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PLENARY TALK

Title

Evolved Machine Intelligence in Action

Speaker

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Abstract

Artificial Intelligence (AI) has become a cornerstone of modern research and applications, driving solutions to increasingly complex real-world problems. This plenary presentation will highlight Evolved Machine Intelligence (EMI), an advanced branch of AI inspired by biological evolution and natural systems. EMI derives its power from adaptive mechanisms such as variation, selection, and survival of the fittest, enabling exceptional problem-solving capabilities beyond conventional approaches. The talk will begin with an overview of AI in practice, outlining its concepts, current trends, and broad impact across diverse domains. It will then focus on evolutionary intelligence techniques, with emphasis on genetic programming and its recent developments for automated learning, big data analytics, and modelling. Further, the presentation will examine the optimisation of complex and nonlinear systems, where evolutionary approaches surpass classical optimisation methods. Case studies will include large-scale structural optimisation of towers and many-objective problem-solving, demonstrating EMI's versatility and effectiveness.

The session will conclude with a discussion on hybrid heuristics that integrate with EMI to further enhance performance, illustrating how evolved machine intelligence in action delivers innovative and robust solutions to pressing challenges in modelling and optimisation.

Short CV

Amir H. Gandomi is a Professor of Data Science at the Faculty of Engineering & Information Technology, University of Technology Sydney. He is also affiliated with Óbuda University, Budapest, as a Distinguished Professor. Prior to joining UTS, Prof. Gandomi was an Assistant Professor at the Stevens Institute of Technology and a distinguished research fellow at BEACON Center, Michigan State University. Prof. Gandomi has published over four hundred journal papers and 12 books, which have collectively been cited 71,000+ times (H-index=115). He has been named one of the most influential scientific minds and received the Highly Cited Researcher award from Web of Science for six years. In a recent study at Stanford University, released by Elsevier, Prof Amir H Gandomi is ranked the 24th most impactful researcher in the AI and Image Processing subfield in 2023! He has received multiple prestigious awards for his research excellence and impact, such as the 2024 IEEE TCSC Award for Excellence in Scalable Computing (MCR), the 2023 Achenbach Medal, and the 2022 Walter L. Huber Prize, the highest-level mid-career research award in all areas of civil engineering. Most recently, he received the 2025 Sigma Xi Young Investigator Award from Sigma Xi, The Scientific Research Honor Society, one of the world's oldest and most prestigious multidisciplinary honour societies that counts 200+ Nobel Laureates, among them Albert Einstein. He has served as associate editor, editor, and guest editor in several prestigious journals, such as the AE of IEEE Networks and IEEE IoTJ. Prof Gandomi is active in delivering keynotes and invited talks. His research interests are applied AI, particularly for predictive (big) data analytics and global optimisation.