Precision Convergence Webinar Series

Foundation Models for Time-Series and Spatio-Temporal Data

*by **Flora Salim***

University of New South Wales

With High-Level Panel of Leaders in Science, Technology, On-the-Ground Action, and Policy

Friday February 13, 2026 8:00 AM Montreal to 9:30am EST (1.5 hours in duration)

For Remote Participation, please register Here

ABSTRACT: This talk explores the foundations of AI for time-series and multimodal sensor data, emphasizing the pressing challenges and frontier solutions for real-world spatio-temporal learning. Time-series data from sensors in domains such as transport, energy, and urban systems are often riddled with missing values, heterogeneity, irregular sampling, high noise, and label scarcity. These issues are compounded by modality differences across sensors, domain shifts, and dynamic environments. We present a comprehensive overview of recent advances, grounded in a series of foundational works. We also introduce a massive traffic forecasting, building IoT time-series, and human mobility datasets and benchmarks. and pretrained models for generalizable spatio-temporal inference across diverse urban contexts. We ground this discussion in broader trends outlined in a recent comprehensive survey on foundation models for spatio-temporal data science, which articulates how pretraining, cross-domain transfer, and unified architectures are reshaping the field.

In summary, this talk offers a unified vision of foundational AI for time-series and multimodal sensors, combining robust temporal modeling, cross-modal alignment, and scalable representation learning to unlock new capabilities in dynamic, real-world environments.

Flora Salim is a Professor in the School of Computer Science and Engineering at the University of New South Wales (UNSW) Sydney, where she also serves as the Deputy Director (Engagement) of the UNSW AI Institute. Her work focuses on multimodal machine learning and foundation models for time-series and spatio-temporal data, behavioural modelling with multimodal sensors, robust and trustworthy machine learning, and on applications of AI and LLMs for smart and sustainable cities, and for mobility, transport, energy, and grid systems. She is a Co-Lead of the Mobilities Focus Area in the ARC Centre of Excellence for Automated Decision Making and Society. She is a Vice Chair of the IEEE Task Force on AI for Time-Series and Spatio-Temporal Data. She serves in the editorial board of ACM TIST, ACM TSAS, PACM IMWUT, IEEE Pervasive Computing, Nature Scientific Data, and Machine Learning journal. She also serves a member of the Australian Academy of Sciences' National Committee for Information and Computing Sciences and a member of the Australian Research Council (ARC) College of Experts.

About the series: The precision convergence series is launched to catalyze unique synergy between, on the one hand, novel partnerships across sciences, sectors and jurisdictions around targeted domains of real-world solutions,and on the other hand, a next generation convergence of AI with advanced research computing and other data and digital architectures such as PSC's Bridges-2, and supporting data sharing frameworks such as HuBMAP, informing in a real time as possible the design, deployment and monitoring of solutions for adaptive real-world behavior and context.

The McGill Centre for the Convergence of Health and Economics (MCCHE) is a virtual world network of scientist, action and policy leaders promoting the weaving of digital-powered interdisciplinary science into person-centered domain-specific solutions at scale to global challenges faced by traditional and modern economy and society worldwide. The MCCHE stimulates lasting collaborations that bridge the many divides in the market, economy, and society that are at the root of these most pressing modern challenges through collaborative of modular convergence innovation platforms.

The Pittsburgh Supercomputing Center is a joint computational research center between Carnegie Mellon University and the University of Pittsburgh. Established in 1986, PSC is supported by several federal agencies, the Commonwealth of Pennsylvania and private industry. PSC provides university, government, and industrial researchers with access to several of the most powerful systems for high-performance computing, communications, and data-handling available to scientists and engineers nationwide for unclassified research. PSC advances the state-of-the-art in high-performance computing, communications and informatics and offers a flexible environment for solving the largest and most challenging problems in computational science.

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CO-CHAIRs:

Laurette Dubé: is an Emerita Professor and James McGill Chair of Consumer and Lifestyle Psychology and Marketing at the Desautels Faculty of Management. She is the Founding Chair and Scientific Director of the McGill Centre for the Convergence of Health and Economics (MCCHE). Originally trained as a nutritionist, with graduate degrees in finances (MBA), marketing (MPS), and behavioural decision making/consumer psychology (PhD), Dr. Dubé's lifetime research interest bears on the study of affects, behavioural economics, neurobehavioural, and socio-economic processes underlying consumption, lifestyle, and health behaviour. Her translational research examines how such knowledge can inspire more effective behavioural change and ecosystem transformation as scale to address complex challenges and possibilities facing modern society.

Sergiu Sanielevici: Ph.D. is Director of Support for Scientific Applications at the Pittsburgh Supercomputing Center, a joint project of Carnegie Mellon University and the University of Pittsburgh. He has served as the Deputy Director of the Extended Collaborative Support Service of the US NSF XSEDE project and as the manager of its Novel and Innovative Projects program, fostering nontraditional and interdisciplinary applications of advanced computing and data resources since 2011. He is currently the Principal Investigator of the Bridges-2 project and coPrincipal Investigator of the Neocortex project at PSC. Dr. Sanielevici is a proud alumnus of McGill University (Ph.D., Physics, 1986).

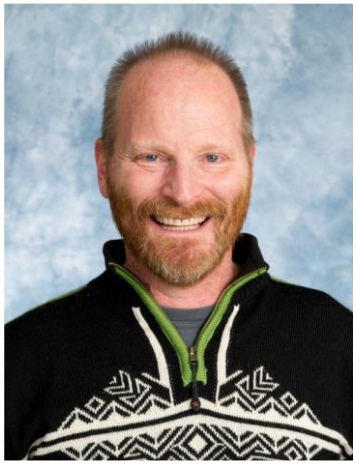
PANELISTS:

Emre Koksal is a Professor of Electrical and Computer Engineering at The Ohio State University, the Founder and Chief Scientist of FenixPyre, and the Chief Scientist at Striv.ai. Emre received S.M. and Ph.D. degrees from MIT in 1998 and 2003, respectively, in Electrical Engineering and Computer Science. He has testified to the Congress multiple times on various aspects of cybersecurity. He is The Ohio State University Innovator of the Year, a Senior Member of the National Academy of Inventors. Among his awards include the National Science Foundation CAREER Award, Columbus Business First – Inventor of the Year Award, HP Labs – Innovation Research Award, OSU College of Engineering Innovator Award (twice), College of Engineering Lumley Research Award (twice). Papers he co-authored received the best paper award in various top conference venues. He has served as an Associate Editor for IEEE Transactions on Information Theory, IEEE Transactions on Wireless Communications, and Elsevier Computer Networks. His areas of expertise include Information Theory, Active Inference, Machine Learning, Cybersecurity - broader applications of Probability Theory.

Artur Dubrawski is the Alumni Research Professor of Computer Science at Carnegie Mellon University and Director of the Auton Lab, a large research group focused on building mathematically founded AI that works in the real world. With over 35 years of experience across academia and industry, Professor Dubrawski has led projects in healthcare, defense, public safety, counter human trafficking, and more, wherever AI is not just theoretical and can be life changing. He combines industrial and academic experience and is passionate about mentoring the next generation of scientists and practitioners and helping them turn cutting-edge research into practical impact.

Michael Batty is Bartlett Professor of Planning at University College London where he is Chair of the Centre for Advanced Spatial Analysis (CASA).He has worked on computer models of cities and their visualisation since the 1970s and has published several books, such as Cities and Complexity (MIT Press, 2005) which won the Alonso Prize of the Regional Science Association in 2011,and most recently The New Science of Cities (MIT Press, 2013). His research group is working on simulating long term structural change and dynamics in cities as well as their visualisation. He is a Fellow of the British Academy (FBA), the Academy of Social Sciences (FAcSS) and the Royal Society (FRS), was awarded the CBE in the Queen's Birthday Honours in 2004 and the 2013 recipient of the Lauréat Prix International de Géographie Vautrin Lud (generally known as the 'Nobel de Géographie'). In 2015 he received the Founders Medal of the Royal Geographical Society for his work on the science of cities. In 2016 he received the Gold Medal of the Royal Town Planning Institute, and the Senior Scholars Award of the Complex Systems Society. He has Honorary Doctorates form the State University of New York and from the University of Leicester.

Viktor Jirsa is Director of the Inserm Institut de Neurosciences des Systèmes at Aix-Marseille-Université in Marseille, France. Dr. Jirsa received his PhD in 1996 in Theoretical Physics and Applied Mathematics and has since then contributed to the field of Theoretical Neuroscience, in particular through the development of large-scale brain network models based with realistic connectivity. His work on Virtual Brain Twins has been foundational for brain medicine with clinical applications in epilepsy and psychiatry. Dr. Jirsa serves as Chief Science Officer of the European digital neuroscience infrastructure EBRAINS https://ebrains.eu/. He has been awarded several international prizes for his research including the first HBP Innovation prize (2021) and Grand Prix de Recherche en Provence (2018) and has published more than 160 scientific articles.



Steve Simske received a post-Doctoral degree in aerospace engineering and a post-Doctoral he was an engineer (HP Fellow since 2011), Vice President, and Director at HP Labs. Since 2018, he is a Faculty Professor of Systems Engineering at Colorado State University (CSU). He is the author of more than 600 publications and more than 240 US patents. His research interests include analytics, systems security, sensing, signal and imaging processing, printing and manufacturing, and situationally aware robotics. Dr. Simske is an IEEE Fellow, an NAI Fellow, an IS&T Fellow, and a past President (2017-2019). Steve completed a CSU Faculty Institute for Inclusive Excellence (FIIE) Fellowship in 2020 and was a CSU Best Teacher awardee in 2022. In his 20+ years in the industry, he directed teams to research 3D printing, education, life sciences, sensing, authentication, packaging, analytics, imaging, and manufacturing. He has written seven books including ones on analytics, algorithmics, and cyber-physical security. At CSU, he has a cadre of on-campus students in Systems and Biomedical Engineering and a larger contingent of online/remote graduate students researching various disciplines. Steve's most recent book is titled 'Doctoring Documents' with co-author Dallen Simske.