mathbb{Z}[G]$. The number $e(S) = min\{t \mid S^t = G + X\}$ is called the exhaustion number of the set S. Our contribution is to improve earlier results on exhaustion sets in abelian group by presenting a systematical group ring approach together with group characters. Thus, a new lower bound for exhaustion number is constructed to determine the existence of an exhaustion set in abelian group H containing a cyclic Sylow q-subgroup and when q is self-conjugate modulo $exp(H)$. Furthermore, we show that the problem of finding exhaustion sets is NP-hard which can be served as a new hardness problem in constructing some cryptographic primitives.

Keywords: exhaustion sets, abelian group, NP-hard, self-conjugate, group ring.

A New Modified Conjugate Gradient Method under the Strong Wolfe Line Search

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Abstract. Conjugate gradient (CG) methods is widely develop and well known for their efficiency to solve unconstrained optimization problems due to its convergence properties and low computation cost. In this paper, a modification of CG method will be proposed to improve classical CG methods. A new beta CG method is presented which combines the advantages of the previous existing CG methods. The proposed method ensures that the sufficient descent condition holds and globally convergent with Strong Wolfe-Powell Line Search. Numerical results show that the method is efficient to solve the unconstrained optimization and performed well compared to classical and existing CG methods.

Keywords: unconstrained optimization, conjugate gradient, Strong Wolfe-Powell line search.

SESSION 5C

ABSTRACTS OF PARALLEL SESSIONS 6A, 6B AND 6C

8 August 2018
Wednesday
08:30 - 09:50

SESSION 6A

Marangoni Convection in a Double Diffusive Binary Fluid with Temperature Dependent Viscosity, Coriolis Force and Internal Heat Generation

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Abstract. Temperature dependent viscosity, Coriolis force and internal heat generation were applied to the steady Marangoni convection where the lower boundary of a horizontal layer of the binary fluid is heated from below and cooled from above. The purpose of this paper is to study in detail the onset of convection with these effects. The bottom boundary was set to be insulating or conducting to temperature. A detailed numerical calculation of the marginal stability curves was performed by using the Galerkin method and it is showed that temperature dependent viscosity, internal heat generation and Soret number destabilize the binary fluid layer system while Taylor number and Dufour number act oppositely to the system. Keywords: binary fluid, double diffusive, variable viscosity, coriolis force, heat generation.

Keywords: binary fluid, double diffusive, variable viscosity, coriolis force, heat generation.

Ricci-Pseudo-Symmetric generalized S-space-forms

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Abstract. The purpose of the present paper is to investigate the pseudo-symmetry and the Ricci pseudo-symmetry of generalized S-space-form with two structure vectors fields. We know that the Sasakian space form and the S-space form are particular classes of the class of generalized S-spaces form. Previous work has proved that every Sasakian-space-form is pseudo-symmetric. We extend this work and prove that the generalized S-space form M^{2n+s} under some conditions can be Ricci pseudo symmetric.

Keywords: generalized Sasakian space form, generalized S-space-form, pseudo-symmetry, Ricci-pseudo-symmetry.

SESSION 6A

Symmetric Group and Its Commuting Graph for Elements of Order Three

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Abstract. Suppose G is any finite group and $X \subseteq G$, a subset of G. Commuting graph denoted by $C(G, X)$, is defined as a graph where X is its vertex set, and two group elements $x, y \in X$, $x \neq y$, are linked by an edge if $xy = yx$. For this talk, we will focus on the construction of commuting graph where X is the conjugacy class of elements of order three in $G = \text{Sym}(n)$, the symmetric group of degree $n = 3r$, with r being the number of 3-cycles. For this particular case, we are able to give a bound on the diameter of $C(G, X)$.

Keywords: commuting graph, symmetric group.

SESSION 6B

The Performance of Robust Estimation In Response Surface Design With Heteroscedastic Conditions

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Abstract. The dual response surface optimization approach is commonly used in an industrial process to minimize the process variability of sample mean and sample standard deviation. The shortcoming of this approach is that the usual assumptions of experimental data are approximately normal and there is no major contamination due to outliers in the data. In real practice, these two assumptions are difficult to meet. The problems get more complicated when outliers and heteroscedastic errors come together. The iterative reweighted least squares approach (RLS) method is put forward to rectify this problem. Nevertheless the RLS is easily affected by outliers since the RLS is constructed based on the Ordinary Least Squares (OLS) estimate which is not resistant to outliers. As an alternative, we propose the Two-stage robust estimator based on MM-estimator (TSR-MM based) which can handle both the outliers and heteroscedasticity problem. A numerical and simulations example are presented to assess the performance of the TSR-MM based method. The results signify that the TSR-MM based method offers a substantial improvement over the existing methods for handling the problems of outliers and heteroscedastic errors in response surface model.

Keywords: heteroscedastic errors, optimization, dual response surface model, reweighted least squares, robust MM-estimator.

Comparing O'Brien test on mean, median, symmetric and asymmetric trimmed mean using usual variances

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Abstract. The assumption of homogeneity of variances can be tested with O'Brien technique since it is compatible with standard analysis of variance (ANOVA). The test is very sensitive to non-normality which lead to the modification of technique by replacing the original test with trimmed mean. This study will compare the behavior of O'Brien test on robustness by using usual variances on mean, median, symmetric trimmed mean and asymmetric trimmed mean under normal distributions. The results show that O'Brien test is robust when data is normal under simulation study condition on sample sizes.

Keywords: ANOVA, O'Brien, trimmed mean, symmetric, asymmetric.

SESSION 6B

Comparison on O'Brien Procedure Using Welch F Test

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Abstract. One of the assumptions of ANOVA is homogeneity of variance. O'Brien test is one of the techniques used to test this assumption. This study has conducted a simulation and an evaluation of the performance of O'Brien procedure in terms of robustness and power under various study conditions (sample sizes, degree of variance heterogeneity, types of population distributions and percentages of total trimming). After that, the performance of O'Brien procedure will be tested using Welch F test. The result for the performance of O'Brien procedure in terms of robustness for all distributions showed liberal. On the other hand, Welch F test is power under skewed-heavy tail distribution.

Keywords: ANOVA, homogeneity, O'Brien test, Type I error, Welch test.

Weather Generator Application with Mixed Exponential Distribution Representing Rainfall Intensity

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Abstract. Weather generators (WGs) or stochastic *weather generators* are statistical models that generate numerous possible weather variables, where those variables are generally conditioned on the occurrence of precipitation. This study used the Advanced Weather Generator (AWE-GEN) model incorporated with Mixed Exponential distribution to represent rainfall intensity. The main aim of this study was to test the capability of the weather generator in assessing rainfall distribution in Johor. Hourly rainfall data were collected from two rainfall stations to represent the state, and the AWE-GEN was chosen to model the hourly rainfall time series. Mixed Exponential distribution was incorporated in the AWE-GEN to model the distribution of the hourly rainfall intensity. The AWE-GEN model was capable of replicating the monthly rainfall series in Johor, and it was able to capture the main characteristics of rainfall distribution in the state very well. Generally, the seasonal wind has a significant influence on the mean rainfall amount received by each station.

Keywords: stochastic model, rainfall intensity, probability distribution, weather generator, goodness-of-fit.

SESSION 6C

Generalized Interval-Valued Intuitionistic Hesitant Fuzzy Soft Set

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Abstract. This paper aims to extend the interval-valued intuitionistic hesitant fuzzy set to a generalized interval-valued intuitionistic hesitant fuzzy soft set (GIVIHFSS). GIVIHFSSs and some operations on GIVIHFSSs are defined and some of their properties are studied. The authors define equality of two GIVIHFSSs, subset and super set of a GIVIHFSS, complement of a GIVIHFSS, null GIVIHFSS, and absolute GIVIHFSS with examples. Soft binary operations like AND, OR and also the operations of union, intersection are defined. De Morgan's laws and a number of results are verified in GIVIHFSSs theory.

Keywords: soft set, interval-valued intuitionistic hesitant fuzzy set, generalized interval-valued intuitionistic hesitant fuzzy set.

Two and Three point Implicit Second Derivative Block Methods for Solving First Order Ordinary Differential Equations

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Abstract. A lot of research has been done on developing methods which can give more accurate as well as faster numerical results for solving first order ordinary differential equations with the aim to produce efficient numerical methods. Hence, in this research we developed implicit block methods which make used of the first and second derivatives of the problems. Numerical results clearly show that the new proposed methods performs better than well-known existing methods in solving the same test problems.

Keywords: second derivative, implicit block methods.

SESSION 6C

The Convergence of the Hard Sampling Operator with Rapidly Decreasing Wavelet Functions

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Abstract. In this work, the two-dimensional wavelet expansion of $L^p(R^2)$ function for $1 < p < \infty$ converges pointwise, almost everywhere under new kind of wavelet projection operator called hard sampling operator. The convergence is established by assuming some minimal regularity in which to define the rapidly decreasing property for two dimensional wavelet function ψ_{j_1,j_2,k_1,k_2} and by proving the bound (limit) of this wavelet function. Also, the two-dimension wavelet expansions under hard sampling operator are controlled in a magnitude by the maximal function operator. All these conditions can be utilized to achieve the convergence almost everywhere.

Keywords: almost everywhere convergence, two-dimensional wavelet expansion, hard sampling operator, rapidly decreasing, bound, maximal function.

Multi-Valued Mappings in Quasi-Partial B-Metric Spaces: A Fixed Point Theorem

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Abstract. Fixed Point theorems for Multi-valued functions in Partial metric spaces and quasi-partial b-metric spaces arise in the treatment of semantics of disjunctive programs and databases, an important area in theoretical computer science. Recently, several authors established generalizations of fixed point theorems (of point-valued functions in complete metric spaces) in the setting of partial b-metric spaces (Aydi *et al*, 2012). Similar generalizations have been made earlier for the case of partial metric spaces. Matthews (1994), who first introduced partial metric spaces, dropped the zero self-distance property in metric spaces, replacing it with the "small self-distance" (SSD) property, and a tighter version of the triangle inequality. Shukla (2014) introduced the concept of partial b-metric space as a generalization of partial metric spaces and b-metric space. Karapinar (2012) introduced the idea of a quasi-partial metric space, and proved some general fixed point theorems for functions in quasi-partial metric spaces. We will extend this to multi-valued mappings in quasi-partial b-metric spaces, and establish a fixed point theorem for such mappings satisfying a general contraction condition.

Keywords: quasi-partial b-metric space, fixed Point theorem.

ABSTRACTS OF PARALLEL SESSIONS 7A, 7B AND 7C

8 August 2018
Wednesday
10:05 - 11:25

SESSION 7A

Enhanced AA_β Cryptosystem – A Comparative Analysis

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Abstract. A major enhancement strategy of the AA_β cryptosystem is currently proposed which incorporates the Rabin-p decryption method upon its original design while maintaining the key generation and encryption procedures. Consequently, such strategy improved the decryption procedure of the AA_β cryptosystem compare to any previously proposed design. In this paper, the aim is to provide a comparative analysis of the new design of the AA_β cryptosystem with the original and the other enhancement methods in existence. The scope of this work is a comparative analysis upon the decryption procedure only. The results show that the new design for the AA_β cryptosystem is efficient and faster in term of computational complexity and running time.

Keywords: AA_β cryptosystem, Rabin-p cryptosystem, comparative analysis, internet of things, embedded system.

Origins of One Dimensional Instability in Stationary Shock and Slowly Moving Shock

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Abstract. Shock instabilities in the numerical sense include the carbuncle phenomenon and the slowly moving shocks. The carbuncle phenomenon is a term referred to the protruding formation at the stagnation region in addition to the continuous bow shock when simulating a high-speed flow over a blunt body. Most schemes formulated to cure this problem only focus on the dissipation methods without properly indulged into the real cause, which could also be the root problem for the slowly moving shock. Therefore, this paper attempted to find the source of the problem by firstly analyzing the governing equations. After using perturbation mechanism on the conservative variables in 1D Euler equations, several factors were found and one of them is caused by perturbation in density. Then, a dissipation was added to the RHS of the continuity equation to remove the perturbation. This artificial dissipation has shown stable solutions for both carbuncle and slowly moving shock problems.

Keywords: artificial dissipation, carbuncle phenomenon, shock anomaly, slowly moving shock.

<div align="center">

SESSION 7A

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Stochastic Investment Modelling: A Study of Share Dividend Yield in Malaysia

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Abstract. In this research, we study the Wilkie investment asset model for share dividend yields in case by updating the data and re-estimating the variables from January 2007 to November 2017. Basically, the Wilkie model was considered as a discrete-time horizon and we applied the concepts from the Wilkie model to develop a suitable ARIMA model by using the Box-Jenkins methodology for Malaysian data. We obtained the estimated parameters for share dividend yield sub model within the Wilkie model from FTSE Bursa Malaysia KLCI that suited the cases in Malaysia, and consequently permitted us to analyse the result based on statistics and economics.

Keywords: Wilkie model, share dividend yield, Box Jenkins model, ARIMA model.

Alternative Method to Find the Number of Points on Koblitz Curve

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Abstract. A Koblitz curve E_a is defined over field F_{2^m}. Let $\tau = \dfrac{(-1)^{1-a} + \sqrt{(-7)}}{2}$ where $a \in \{0,1\}$ denotes the F1obenius endomorphism from the set $E(F_{2^n})$ to itself. It can be used to improve the performance of computing scalar multiplication on Koblitz Curves. In this paper, another version of formula for $\tau^m = r_m + s_m\tau$ where r_m and s_m are integers is introduced. Through this approach, we discover an alternative method to find the number of points through the curve E_a.

Keywords: Koblitz curve, scalar multiplication, Frobenius endomorphism, elliptic curve cryptosystem, number of points.

SESSION 7B

Multivariate High Leverage Detection in Binary Response Model for Defect Classification

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Abstract. In pattern recognition, classifying membership given features observed is a laborious task. Analyzing multivariate datasets in the field of engineering computer, image processing and pattern recognition with multiple high leverage points may lead to a bad classifier. We introduce a novel method to detect multiple high leverage points using the concepts of a robust estimator and group deletion. The proposed algorithm is computationally fast and robust to multiple the high leverage points. Our experimental results demonstrate the improved performance of the proposed algorithm in comparison with the existing detection procedures.

Keywords: logistic regression, robust estimator, high leverage, diagnostic, multivariate data.

Robust Bootstrapping for Panel Data

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Abstract. Bootstrapping is a powerful tool for approximating the distribution of complicated statistics based on independent and identically distributed data. A natural way to bootstrap beta coefficients for fixed effect regression is by using residual-based bootstrap. However, the method heavily suffers the effects caused by high leverage points (HLPs). Random sampling with replacement in bootstrapping will introduce more outliers in the sub-samples of a contaminated data which then cause the bootstrap distribution to break down. We propose robustly weighted bootstrapping procedure that we called Boot RDF which incorporates the use of Robust Diagnostic-F to identify HLPs. Robust weights are then determined based on robust location of each data point from central data. In this way, lower weights are assigned to any outlying observation which in turn will lower down their chances of being included in the sub-samples. The performance of Boot RDF are evaluated and compared to the existing fixed-design, residual-based bootstrap via Monte Carlo simulation and numerical examples. The robust properties hugely increases the efficiency of the proposed Boot RDF; translated in the results of this study.

Keywords: bootstrap, high leverage point, panel data, robust estimator, weighting scheme.

SESSION 7B

Production of Statistically Self-Similar Attractor: A New Idea of Improved Fractal Image Cipher and Decipher

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Abstract. Fractal image compression is the best choice of selection out of all other image processing due to high compression ratio and resolution independent. In fractal image compression, two steps processes, firstly encoding step in which we produced some numerical data naming Iterated Function System- data from the binary input image. Secondly decoding steps where we constructed decoded image from IFS-data as a fractal compressed image, statistically self-similar attractor. However, the encoding time complexity and quality of decoded image of the process are still further improvable. This paper showed the improvement by introducing a concept of changing the number of pixels averaging compare to the existing system using the concept of pixels neighborhood. Finally this study proved that the improvement in both encoding and decoding time as well as quality of the decoded image by analyzing different quality features and demonstrated the improved results.

Keywords: IFS-data, pixel-averaging, pixel-neighborhood, fractal image codification, fractal ciphers.

Students Satisfaction on Online Mathematics Learning: A Literature Review

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Abstract. This study presents a systematics review of the literature to examine the research on online learning particularly on students satisfaction in learning mathematics at higher education. Completed details of selected studies published 2010 to 2018 were analyzed. Other than participants demographics, synthesis focused on describing the research designs, and underpinning theories. Our findings provide insight for a framework that captures factors contribute to the students satisfaction on online learning mode in learning mathematics.

Keywords: online learning satisfactions, learning mathematics, higher education.

SESSION 7C

Perceptions of Learning Mathematics among Lower Secondary Students in Malaysia: Study on Students' Engagement using Fuzzy Conjoint Analysis

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Abstract. As Malaysia strives to embrace the Data Science revolution, the need to produce competent future generations, especially in mathematics grows accordingly. However, there is a decline in the interest to learn mathematics among the younger generations. Students' interest to learn mathematics can be derived from their perceptions. Accordingly, this paper evaluated the perceptions of learning mathematics among lower secondary students in Malaysia. A survey was conducted on 562 students and evaluated using Fuzzy Conjoint Analysis. Highest similarity degree was scored on linguistic level agree, in which students responded they would learn what the teacher teaches. Lowest similarity was scored on neutral level, responded for being unsure in their active participation during discussions on new topics. Overall, students' perceptions were positive. Nevertheless, negative perceptions do exist and needs great attention. Measures such as integrating technology into the existing instruction method may help to evade negative perceptions and promote their interest.

Keywords: perceptions, interest, mathematics learning, engagement, fuzzy conjoint analysis.

What makes Reading Mobile e-book is Difficult for University Mathematics Students

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Abstract. This study determined the issues related to mathematics mobile e-book reading and how these issues affected the learning process of the participants. The study used qualitative case study design. Eight postgraduate Mathematics students from Abstract Algebra research group from a local university in Malaysia were interviewed and observed. The data were analysed in terms of content analysis and descriptive analysis. The result showed that, utilitarian, affective and cognitive reasons affected the learning activities of the participants negatively. This study contributed in terms of expanding readers understanding on the reasons that demotivates the usage of mobile e-books and how it's dampen the learning process of the participants.

Keywords: Mathematics, challenges, utilitarian, cognitive, affective.

SESSION 7C

School Improvement Specialist Coach Plus (SISC+) Program: Impact on Teachers' Pedagogical Skills and Students' Performance in Mathematics Classroom

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Abstract. The purpose of this study was to identify the impact of teacher coaching initiatives under the District Transformation Programme (DTP) on teachers' pedagogical aspects level and students' performance. The data of this study was collected via mixed methods. 79 mathematics teachers from 14 secondary schools in Kuala Selangor district in 2014-2017 participated in this study. The data was analysed in term of descriptive analysis and content analysis. The findings indicated that the teacher coaching initiatives had contributed to the positive changes of the pedagogical aspects of the teachers. This consequently improved the students' performance. The study suggests that the teachers' active engagement in the professional learning community need to be improved.

Keywords: SISC+, coaching, pedagogical skills, student performance.

Implementation Integral Calculus Textbook that Supported with GeoGebra to Enhancing Students' Mathematical Representation

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Abstract. The main purpose of this research is to analyze comprehensively the achievement of students' mathematical representation as the result of implementation of Integral Calculus Textbook that supported with GeoGebra. This research used mixed method under sequential explanatory design. The population of this research consisted of all students in Mathematics Study Program of one of universities in Central Java, Indonesia. The sample was groups of students who enrolled in Integral Calculus course, and two sample groups were selected randomly. From this research, it can be concluded that: (1) The achievement of the students' mathematical representation ability who were taught by using Integral Calculus Textbook that supported with GeoGebra are better than the achievement of those who were taught by using other textbook (Calculus 2 without GeoGebra); (2) There is no interaction between types of textbook and mathematical prior knowledge toward the achievement of the students' mathematical representation ability.

Keywords: Calculus, GeoGebra, mathematical representation.

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