5 TA3A Panel **Autonomous Machine Learning** **Asim Roy**

Tuesday, July 20, 4:50PM-6:30PM Room 6

PANEL MEMBERS -

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ABSTRACT

Autonomous machine learning has become a top priority in the science and engineering of learning. In July 2007, National Science Foundation (NSF), USA, had a workshop on the "*Future Challenges for the Science and Engineering of Learning*." Here is the summary of the "*Open Questions in Both Biological and Machine Learning*" from the workshop (<http://www.cnl.salk.edu/Media/NSFWorkshopReport.v4.pdf>).

"**Biological learners have the ability to learn autonomously**, in an ever changing and uncertain world. This property includes the ability to generate their own supervision, select the most informative training samples, produce their own loss function, and evaluate their own performance. More importantly, it appears that biological learners can effectively produce appropriate internal representations for composable percepts -- a kind of organizational scaffold - - as part of the learning process. By contrast, **virtually all current approaches to machine learning typically require a human supervisor** to design the learning architecture, select the training examples, design the form of the representation of the training examples, choose the learning algorithm, set the learning parameters, decide when to stop learning, and choose the way in which the performance of the learning algorithm is evaluated. **This strong dependence on human supervision is greatly retarding the development and ubiquitous deployment autonomous artificial learning systems**. Although we are beginning to understand some of the learning systems used by brains, many aspects of autonomous learning have not yet been identified."

The neural network and computational intelligence communities have a special obligation to step up to this challenge of creating autonomous learning systems that do not depend on human supervision. The International Neural Network Society (INNS) formed a **Special Interest Group on Autonomous Machine Learning** in 2009. This panel will be the first of a continuing series to focus on the issues raised by NSF and on the problems of creating widely deployable autonomous learning systems.