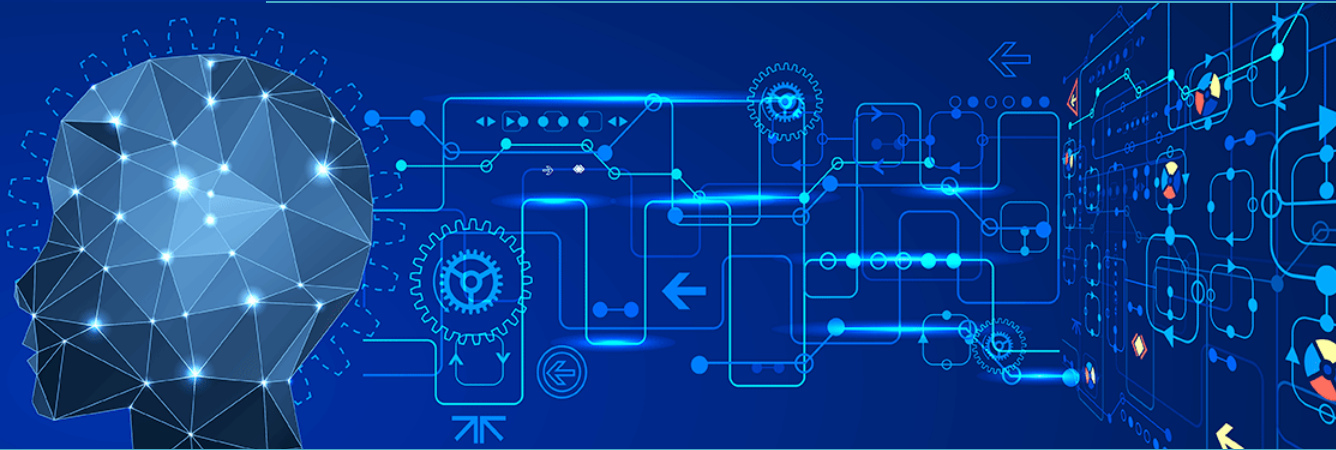


Machine Learning: Classifiers to Understand Emergent Behavior in Complex Systems and System-of-Systems



Tues Feb 9, 2021
7:00 – 8:30 PM CST

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A complex system is characterized by emergence of global properties which are very difficult, if not impossible, to anticipate just from complete knowledge of component behaviors. Emergence, hierarchical organization and numerosity are some of the characteristics of complex systems. With increasing system complexity, achieving confidence in systems becomes increasingly difficult. With the recent trend towards significant footprint of complex system's functionality being governed by machine learning based models and algorithms, there is a need to ensure that emergent behavior associated with such systems are well analyzed and understood. This presentation discusses an approach that involves developing machine learning classifier models that learns on potential negative and positive emergent behaviors. The machine learning model observes the various MOEs (Measures of Effectiveness) and MOPs (Measures of Performance) and learns the nature of emergent behavior. The approach is illustrated through two examples – one at system level, and another at system-of-system level. The effectiveness and performance of the approach are quantified.

Dr. Raman received B. Tech and MS degrees from IIT Madras, and Ph.D. from IIIT-Bangalore. He is a certified Six Sigma Black Belt and is INCOSE Certified Expert Systems Engineering Professional - ESEP. He has over 23 years of extensive systems and software engineering experience in the Building/ Industrial Automation and Aerospace domains. He has been the Lead Systems Engineer and Architect for designing many complex systems globally over the years. He is currently Principal Systems Engineer at Honeywell Technology Solutions. He has to his credit publications in refereed international conferences & journals of complex systems architecture design and Artificial Intelligence – Machine Learning. He has been a member of INCOSE since 2005 and is currently serving as Assistant Director, INCOSE Asia Oceania Sector.

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