Programme Booklet for SIMC Educators' Learning Festival

Time	Programme	Presenter/ Speaker
0930	**Welcome Address**	Mr Goh Hock Leong, *Deputy Principal (Academic), NUS High School*
0940	***How AI is used to empower Singapore's Digital Transformation***	Mr Hardeep Singh Arora *Temus*
1025	***Introduction to AI Centre for Educational Technologies***	Ms Juliana Binte Jumain *AI Centre for Educational Technologies*
1110	Tea-break	
1130	***Explorations into the use of AI in education***	Assoc Prof Hady Wirawan Lauw *SMU Computer Science*
1215	***Fairness-Driven Machine Learning***	Assoc Prof Xin Tong *Chief Judge of SIMC $^{2.0}$2024* *NUS College of Humanities & Sciences (Mathematics)*
1300	Lunch	
1400	***Letting data and curiosity drive***	Asst Prof Loh Ne-Te *Chief Setter of SIMC $^{2.0}$2024* *NUS College of Humanities & Sciences (Physics and Biological Sciences)*
1430	***Mathematical Modeling with Python: An Application***	Mr Beertino Romerow Woe *National Junior College*
1500	***Changes in the teaching of mathematics to gifted children in England over 25 years***	Mr Robin Johnson *Camborne Science & Int'l Academy*
1530	***Meaning, evolution and crisis of the top mathematics competitions***	Mr Vadlimir Saric *Mathematical Grammar School*
1600	Tea-break	
1615	**Math Education for Gifted Learners**	Mr Liu Kai Feng

		High School affiliated to Xi-an Jiaotong University
1645	**Use of Geogebra Augmented Reality in Teaching and Learning Calculus: Volume of Solids in Integration**	Mrs Liu-Ye Xiajuan and Mr Ku Ching Ming *NUS High School of Math and Science*
1730	End of Programme	

Synopsis

How AI is used to empower Singapore's Digital Transformation

by Mr Hardeep Singh Arora

Temus

The outline for the presentation is as follows:

1. Introduction to GenAI
2. Brief history
3. Use-cases we are seeing for GenAI in digital transformation.
    a. Enterprise level (what are client demanding)
    b. Personal level (how can you use it in your daily life)
    c. Demos
4. Q&A

Introduction to AI Centre for Educational Technologies

by Ms Juliana Binte Jumain

AI Centre for Educational Technologies, NUS, Singapore

Since 2021, the AI Centre for Education Technologies (AICET) has been developing new edtech tools to address gaps in the local education ecosystem. In this talk, we will share our approach to building software for teaching, some of the systems we have built and the lessons we have learnt over the past 4 years.

Explorations into the Use of AI in Education

by Professor Hady

Singapore Management University, Singapore

Learning from concise educational materials, such as lecture notes and presentation slides, often prompts students to seek additional resources. Newcomers to a subject may struggle to find the best keywords or lack confidence in the credibility of the supplementary materials they discover. To address these problems, we introduce Slide++, an automated tool that identifies keywords from lecture slides, and uses them to search for relevant links, videos, and Q&As. In this talk, we discuss some of the inherent technologies, as well as our experiences in piloting the system for computing and algorithmic courses.

Fairness-Driven Machine Learning

by A/P Tong Xin

National University of Singapore, Singapore

Artificial intelligence (AI) holds immense potential for revolutionizing industries and improving various aspects of our lives. However, its rapid advancement also raises concerns about potential dangers. One significant risk is the potential for AI systems to exhibit unintended biases, leading to discriminatory

outcomes in areas such as admission, hiring, and lending. In this talk we will discuss the mathematical reason behind these concerns and how to (partially) resolve it by building fairness constrained AI.

Letting Data and Curiosity Drive

by A/P Duane Loh
National University of Singapore, Singapore

Scientific exploration and discovery are driven by careful observations and measurements of our physical world. With constantly improving instrumentation, innovations in sample preparation, and faster automation, we can collect vast quantities of data about our world and higher fidelity. It is no longer possible to interrogate such voluminous data without computers and some form of machine learning. The critical challenges ahead of scientists are: (1) to productively explore and make sense of these large datasets in the context of prior knowledge and (2) to discover hidden phenomena and principles.

In this talk, I will share a few examples from my own research, where we are starting to uncover how order emerges from disorder in the nanometer-scale world using data-driven approaches. Additionally, I will argue why it is critical for our students to fluidly digest and understand data. Only then can their curiosities be productively unleashed.

Mathematical Modelling with Python: An Application

by Mr Beertino Romerow Woe
National Junior College, Singapore

In this talk, we will examine how the process of modelling the outcome of a deuce situation that frequently arises in a tennis game can be augmented with Python. We will start with an introduction of the Singapore Mathematics framework, followed by an analysis of the deuce situation, employing diagrams and probability models for insight. We will develop a naïve solution with basic assumptions and model validation, then progresses to more sophisticated methods. We discuss how Python can be leveraged for mathematical modeling, illustrating its versatility and potential in educational and practical applications.

Changes in the Teaching of Mathematics to Gifted Children in England over 25 years

by Mr Robin Johnson
Camborne Science and International Academy, United Kingdom

Robin Johnson has been teaching Maths in the UK since 1997, shortly after the New Labour government swept into Parliament on the agenda, 'Education, education, education'. He has taught at numerous schools in London, Merseyside, and is now based in Cornwall at Cornwall School of Maths and Science. He has witnessed numerous changes to the education system over this period. He has held a number of positions of responsibility including head of mathematics at two schools and assistant head teacher with responsibility for assessment and tracking. On top of this he has been an A level examiner for Pearson for over 15 years. In recent years he has embraced new technologies and is a verified Kahoot Educator for Mathematics and is leading the way on use of graphical calculators. This presentation will give a personal view of teaching gifted children in the UK and how the influence of 'Singapore Maths' has become so important.

Meaning, Evolution, and Crisis of the Top Mathematics Competitions

by Mr Vadlimir Šarić
Mathematical Grammar School, Serbia

A brief overview of history of mathematics competitions with some highlights of their effect on education and science followed by some description of current state based on observations available to author

during more than 20 years of experience. There is a crisis in math competition movement that should be dealt with, and that might lead to transformation of the competitions system.

Math Education for Gifted Learners

by Mr Liu Kai Feng
High School affiliated to Xi-an Jiaotong University, China

The speech addresses the significance of integrating Artificial Intelligence (AI) into mathematics education to enhance learning outcomes

Use of GeoGebra Augmented Reality in Teaching and Learning Calculus: Volume of Solids in Integration

by Mrs Liu-Ye Xiajuan & Mr Ku Ching Ming
NUS High School of Mathematics and Science, Singapore

Augmented Reality (AR) serves as an extra tool to enhance, rather than replace, our traditional teaching methods, with the goal of meeting students' learning needs. In this presentation, we'll showcase a couple of examples of how our teachers have incorporated AR to assist students in understanding solids generated with specified bases and cross-sections, as well as solids created by revolution, in Calculus. With AR integration, students can grasp abstract concepts more easily, fostering heightened motivation and engagement throughout the learning journey.