INSTITUTE OF MATHEMATICAL SCIENCES
UNIVERSITI MALAYA

MONTHLY RESEARCH SEMINAR SERIES (1/2022)

Title: Logical Permutation in Logic Mining: Game Changer in Knowledge Extraction

Speaker: Dr. Mohd Shareduwan Mohd Kasihmuddin
(School of Mathematical Sciences, Universiti Sains Malaysia)

Date: 14/01/2022 (Friday)

Time: 3.00 pm – 4.00 pm

Platform: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/nwy-kaqq-tum
Or dial: (US) +1 402-922-6581 PIN: 187 649 062#

ABSTRACT

The logical rule that has been embedded in Hopfield Neural Network (HNN) has long suffered from a lack of interpretability and accuracy. This has severely limited the practical usability of logic mining because dynamical behaviours of logic mining in real datasets are strongly dependent on its logical structure. Logical permutation consists of a finite arrangement of attributes that makes logical rule became true. By utilizing the effect of permutation, the output obtained by logic mining can be improved. In this talk, the effect of logical permutation in logic mining integrated with recurrent Hopfield Neural Network will be discussed in detail. Several benchmark datasets will be used to validate the effect of logical permutation. Based on the experimental result, different permutations of the induced logic will significantly improve the performance metric. This finding will lead to a better understanding of logic mining in doing real-life datasets.

All are Welcome

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MONTHLY RESEARCH SEMINAR SERIES (2/2022)

Title: Optimal Performance Evaluation Metrics in Discrete Artificial Neural Network Analysis

Speaker: Dr. Mohd Asyraf Mansor
(Mathematics Section, School of Distance Education, Universiti Sains Malaysia)

Date: 28/01/2022 (Friday)

Time: 3.00 pm – 4.00 pm

Platform: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/nyb-npof-bwb
Or dial: (US) +1 574-316-0045 PIN: 133 544 841#

ABSTRACT

The performance metrics are essential in assessing the computational performance and the quality of the solutions of any artificial neural network or machine learning pipeline. The performance measures and the quality assessment of the final neuron states for Satisfiability logic programming in any variant of Discrete Artificial Neural Network are significantly dependent on the optimal selection of the performance evaluation metrics. The current performance measures were mostly leveraging the computational time, absolute error, mean squared error, loss function, and goodness of fit measures. Therefore, to assess the learning capability of a neural network model, the optimal performance metrics are adopted in measuring the quality of the final states of the neuron and the possible interpretations obtained by the network when dealing with the different number of clauses of Satisfiability logic. The core impetus of this study is to investigate the effects of various performance evaluations metrics towards the performance analysis based on the learning error, similarity analysis, and energy analysis. Overall, the simulation results have revealed the significant impact of various performances. This finding will assist the neural network practitioners in evaluating the capability of their approach or model in more holistic perspectives.

All are Welcome

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SIRI SEMINAR PENYELIDIKAN BULANAN (3/2022)

Tajuk: Pengalaman Dalam Dunia Penyelidikan dan Penerbitan

Penceramah: Prof. Dr. Mohd Salmi Md. Noorani.
(Jabatan Sains Matematik, Universiti Kebangsaan Malaysia)

Tarikh: 18/02/2022 (Jumaat)

Masa: 10.00 am – 11.00 am

Platform: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/toc-pkqt-waj
Or dial: (US) +1 518-348-9846 PIN: 260 177 869#

ABSTRAK

Dalam pembentangan ini, saya akan berkongsi pengalaman lebih daripada 35 tahun dalam dunia academia khususnya dalam aspek penyelidikan dan penerbitan. Berteraskan bidang kepakaran dalam sains matematik, saya akan menceritakan tentang selok belok penyelidikan dari perspektif individu yang asalnya dilatih sebagai seorang ahli matematik tulen. Pengalaman menerbit kerja-kerja penyelidikan ini akan turut dikongsi berserta dengan tips dan anekdot. Tidak ketinggalan ialah perkara yang jadi buah mulut para penyelidik sekarang iaitu "penerbitan berimpak tinggi". Semoga semua ini dapat menjadi panduan dan pedoman kepada semua yang berminat terutamanya para pensyarah muda dan pelajar pascasiswazah.

Sertai Kami!

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: How to Publish in High Impact Journals.

Speaker: Assoc. Prof. Dr. Ammar I. Alsabery
(Refrigeration & Air-conditioning Technical Engineering Department,
College of Technical Engineering, The Islamic University, Najaf, Iraq)

Date: 18/03/2022 (Friday)

Time: 3.00 pm – 4.00 pm

Venue: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/ttf-ruog-udv
Or dial: (US) +1 208-614-3875 PIN: 673 205 131#

ABSTRACT

There are many paths to obtaining your research out into the world, from broad-scope open access journals to preprint outlets. You may be ready to see your work published in a journal that scores highly in citation-based metrics in some models. After all, these metrics have become a shorthand for where to focus your limited time in an age of information plenty. Nevertheless, many researchers are not aware of high-impact journals' assessment procedures. In this talk, there are some scopes you can employ to ensure that your work has the best chance of locating an appropriate home. This talk delivers five important sections to get your manuscript published in high impact journals. (1) Journal scientific ranking. (2) How to identify your research topic and the right journal. (3) Types of research articles. (4) Before submitting the research to the journal. (5) H-index (Hirsch index).

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Ranking Nodes in a Complex Network.

Speaker: Prof. Dr. Kuru Ratnavelu
                 (Institute of Computer Science & Digital Innovation (ICSDI)
                 Professor, UCSI University (2020 - present)
                 Foundation Director of ICSDI (2020 - 2021)
                 Honorary Professor, Universiti Malaya (2019 - 2024))

Date: 01/04/2022 (Friday)

Time: 10.00 am – 11.00 am

Venue: Google Meet
                 Google Meet joining info
                 Video call link: https://meet.google.com/ezv-jmnf-fhq
                 Or dial: (US) +1 954-688-3131 PIN: 667 097 185#

ABSTRACT

The increasing influence of network analysis in human activities has a tremendous impact on its utility in many diverse fields. Among its key role is the ranking of nodes in a network. It played a pivotal role in various activities, such as ranking web pages to the ranking of scientists based on citation networks to cancer genes in proteomic data. In the last two decades, we have seen the increasing popularity of various of these algorithms, such as Pagerank (PR) and HITS. This talk will review some of these algorithms and the mathematics that underlies these algorithms.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Revisiting businesses vulnerability and classifying the main problems of msmes during the Covid-19 pandemic: Dashboard, data mining, and text mining.

Speaker: Rezzy Eko Caraka,M.Sc(RES).,PhD
(Associate Researcher, The National Research and Innovation Agency (BRIN);
Research Professor, Department of Statistics, Seoul National University (SNU))

Date: 22/04/2022 (Friday)

Time: 14:00 GMT+7 / 15:00 GMT+8 – 15:00 GMT+7 / 16:00 GMT+8

Venue: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/pfu-xydp-zcq
Or dial: (US) +1 636-707-2615 PIN: 956 343 933#

ABSTRACT

Design/methodology/approach: The COVID-19 pandemic has caused effects in many sectors, including businesses and enterprises. The most vulnerable businesses to COVID-19 are micro, small, and medium enterprises (MSMEs). Therefore, this research aims to analyze the business vulnerability of MSMEs in Indonesia using the NASPACLUST with various optimization, including Artificial Bee Colony, Intelligent Firefly Algorithm, Particle Swarm Optimization, and Gravitational Search Algorithm. At the same time, We conducted the knowledge management of MSME actors for business, agriculture, and industry sectors with the in-depth interview result using text mining Latent Dirichlet Allocation Mallet to obtain information on their problems.

Purpose: This research recalculates the MSME business vulnerability index in 503 districts and 34 provinces in Indonesia. Then, we conducted in-depth interviews with MSME actors in Medan, Central Java, Yogyakarta, Bali, and Manokwari West Papua and discussed how they could survive the COVID-19 pandemic and the extent of digital literacy, technology application to maximize sales and business.

Findings: The results showed that NASPACLUST with Flower Pollination Algorithm (FPA)has the best performance in optimizing the clustering result in the business vulnerability context. We found that almost all of the regions in Indonesia outside Java Island have vulnerable businesses. Meanwhile, in most of Java Island, particularly the JABODETABEK area that is the national economic backbone, businesses are not vulnerable. Based on the results of the study, we provide the recommendation to handle the gap between the number of micro and small enterprises (MSMEs) in Indonesia.

Recommendation: From the results of a deep survey of MSMEs involved in this research, which covers three sectors, namely agriculture, trade, and processing, there are 7 (58.33%) of them experiencing a decrease in income during the pandemic, 12.66% experiencing an increase in revenue, and 25 % did not experience changes in income before and during the pandemic. For the sake of sustainability, the Penta-Helix collaboration is needed to get the best solution from the COVID-19 problem for the new normal and especially for Micro, Small, Medium Enterprises' business activities.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Application of SOR iteration family for Caputo's finite difference solution of space-fractional and time-fractional diffusion equations.

Speaker: Prof. Dr. Jumat Sulaiman
(Director of Preparatory Centre for Science & Technology, Universiti Malaysia Sabah)

Date: 20/05/2022 (Friday)

Time: 3.00 pm – 4.00 pm

Venue: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/knp-ovsy-mnx
Or dial: (US) +1 413-276-7545 PIN: 712 449 949#

ABSTRACT

Fractional parabolic partial differential equations (FPPDEs) are frequently used to describe issues in engineering, economics, physics, and other fields. Even now, numerically solving these equations remains a significant issue. Consequently, several numerical techniques exist for getting their corresponding approximation equation of FPPDEs. In addition to these techniques, various families of iterative methods have also been presented and addressed in previous works, primarily in solving any system of linear equations constructed by these approximation equations. Therefore, we describe Caputo's implicit finite difference solution for the one-dimensional linear space-fractional diffusion equation (1DSFDE) and time-fractional diffusion equation (1DTFDE) based on the quarter-sweep Caputo's implicit finite difference approximation equation. To do this matter, both problems must be discretized using Caputo's space fractional derivative and Caputo's time-fractional derivative operators and second-order quarter-sweep central difference schemes to construct the corresponding approximation equation. Then we may build a linear system that has been solved iteratively using the Quarter-Sweep SOR (QSSOR) method. The numerical results of this iterative method have been compared to the numerical results of other known SOR methods such as Full-Sweep SOR (FSSOR) and Half-Sweep SOR (HSSOR). Finally, it is possible to conclude that the suggested iterative method outperforms the FSSOR and HSSOR methods.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Role of mathematics in prediction models using machine learning algorithm.
Speaker: Prof. Dr. P. Balasubramaniam.
(Professor, Department of Mathematics, The Gandhigram Rural Institute (Deemed to be University))
Date: 27/05/2022 (Friday).
Time: 10.00 am – 11.00 am.
Venue: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/rrw-fppx-bmq
Or dial: (US) +1 347-318-9384 PIN: 118 750 420#

ABSTRACT

Crop leaf diseases are one of the primary sources of obstruction in the quality and productivity of foods, leading to the shortage of food supply. Therefore, plant leaf disease classification is essential to the agriculture industry. This presentation aims to classify plant diseases by assessing the images of the leaves with the application of a Machine Learning (ML) classification algorithm with a mathematical background. This presentation proposed image features as input where the image is pre-processed via fractional TBD mask and features extraction via GLCM. The features are then fitted into the supervised learning algorithm to perform the model training and testing. The dataset used comprises plant leaves extracted from the Plant-Village dataset. Finally, the result and coding of the plant leaf disease prediction model are shown in the MATLAB platform.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Introduction of Maple 2022 in Teaching & Research Webinar.
Speaker: Mr. Kelvin Wong
(General Manager, Ultra Technology Engineering)
Date: 03/06/2022 (Friday).
Time: 3.00 pm – 4.00 pm.
Venue: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/tif-vynz-dep
Or dial: (US) +1 470-241-5191 PIN: 555 064 894#

ABSTRACT

In this talk, you'll learn about Maple's mathematical abilities and advancements. This is extremely an important session to get to know significant changes in the Maple software to help the users improve workflow and usability. Moreover, some of the new tools Maple 2022 has for teaching and research will be revealed. Further, code generation of Maple commands to other programming languages with optimization, grading solution & Step-By-Step solution will be clarified. Here are the topics which will be covered in this seminar:

- What's New in Maple 2022.

- Advanced Math Visualization.

- Plot Builder in Animation, 2D/ 3D graph, plot discontinuities, zooming and planning.

- Grading solution & Step-By-Step solution.

- Signal & image processing.

All are Welcome

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MONTHLY RESEARCH SEMINAR SERIES (10/2022)

Title: Weighted Mean Iterative Methods for Solving Fredholm Integral Equations.

Speaker: Dr. Mohana Sundaram Muthuvalu
                (Department of Fundamental & Applied Sciences, Universiti Teknologi PETRONAS)

Date: 17/06/2022 (Friday)

Time: 3.00 pm – 4.00 pm

Platform: Google Meet
                Google Meet joining info
                Video call link: https://meet.google.com/uxp-difm-jhw
                Or dial: (US) +1 415-985-8250 PIN: 667 190 936#

ABSTRACT

The theory and application of the Fredholm integral equations (FIEs) have been one of the important tools in various areas of science, mathematics and engineering. On the other hand, FIEs are encountered in numerous applications in many fields, including continuum mechanics, potential theory, geophysics, electricity and magnetism, kinetic theory of gases, steady-state heat conduction, fracture mechanics, radiative heat transfer, inverse conductivity and scattering of electromagnetic wave problems. Consequently, this talk will discuss the application and implementation one of the two-stage iterative methods, i.e., Weighted Mean (WM) and its variants in solving FIEs. The effectiveness and comparison of the WM methods by solving the test problems will be discussed.

All are Welcome

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Big Data Applications … Use Cases.
Speaker: Dr. Mohammed Al-Obaydee.
Date: 24/06/2022 (Friday).
Time: 10 am -11 am.
Venue: Google Meet
                 Google Meet joining info
                 Video call link: https://meet.google.com/yys-ykvm-jng
                 Or dial: (US) +1 307-298-0212 PIN: 565 020 733#

ABSTRACT

Big Data, Data Science, Data Analytics are among the hottest professions of the decade, and the demand for analyzing data and communicating results to inform data-driven decisions has never been greater. This presentation is for anyone interested in pursuing a career in big data, data science, data analytics, machine learning, deep learning, and developing career-relevant skills and experiences. Anyone with a passion for learning can learn and master all the needed tools and skills to be a data scientist – through this quick presentation, we will dive into the meanings of big data, data science, data scientist, data science methodology, projects and applications of data science and big data, definition and significant differences among artificial intelligence, machine learning, and deep learning, then will end by the involvement of big data in the industry revolution 4.0 & 5.0.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title   : Contagion in Networks

Speaker : Kwa Kiam Heong

Date   : 15 July 2022

Time   : 3:00pm-4.00pm

Venue   **:** Google Meet
Video call link: https://meet.google.com/gjz-kqwo-urx
Or dial: (US) +1 573-887-5214 PIN: 213 684 247#

ABSTRACT

Consider a narrative initiated by a group of players S belonging to a network. We assume that all the remaining players in the network have a constant adoption threshold q such that each of them will only accept the narrative if at least a fraction q of his own neighbors have accepted the narrative. Consequently, there is a maximum threshold q below which full contagion (i.e. acceptance of the narrative by all players in the network) can occur from S, called the contagion threshold of S. We study how the contagion threshold is influenced by the neighborhood of a player or by the global topology of the network. Firstly, we illustrate how contagion may or may not occur and how it depends on the position of the initiator. Secondly, we indicate an algorithm to compute the contagion threshold that admits a natural interpretation. Thirdly, we show when neighborhood-inclusion pre-order is preserved by the contagion threshold and how it may fail. Next, we show that the contagion threshold of a connected group in a tree is completely determined by the degrees of other players. Finally, we state a characterization for groups of players with high contagion thresholds.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title : **The Art of Problem Solving**

Speaker : **Dr Azam Pirmoradian**

Date : **19/08/2022**

Time : **10 a.m – 11 a.m**

Venue : **MM3, Second floor, Institute of Mathematical Sciences, Faculty of Science.**

ABSTRACT

This fun presentation is trying to find a logical link between optimization, statistics, and machine learning with no greedy details. I am trying to highlight the importance of understanding the problem rather than using some fancy name; therefore, I am bringing an example of a real-world situation where I have modelled recently, and through this modeling, we had a 50% better result.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title : **Sandpile Graphs and graph algebras**

Speaker : **Prof. Dr. Roozbeh Hazrat (Western Sydney University)**

Date : **15/09/2022 (Thursday)**

Time : **11.00 am -12.00pm**

Venue : **MM3, Second floor, Institute of Mathematical Sciences, Faculty of Science.**

ABSTRACT

We give a down to earth introduction to seemingly two very different topics, one about sandpile models (a model about spreading objects along networks) and the other is how to associate interesting algebras to graphs. We then relate these two topics, via the concept of monoids.

All are Welcome

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title   **:** On FRGS Applications – Some Latest Information.

Speaker : Assoc. Prof. Dr. Chooi Wai Leong

Date   **:** October 3, 2022

Time   **:** 10.00 am-11.00 am

Venue   **:** Google Meeting Platform
Google Meet joining info
Video call link: https://meet.google.com/zza-rdcx-dde
Or dial: (US) +1 650-667-3453 PIN: 581 960 401#

ABSTRACT

Based on the feedback from the Centre of Research Grant Management (PPGP), some new regulations on FRGS have been imposed by the Ministry of Higher Education (MOHE). In this sharing some latest information and personal experience about FRGS application will be given.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title : **Summary Report of Sabbatical Leave**

Speaker : **Dr Ruhaila Md Kasmani**

Date : **11 November 2022**

Time : **10.00 am**

Venue : **MM3**

ABSTRACT

A sabbatical leave is granted to the eligible faculty member for engaging in research or other activities. In my case, I have been given a sabbatical leave from 3rd January until 2nd October 2022 (9 months). One of the two objectives of my sabbatical was to co-edit and co-author the *Pre-University Mathematics* book. This book is designed for students pursuing Foundation Level, Matriculation, A-Level, and STPM and is based on the latest syllabus prescribed by the Mathematics Division of the Centre for Foundation Studies in Science, Universiti Malaya. Another objective was continuing a research project under the FRGS grant: Natural convection analysis of copper-alumina/water hybrid nanofluids in a U-shaped cavity with adiabatic wavy walls.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Tips and Tricks: Optimization with MATLAB
Speaker: Intan Nuralisa Mat Dali
Date: 25 November 2022
Time: 3.00 p.m. – 4.00 p.m.
Venue: Google Meet
              Google Meet joining info
              Video call link: https://meet.google.com/zzt-zosm-ymr
              Or dial: (US) +1 484-841-8299 PIN: 843 375 481#

ABSTRACT

In this talk, you will be exposed about
- Running an Optimization Problem in MATLAB,
- Choosing a Solver
- Evaluating Results and Improving Performance
- Building Optimization Applications, and
- Resources sharing and where to start

All are Welcome

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title : **Inducibility of graphs & other works during sabbatical**

Speaker : **Dr Tan Ta Sheng**

Date : **16 December 2022**

Time : **3.00 pm - 4.00 pm**

Venue : **MM3, Level 2, Institute of Mathematical Sciences, Faculty of Science.**

ABSTRACT

The study of the inducibility of a given graph H involves maximising the number of induced copies of H in a graph with n vertices. This is a classical problem in extremal combinatorics tracing back to the work of Pippenger and Golumbic from 1975, where they conjectured exact answers for the inducibility of cycles. In general, a lower bound on the inducibility of H can be deduced from the graphs obtained from iterated blow-ups of H. While this problem has been studied by various researchers over the last four decades, the exact inducibility of many classes of graphs is still an open problem, including the conjecture of Pippenger and Golumbic. In this talk, I will give an overview of the study of inducibility of graphs, and I will touch on the research focus within this topic that was considered during my sabbatical leave. Towards the later part of the talk, I will also briefly mention some other works that were carried out during my sabbatical leave.

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SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: **Inventory Modelling with Controllable Carbon (CO_2) Emission & Other Works During Sabbatical.**

Speaker: **Dr. Siti Suzlin Binti Supadi**

Date: **30 Dec 2022**

Time: **8.30 am – 9.30 am**

Venue: **MM3, Level 2, Institute of Mathematical Sciences, Faculty of Science.**

ABSTRACT

Today industries are looking for solutions to reduce carbon (CO_2) emissions associated with their operations. Emissions from different industries and vehicles are the prime reason and social-ecological imbalance and environmental issues. The associated emissions generated from production, transportation and storage processes are mainly determined by inventory control decisions, transportation frequency and energy efficiency. Operational adjustments, such as modifications in batch sizes or order quantities, have proven to be an effective way to decrease emissions. Therefore, the CO_2 emission in the inventory modelling is the main focus of this research which will consider the preservation technology and the transportation factor. In this presentation, I will also briefly mention some other works that were carried out during my sabbatical leave.

All are Welcome