Anouncing the Final Examination of Sean Mondesire for the degree of Doctor of Philosophy

Time & Location: March 27, 2014 at 11:00 AM in Partnership 2 301
Title: Complementary Layered Learning

Layered learning is a machine learning paradigm used to develop autonomous robotic-based agents by decomposing a complex task into simpler subtasks and learns each sequentially. Although the paradigm continues to have success in multiple domains, performance can be unexpectedly unsatisfactory. Using Boolean-logic problems and autonomous agent navigation, we show poor performance is due to the learner forgetting how to perform earlier learned subtasks too quickly (favoring plasticity) or having difficulty learning new things (favoring stability). We demonstrate that this imbalance can hinder learning so that task performance is no better than that of a sub-optimal learning technique, monolithic learning, which does not use decomposition. Through the resulting analyses, we have identified factors that can lead to imbalance and their negative effects, providing a deeper understanding of stability and plasticity in decomposition based approaches, such as layered learning.

To combat the negative effects of the imbalance, a complementary learning system is applied to layered learning. The new technique augments the original learning approach with dual storage region policies to preserve useful information from being removed from an agent's policy prematurely. Through multi-agent experiments, a 20% task performance increase is obtained with the proposed augmentations over the original technique.

Major: Computer Science

Educational Career:
Bachelor's of Computer Science, BS, 2004, University of Central Florida
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Committee in Charge:
Annie S. Wu, Chair, Electrical Engineering & Computer Science
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Gita Sukthankar, Electrical Engineering & Computer Science
Michael Proctor, Industrial Engineering & Management Systems

Approved for distribution by Annie S. Wu, Committee Chair, on March 7, 2014.

The public is welcome to attend.