

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

Org. by

School of Mathematical & Computational Sciences

Speaker: Dr. Pavithra Prabhakar

Title: Abstraction based Output Range Analysis for Neural Networks

Abstract:

A crucial step in the verification of neural network controlled physical systems is the output range analysis problem. We consider the problem of output range analysis for feed-forward neural networks with ReLU activation functions. The existing approaches reduce the output range analysis problem to satisfiability and optimization solving, which are NP-hard problems, and whose computational complexity increases with the number of neurons in the network. To tackle the computational complexity, we present a novel abstraction technique that constructs a simpler neural network with fewer neurons, albeit with interval weights called interval neural network (*INN*), which over-approximates the output range of the given neural network. We reduce the output range analysis on the *INNs* to solving a mixed integer linear programming problem. Our experimental results highlight the trade-off between the computation time and the precision of the computed output range.

Venue: S. N. Bose Hall

Time: Friday, 10 January 2020 at 2:30 PM

Speaker Bio: Pavithra Prabhakar is an associate professor of computer science at Kansas State University, where she holds the Peggy and Gary Edwards Chair in Engineering. She obtained her doctorate in Computer Science from the University of Illinois at Urbana-Champaign (UIUC) in 2011, from where she also obtained a masters in Applied Mathematics. She was a CMI (Center for Mathematics of Information) fellow at Caltech for the year 2011-12. She has been on the faculty of Kansas State University since 2015, and has previously held a faculty position at the IMDEA Software Institute. Her main research interest is in the Formal Analysis of Cyber-Physical Systems, with emphasis on both theoretical and practical methods for verification and synthesis of hybrid control systems. She is the recipient of an NSF CAREER Award and an ONR Young Investigator Award.

All are cordially invited to attend the seminar.