ICTS Calibre Seminar Series

Title : Biocomplexity and AI

Speaker : Madhav Marathe (University of Virginia, USA)

Date : Thursday, 14 May 2026

Time : 5:00 PM (IST)

Abstract : Biocomplexity refers to the study of biological, social, informational and technological agents, their interactions and the ecologies they form and evolve. These agents can be living agents but importantly can include artificial agents such as the ones created by today's AI systems. These agent ecologies are complex systems and reasoning about them is complicated and scientifically challenging due to their size, co-evolutionary nature and multiple scales and types of interactions simultaneously. Examples include: human immune system, human brain, The 2019 COVID-19 pandemic, 2009 financial crisis, global migration, information propagation over social media, agentic AI and climate change. Advances in computing have fundamentally altered how such bio-social complex systems can be synthesized, analyzed and reasoned.

Graphical Dynamical systems (GDS) and digital twins provide formal models and associated data structures to represent large co-evolving bio-social complex systems. After a brief introduction, the talk will discuss these two concepts with the aim of developing scalable and practical decision support systems for such coevolving bio-social complex systems. The role of AI and high performance computing will be highlighted. I will draw on our work in urban transport planning, energy systems and public health epidemiology to guide the discussion.

Venue : Online
Zoom Link: https://icts-res-in.zoom.us/j/98865957798?pwd=dj2vcIjC1hq2AI340ERbUdapuvx4Qj.1
Meeting ID: 988 6595 7798
Passcode: 141415