

# CONFERENCE PROGRAM

## CMCM 2023

**2023 International Conference on Mathematics,  
Computation and Modeling**

## PDCDP 2023

**2023 International Conference on Parallel, Distributed  
Computing and Data Processing**

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# Welcome Address

Dear Participants,

We are delighted to welcome you to CMCM 2023 & PDCDP 2023 conferences. 2023 International Conference on Mathematics, Computation and Modeling (CMCM 2023) in conjunction with 2023 International Conference on Parallel, Distributed Computing and Data Processing (PDCDP 2023) which should be held in Hangzhou, China from March. 24-26, 2023. However, most of the speakers, committees and authors cannot attend the conference in-person due to the pandemic situation, and their schedule arrangement are not available. We are not able to hold our conference offline, and we have to change it online today.

Changing the format however shall not affect the desire of the conference. We wish to continue our communication to share our new research ideas, discuss challenges and form collaborations to solve various issues on Mathematics, Computation and Modeling. Also, the change of conference form will not influence the papers' publication and indexing. All accepted and registered papers will be included in the Conference Proceedings, which will be published by IOP Publishing in the Journal of Physics: Conference Series (ISSN: 1742-6596) and indexed by Ei Compendex, Scopus (Elsevier), CPCI-S (ISTP) and Inspec (IET).

After several rounds of review procedures, the program committee accepted those papers to be published in conference proceedings. We wish to express our sincere appreciation to all the individuals who have contributed to CMCM 2023 & PDCDP 2023. Special thanks are extended to our colleagues in program committee for their review of all the submissions, which is vital to the success of the conferences, and to the members in the organizing committee who had dedicated their time and efforts in planning, promoting, organizing and helping the conferences. Last but not the least, our special thanks go to our speakers: **Prof. Witold Pedrycz**, University of Alberta, Canada; **Assoc. Prof. Ata Jahangir Moshayedi**, Jiangxi University Of Science And Technology, China.; **Prof. Charles Robert Telles**, Universidade Federal do Paraná, Brazil and **Prof. HAI DINH**, Kent State University, USA, for all the kind and patient support and assistance they offered to our whole conference procedures.

In all, I would like to express my deepest gratitude to all of you sitting here, to the whole organizing committee, to all the reviewers and those who are not able to show up today, for your great support for CMCM 2023 & PDCDP 2023.

While we are not able to meet each other face to face in Hangzhou, China, we hope the conference can still establish a solid linkage among all the participant as desired. We look forward to your contribution to making CMCM 2023 & PDCDP 2023 a success.

CMCM 2023 & PDCDP 2023

## Conference Speakers

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**Prof. Witold Pedrycz**

**University of Alberta, Canada**

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**Biography:** Witold Pedrycz (IEEE Life Fellow) is Professor in the Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada.

He is also with the Systems Research Institute of the Polish Academy of Sciences, Warsaw, Poland. Dr. Pedrycz is a foreign member of the Polish Academy of Sciences and a Fellow of the Royal Society of Canada. He is a recipient of several awards including Norbert Wiener award from the IEEE Systems, Man, and Cybernetics Society, IEEE Canada Computer Engineering Medal, a Cajastur Prize for Soft Computing from the European Centre for Soft Computing, a Killam Prize, a Fuzzy Pioneer Award from the IEEE Computational Intelligence Society, and 2019 Meritorious Service Award from the IEEE Systems Man and Cybernetics Society. His main research directions involve Computational Intelligence, Granular Computing, and Machine Learning, among others. Professor Pedrycz serves as an Editor-in-Chief of Information Sciences, Editor-in-Chief of WIREs Data Mining and Knowledge Discovery (Wiley), and Co-editor-in-Chief of Int. J. of Granular Computing (Springer) and J. of Data Information and Management (Springer).

### **Speech Title: Credibility of Machine Learning Architectures: Supporting Self-Awareness Mechanisms**

**Abstract:** Over the recent years, we have been witnessing spectacular and far-reaching achievements and applications of Artificial Intelligence and Machine Learning (ML), in particular. Efficient and systematic design of their architectures is important. Equally important are comprehensive evaluation mechanisms aimed at the assessment of the quality of the obtained results. The credibility of ML models is also of concern to any application, especially the one exhibiting a high level of criticality commonly encountered in autonomous systems. With this regard, there are a number of burning questions: how to quantify the quality of a result produced by the ML model? What is its credibility? How to equip the models with some self-awareness mechanism so careful guidance for additional supportive experimental evidence could be triggered?

Proceeding with a conceptual and algorithmic pursuits, we advocate that these problems could be formalized in the settings of Granular Computing. We show that any numeric result be augmented by the associated information granules and the quality of the results is expressed in terms of the characteristics of information granules such as coverage and specificity. Different directions are covered including confidence/ prediction intervals, granular embedding of ML models, and granular Gaussian Process models.

Several representative and direct applications in the realm of transfer learning, knowledge distillation, and federated learning are discussed.



**Assoc. Prof. Ata Jahangir Moshayedi**  
**Jiangxi University Of Science And Technology, China**

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**Biography:** Dr Ata Jahangir Moshayedi, Associate professor at Jiangxi University of Science and Technology, China, PhD. In Electronic Science from Savitribai Phule Pune University, India. IEEE member, Instrument Society of India as a Life Member, Lifetime Member of Speed Society of India, member of the editorial team of various conferences and journals like; International Journal of Robotics and Control, JSME, Bulletin of Electrical Engineering and Informatics, International Journal of Physics and Robotics Applied Electronics, etc., 80 papers published in national journals and conferences, 3 books published, Owns 2 patent, 9 copyright. His research interest includes: Robotics and Automation/ Sensor modelling /Bio-inspired robot, Mobile Robot Olfaction/Plume Tracking, Embedded Systems / Machine vision-based Systems/Virtual reality, Machine vision/Artificial Intelligence

**Speech Title: From electronic nose to Gas sensor modelling**

**Abstract:** Since 1982, the creature Olfaction system has attracted researchers to do a similar system. Although the olfaction system is still a mystery for humans, the initial step was built successfully with an Electronic nose (Enose). The extended application of Enose opens a new gate for researchers. The enose Applications are started from food quality and test to bomb detection and currently extend to Agriculture projects. Even more recently, electronic noses (Enose) were used to identify those infected with the coronavirus (Covid 19). In this talk, after a review on enose structure and the sensor behaviour, some applications like odour source localization and some agriculture application will review. and two new model proposed by Dr Moshayedi for the MOX gas sensor will be described



**Prof. Charles Robert Telles**

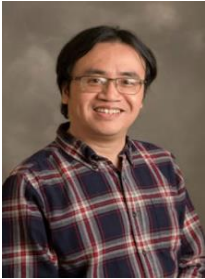
**Universidade Federal do Paraná, Brazil**

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**Biography:** Charles works for government at Paraná Brazil as advisor and reviewer for researches/projects of BID, UNESCO and OEI international technical cooperation agreement. His main topics of research are public administration and mathematics at the Secretary of State for Education of Paraná State. His main contributions to the public administration were analysis of oscillations in nonlinear administrative events, information processing and productivity indicators on workflows and mathematical modelling of closed loop control systems for human work. He has published more than 14 original researches as lead author and more than 40 technical contributions to scientific and governmental literature. Charles have won two Awards for the best poster research presentation in Londres (Computing Conference, 2020) and The Wolfram Letter Award in Portugal (Entropy Conference, 2021) for researches concerning asymptotic stability and productivity metrics in public administration, respectively.

### **Speech Title: Restorative Justice: An Equation for Justice?**

**Abstract:** Restorative justice is becoming a very popular and reliable method to achieve justice and culture of peace tasks in many developed juridical systems. Based on the conflicts mediation and restoration of values once deprecated by an offender and a victim it can brings reconciliation effects without incarceration and trigger justice values among society not only in the form of a juridical system but educational aspects. According to European Committee for Restorative Justice, recently restorative justice concept and diffusion on society needs to be expanded towards different sectors of application and methodology for empirical advances in the field. In this sense it is possible to ask what mathematical sciences can offer to the social sciences? And the answer for it is a daily demanding challenge for the 21st century towards an equitable society. Exploratory data analysis was applied to restorative justice goals and empirical parameters of the problem were modeled into an equation for data and information visualization. The model proposed can generate numerical results to any given scenario of social conflicts to allow further statistical analysis of samples and avoid black box frequentism of which is typically normal for this issue.

**Prof. HAI DINH****Kent State University, USA**

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**Biography:** Dr. HAI Q. DINH is a professor in Mathematics at the Department of Mathematical Sciences, Kent State University, USA. After completing his B.Sc. (1998) Summa Cum Laude, M.Sc. (2000), and Ph.D. (2003) in Mathematics at Ohio University, USA, he worked one year as a visiting professor at North Dakota State University, USA. Since 2004, Prof. Dinh has been working at Kent State University as a tenure full professor in mathematics. Prof. Dinh research interests include Algebra and Coding Theory. Since 2004, he has published more than 120 papers at high level SCI(E) research journals such as Journal of Algebra, Journal of Pure and Applied Algebra, IEEE Transactions in Information Theory, IEEE Communication Letters, Finite Fields and Their Applications, Applicable Algebra in Engineering Communication and Computing, Discrete Applied Mathematics. Prof. Dinh has been a well-known invited/keynote speaker at numerous international conferences and mathematics colloquium with more than 100 invited talks. Other than universities in the US, he also gave many honorary tutorial lectures, ranging from 8 to 30 hours, at international universities in China, Indonesia, Kuwait, Mexico, Singapore, Thailand, and Vietnam.

### **Speech Title: Structures and applications of constacyclic codes in skew setting.**

**Abstract:** We discuss the foundation and properties of skew  $\theta$ - $\lambda$ -constacyclic codes over finite fields and finite commutative chain rings for any unit  $\lambda$  and automorphism  $\theta$  that fixes  $\lambda$ . As in the situation of classical constacyclic codes, the dual of a skew constacyclic code is in turn a skew constacyclic code. The algebraic structure, generator and parity-check matrices of skew  $\theta$ - $\lambda$ -constacyclic codes and their duals are presented. Among other results, we also consider the self-dual skew constacyclic codes, and skew constacyclic codes with complementary duals. Moreover, some generalizations and applications of the concept of skew constacyclic codes are explored.



# Instructions for Presentations

## **Oral Presentations**

1. File format: MS-PowerPoint (\*.ppt) or Adobe PDF (\*.pdf)
2. Time: About 15mins, including Q/A time.
3. Language: English
4. Fonts: Arial or Times New Roman
5. Dress code: Formal clothes
6. Facility: Presenters need to use own laptop, please notify conference secretary via e-mail in advance and test the connection before session start.
7. Video conference software: Zoom



# Program Overview

Date	Time(for GMT+8 time zone-Beijing time)	Content	Location
<b>March 24, 2023 Friday</b>	9:00-9:10	Welcome Message	<b>Zoom</b>
	9:10-9:50	Keynote Speech I <b>Prof. Witold Pedrycz</b>	
	9:50-10:30	Keynote Speech II <b>Assoc. Prof. Ata Jahangir Moshayedi</b>	
	10:30-10:40	Short Break	
	10:40-11:20	Keynote Speech III <b>Prof. Charles Robert Telles</b>	
	11:20-12:00	Keynote Speech IV <b>Prof. HAI DINH</b>	
	12:00-13:30	Lunch Time	
	13:30-15:00	Oral Presentation I	
	15:00-15:20	Short Break	
	15:20-17:20	Oral Presentation II	

## Detailed Schedule

Online Meeting | 9:10am-12:00am

< Keynote Speeches >

Time	Content
09:10-09:50	 <p><b>Speaker:</b> Prof. Witold Pedrycz <b>Affiliation:</b> University of Alberta, Canada</p> <p><b>Title of Speech:</b> Credibility of Machine Learning Architectures: Supporting Self-Awareness Mechanisms</p> <p><b>Abstract:</b> Over the recent years, we have been witnessing spectacular and far-reaching achievements and applications of Artificial Intelligence and Machine Learning (ML), in particular. Efficient and systematic design of their architectures is important. Equally important are comprehensive evaluation mechanisms aimed at the assessment of the quality of the obtained results. The credibility of ML models is also of concern to any application, especially the one exhibiting a high level of criticality commonly encountered in autonomous systems. With this regard, there are a number of burning questions: how to quantify the quality of a result produced by the ML model? What is its credibility? How to equip the models with some self-awareness mechanism so careful guidance for additional supportive experimental evidence could be triggered?</p> <p>Proceeding with a conceptual and algorithmic pursuits, we advocate that these problems could be formalized in the settings of Granular Computing. We show that any numeric result be augmented by the associated information granules and the quality of the results is expressed in terms of the characteristics of information granules such as coverage and specificity. Different directions are covered including confidence/ prediction intervals, granular embedding of ML models, and granular Gaussian Process models.</p> <p>Several representative and direct applications in the realm of transfer learning, knowledge distillation, and federated learning are discussed.</p>
9:50-10:30	 <p><b>Speaker:</b> Assoc. Prof. Ata Jahangir Moshayedi <b>Affiliation:</b> Jiangxi University Of Science And Technology, China.</p> <p><b>Title of Speech:</b> From electronic nose to Gas sensor modelling</p>



	<p><b>Abstract:</b> Since 1982, the creature Olfaction system has attracted researchers to do a similar system. Although the olfaction system is still a mystery for humans, the initial step was built successfully with an Electronic nose (Enose). The extended application of Enose opens a new gate for researchers. The enose Applications are started from food quality and test to bomb detection and currently extend to Agriculture projects. Even more recently, electronic noses (Enose) were used to identify those infected with the coronavirus (Covid 19). In this talk, after a review on enose structure and the sensor behaviour, some applications like odour source localization and some agriculture application will review. and two new model proposed by Dr Moshayedi for the MOX gas sensor will be described.</p>
10:40-11:20	<div data-bbox="821 495 1023 734" data-label="Image"> </div> <p><b>Speaker:</b> Prof. Charles Robert Telles  <b>Affiliation:</b> Universidade Federal do Paraná, Brazil</p> <p><b>Title of Speech:</b> Restorative Justice: An Equation for Justice?</p> <p><b>Abstract:</b> Restorative justice is becoming a very popular and reliable method to achieve justice and culture of peace tasks in many developed juridical systems. Based on the conflicts mediation and restoration of values once deprecated by an offender and a victim it can brings reconciliation effects without incarceration and trigger justice values among society not only in the form of a juridical system but educational aspects. According to European Committee for Restorative Justice, recently restorative justice concept and diffusion on society needs to be expanded towards different sectors of application and methodology for empirical advances in the field. In this sense it is possible to ask what mathematical sciences can offer to the social sciences? And the answer for it is a daily demanding challenge for the 21st century towards an equitable society. Exploratory data analysis was applied to restorative justice goals and empirical parameters of the problem were modeled into an equation for data and information visualization. The model proposed can generate numerical results to any given scenario of social conflicts to allow further statistical analysis of samples and avoid black box frequentism of which is typically normal for this issue.</p>
11:20-12:00	<div data-bbox="821 1460 1013 1702" data-label="Image"> </div> <p><b>Speaker:</b> Prof. HAI DINH  <b>Affiliation:</b> Kent State University, USA</p> <p><b>Title of Speech:</b> Structures and applications of constacyclic codes in skew setting.</p> <p><b>Abstract:</b> We discuss the foundation and properties of skew <math>\theta</math>-<math>\lambda</math>-constacyclic codes over finite fields and finite commutative chain rings for any unit <math>\lambda</math> and automorphism <math>\theta</math> that fixes <math>\lambda</math>. As in the situation of classical constacyclic codes, the dual of a skew constacyclic code is in turn a skew constacyclic code. The algebraic structure, generator and parity-check matrices of skew</p>

$\Theta$ - $\lambda$ -constacyclic codes and their duals are presented. Among other results, we also consider the self-dual skew constacyclic codes, and skew constacyclic codes with complementary duals. Moreover, some generalizations and applications of the concept of skew constacyclic codes are explored.

### Online Meeting | 13:30-15:00

#### < Oral Presentation I >

Session Chair: Prof. Lee Chien Sing

Time	Content
C010	 <p><b>Presenter:</b> Yanting Zhang  <b>Affiliation:</b> Guangxi Minzu University, China</p> <p><b>Title of Speech:</b> On QSOR-like iteration method for quaternion saddle point problems</p> <p><b>Abstract:</b> With the continuous expansion of the application range of quaternion, the large quaternion saddle point problem appears in the related engineering and technical field, and it is necessary to explore its effective solution. In this paper, for the <math>2 \times 2</math> block quaternion saddle point system, the QSOR-like iterative scheme with parameter matrix is constructed by referring to the traditional SOR iterative method, and the parameter selection of iterative convergence and the selection of preprocessing matrix are analyzed by using the eigenvalue theory of quaternion matrix. Then the complex representation method of quaternion matrix is used to solve the system in Matlab environment. The numerical results show that the established iteration achieves ideal convergence effect by selecting appropriate parameters and preconditioned matrix.</p>
C012	 <p><b>Presenter:</b> Ji Shi  <b>Affiliation:</b> Harbin Institute of Technology(Shenzhen), China</p> <p><b>Title of Speech:</b> LSTM V-Network Swarm Optimizer(LVNSO): a new meta-heuristic based on machine learning methods</p> <p><b>Abstract:</b> Traditional meta-heuristics have good performance on solving black box problems with flexibility, derivation-free mechanism and local optima avoidance. However, due to the simplicity of most models, traditional meta-heuristics often don't have high stability and reliability on complex continuous problems. This work proposes a new meta-heuristic called LSTM V-Network Swarm Optimizer (LVNSO) inspired by</p>



	<p>machine learning models and methods. The LVNSO algorithm has a basic structure of a swarm with co-evolutionary of leader performance and LSTM V-Network in iteration, with <math>\varepsilon</math>-greedy exploration in reinforcement learning to avoid local optima. Additionally, resetting the network is aim to recover the sensitivity of the net, perform local optimization and improve the accuracy of the result. The algorithm is tested by 23 CEC 2005 benchmark functions and is verified by comparative study with several outstanding algorithms. The results show that the LVNSO is able to give much stabler and more accurate result than other algorithms overall under the condition of different parameters adapted to different functions.</p>
C018	<div data-bbox="826 488 1034 730" data-label="Image"> </div> <p><b>Presenter:</b> LIN MINGRUI  <b>Affiliation:</b> Fuzhou University, China</p> <p><b>Title of Speech:</b> Pure Orientation Passive Localization Technique for UAV based on Greedy Algorithm</p> <p><b>Abstract:</b> In recent years, UAV technology has been developing rapidly, the pure orientation passive positioning of UAVs in formation flight is a hot research topic. Based on the circular formation formatted by 10 UAVs, a "UAV three-point positioning" model is given to find the position coordinates of deviating UAVs using angle information; research found that 3 UAVs can achieve fuzzy positioning of UAVs when the UAV index is unknown, and at least 4 UAVs are needed to achieve accurate positioning. Based on the greedy algorithm, a model is established to find the optimal solution by multiple iterations using the "UAV three-point positioning" model, the MATLAB simulation result show that the error value is 10-25 and basically remains constant after 7 iterations, which can be considered as optimal state, and the optimal adjustment solution is given. The theory that "if a convex polyhedron (convex polygon) formed by all known points has no symmetry plane (axis), the desired position can be uniquely determined by these points" is proved, base on this theory, general UAV location and position adjustment principle of any formation is given.</p>
C027	<div data-bbox="845 1435 1034 1693" data-label="Image"> </div> <p><b>Presenter:</b> Wenxuan Wang  <b>Affiliation:</b> Guilin University of Technology, China</p> <p><b>Title of Speech:</b> Modelling the evolution of overlying karst collapse based on the discrete element method</p> <p><b>Abstract:</b> To study the evolutionary process of karst collapse caused by the fluctuation of groundwater level, a discrete element model of karst collapse is established by the high-performance discrete element software MatDEM. The results show that the scale of the soil cave formed by karst collapse grows with the fluctuation of the groundwater level. In the event of karst internal collapse, the range of water level fluctuation is</p>


	<p>positively correlated with the degree of karst cave development. And the soil spalling caused by the number of water level fluctuations has a stage characteristic. When karst ground collapse occurs, the larger the extent of water level fluctuations, the larger the size of the ground collapse pit. After a soil cave is formed, there is a significant horizontal stress concentration phenomenon at the foot of the soil cave.</p>
C038	<div data-bbox="821 434 1031 732" data-label="Image"> </div> <p><b>Presenter:</b> Yitong Hu  <b>Affiliation:</b> Beijing University of Posts and Telecommunications, Beijing, China</p> <p><b>Title of Speech:</b> Analyzing Human Behavior in Digitized Society: Insights from Wordle Data</p> <p><b>Abstract:</b> This paper focuses on analyzing the human behavior of Wordle players using available player data. While there have been many studies discussing the mechanism, strategy, and cultural influence of Wordle, research on the relationship between player data and human group behavior is still lacking. The authors conducted a time series analysis of the number of daily Wordle players and developed a MIMO XGBoost model to predict the distribution of player attempts. The model demonstrates high confidence through a test set, and the authors analyze the predicted data to provide insights for game designers and sociologists.</p>
C025	<p><b>Presenter:</b> Yang Jingsang  <b>Affiliation:</b> Liuzhou Vocational &amp; Technical College, China</p> <p><b>Title of Speech:</b> Salp Swarm Algorithm Based on Opposition-based Learning and Good Point Set for Numerical Function Optimization</p> <p><b>Abstract:</b> Since the salp swarm algorithm has defects such as slow search speed and low optimization accuracy in the later stage of iteration, a salp swarm algorithm based on good point set and opposition-based learning is proposed. Introduce a good point set to initialize the population to increase the diversity of the initial population. Introduce opposition-based learning in updating the population position to improve the convergence speed and the solution accuracy of the algorithm. Using seven comparison algorithms and twelve benchmark functions to test, the results show that the performance of the improved algorithm is better than the comparison algorithms in terms of convergence accuracy, convergence speed.</p>

Online Meeting | 15:20-17:20

< Oral Presentation II >  
Session Chair: Dr. Roxanne Anunciado

C017	<div data-bbox="810 192 1037 443" data-label="Image"> </div> <p data-bbox="571 456 1289 519"><b>Presenter:</b> Sun Chen <b>Affiliation:</b> China Tobacco Guangxi Industrial CO.LTD, China</p> <p data-bbox="411 555 1445 618"><b>Title of Speech:</b> Optimal foraging algorithm with dynamic parameter for solving 0-1 knapsack problem</p> <p data-bbox="411 654 1445 945"><b>Abstract:</b> The optimal foraging algorithm is a swarm intelligence algorithm based on the foraging behavior of animal groups. This paper proposes an optimized foraging algorithm with dynamic parameters to improve the search performance by changing the scaling factor to increase the convergence accuracy and convergence speed. Testing on 10 benchmark functions showed that the modified optimization foraging algorithm outperforms the comparison algorithms in terms of convergence accuracy and convergence speed. The modified optimal foraging algorithm is used to solve the 0-1 knapsack problem, and the experimental results show that the modified optimal foraging algorithm can achieve better results.</p>
C036	<div data-bbox="825 976 1024 1258" data-label="Image"> </div> <p data-bbox="663 1272 1193 1335"><b>Presenter:</b> Xiaoyu Chen <b>Affiliation:</b> Shaanxi Normal University, China</p> <p data-bbox="411 1370 1398 1433"><b>Title of Speech:</b> Y-index: An effective method to measure the importance of nodes in a directed weighted network</p> <p data-bbox="411 1469 1445 1738"><b>Abstract:</b> This paper proposes Y-index as the basic index of directed weighted network to measure the importance of nodes in the network. Considering the large number of nodes in most real networks, in order to improve the computing speed, we introduce the Y-index of synchronous iteration and asynchronous iteration. It is proved that the iterative Y-index sequence is convergent and converges to the same value. The experimental results of Facebook network and Adolescent health network show that, different from other H-type indices to identify the importance of nodes, Y-index is irreplaceable, indicating that Y-index is meaningful.</p>
	<div data-bbox="825 1821 1018 2089" data-label="Image"> </div>

C028	<p style="text-align: center;"><b>Presenter:</b> Yong Chen</p> <p style="text-align: center;"><b>Affiliation:</b> Hefei Institutes of Physical Science, Chinese Academy of Sciences, China</p> <p><b>Title of Speech:</b> The HybridSLAM based on improved weight optimization combination</p> <p><b>Abstract:</b> Simultaneous localization and map construction tasks can be addressed using feature-based particle filtered SLAM (FastSLAM), which offers precise robot pose estimates but suffers from a limited map construction range owing to high computational costs. On the other hand, Extended Kalman filtered SLAM (EKF-SLAM) leverages Taylor expansion to approximate nonlinear systems and speed up model operations, but truncation errors can compromise the accuracy of robot localization and map building. The HybridSLAM algorithm, which is based on a combination of FastSLAM and EKF-SLAM, holds the potential to leverage the strengths of both approaches, however, resampling can result in a loss of particle diversity. In order to tackle this issue and enhance map accuracy, this paper proposes an improved Weight Optimal Combination-HybridSLAM (iWOC-HybridSLAM) algorithm that employs an improved weight optimization combination. Specifically, an optimal weight combination is introduced into the resampling process to promote particle diversity, and a power exponential-based K-value optimization model is designed to improve the optimization performance. The optimized particles are then filtered based on their weights to form a new particle population, which enhances map accuracy. Finally, the data obtained through fusion with the new particle swarm is used to construct the global map. The paper presents simulation experiments carried out using the SLAM simulator released by the University of Sydney. The least root mean square error test results demonstrate that the proposed iWOC-HybridSLAM algorithm can improve map construction accuracy while addressing particle dissipation compared to traditional HybridSLAM and GA-HybridSLAM, which are based on genetic filtering resampling.</p>
C013	<div style="text-align: center;">  <p><b>Presenter:</b> Yide Yu</p> <p><b>Affiliation:</b> Macao Polytechnic University, China</p> </div> <p><b>Title of Speech:</b> MDPG: Markov Decision Process with Graph representation in Reinforcement Learning</p> <p><b>Abstract:</b> This study focus on Markov Decision Process represented by the graph. We give the definition of MDPG and valid walks. Besides, we give the degree and induced subgraph properties of MDPG. Moreover, the theorem that MDPG can detect non-stationary and partially observable processes is given. To better apply in practice, we redefine the state-value and state-action-value. In contrast to Markov Decision Process and GMDP, MDPG prefers to use Graph Theory logic to represent and address problems.</p>
	<div style="text-align: center;">  </div>

C039	<p style="text-align: center;"><b>Presenter:</b> Junwei Long <b>Affiliation:</b> Wuhan University of Technology, China</p> <p><b>Title of Speech:</b> Multi-level and Multi-swarm Particle Swarm Optimization Algorithm</p> <p><b>Abstract:</b> Inspired by the mechanism of batch processing systems, this paper proposes a multi-level and multi-swarm particle swarm optimization (MMPSO) algorithm to alleviate the performance degradation caused by imbalances in exploration and exploitation within the swarm. The algorithm constrains the learning behavior of different swarms by dividing the swarm into multi-level and multi-swarm. Swarms of different levels are grouped into various to perform different tasks. The small-scale in top-level swarm is responsible for exploiting the global optimal position. The large-scale in bottom-level swarm uses the Levy flight strategy based on the improvement rate to explore unknown areas, effectively improving the exploration ability. The middle-level swarm is divided into multi-swarm to explore and exploit local locations and design an internal and external comprehensive learning strategy. A lifting mechanism is proposed to improve the information exchangeability of swarms at different levels. Experimental results on the 30-D of the CEC2017 benchmark optimization problems show that the MMPSO algorithm exhibits the best convergence accuracy on most benchmark functions due to the balance of exploration and exploitation. Furthermore, the algorithm combine with BP Neural Networks (BPNN) shows the best convergence accuracy on the application problem of developing force-field parameters (FFPs).</p>
C041	<div style="text-align: center;">  <p><b>Presenter:</b> Xiancheng Liu <b>Affiliation:</b> Anhui University, China</p> </div> <p><b>Title of Speech:</b> An improved method for string program verification</p> <p><b>Abstract:</b> Automated program verification tools based on theorem proving are limited by the proving capabilities of the integrated automated theorem prover, especially when dealing with programs that involve string operations, making verification particularly difficult. In this paper, we propose an improved string verification method based on a prototype system that integrates a satisfiability solver to achieve automated program verification. In a defined string constraint language, we have developed a constraint slicing method that relies on the dependency relationships between variables. This method aids in the removal of irrelevant constraint information during verification. Additionally, this method employed a solution cache reuse strategy based on this method. These two methods can effectively reduce the complexity of verification conditions before verification. Experimental results show that translating the generated verification conditions using our proposed translation method and submitting them to the automated theorem prover reduces the number of cases where verification conditions are not proven.</p>
C033	<p style="text-align: center;"><b>Presenter:</b> Yasmin EINIEH <b>Affiliation:</b> Arabic Headline Summarization using AraT5</p> <p><b>Title of Speech:</b> An improved method for string program verification</p> <p><b>Abstract:</b> Headlines are regarded as a brief summary of the text. The necessity to manage a huge number of papers has raised the need to automatically generate headings. Hence, rather than reading every document, you may simply look at the headline to see</p>

	<p>which ones contain significant and pertinent information. Deep learning techniques have advanced this field of study, particularly as pre-trained models become more prevalent that have produced the finest outcomes. In this study, we used a T5 text-to-text transformer, which produced outcomes that were deemed ideal for a variety of tasks involving natural language processing. We used the AHS dataset containing 300,000 articles and their headlines. ROUGE-1, ROUGE-2, ROUGE-L, and BLEU model evaluation results were 0.53, 0.3, 0.36, and 0.48, respectively. The results achieved by the AraT5 model were better than those achieved by the Seq2seq model.</p>
C008	<div data-bbox="874 443 1027 645" data-label="Image"> </div> <p><b>Presenter:</b> Yifei Zhao  <b>Affiliation:</b> Phillips Exeter Academy, USA</p> <p><b>Title of Speech:</b> A Family of 3-Manifolds Arising from the Plumbing Construction</p> <p><b>Abstract:</b> Inspired by Kirby's work in [4] which constructed the Poincaré 3-sphere <math>S^3/2I</math> by an <math>E_8</math>-plumbing, we worked out a general and systematic argument to show that other spherical 3-manifolds <math>S^3/2O</math>, <math>S^3/2T</math> and <math>S^3/2D_n</math> can be obtained from a plumbing construction by the Dynkin diagrams <math>E_7</math>, <math>E_6</math> and <math>D_{(n+2)}</math>, respectively.</p>

# MEMO

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