Shun Zhang

Contact Information

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Research Interests

Reinforcement learning, robotics, multiagent systems, convex optimization, human cognition.

Education

University of Texas at Austin, Austin, TX

Integrated B.S./M.S. Program, Computer Science, Jan. 2012 - May. 2015 (Expected)

- Major G.P.A. 3.8. Overall G.P.A. 3.55.
- Master Thesis.

Nanjing University of Aeronautics and Astronautics, Nanjing, China

Undergraduate program, Computer Science and Technology, Sep. 2009 - Dec. 2011

- G.P.A. 3.8/5.0.
- Transferred to University of Texas at Austin in Jan. 2012.

Research Experience

Modular Reinforcement Learning Fall 2014 — Spring 2015
Department of Computer Science and Center for Perceptual Systems
University of Texas at Austin

- Supervisor: Prof. Dana Ballard and Prof. Mary Hayhoe.
- Research question: *Assume human already has Markov Decision Processes (MDP) trained for preliminary tasks, how would these MDPs contribute to complicated behaviors?*
- Using Inverse Reinforcement Learning to interpret human's behavior, assuming that it is a combination of the MDPs for preliminary tasks.
- Master thesis. Part of the draft [link].

Determining Placements of Influencing Agents in a Flock Fall 2014
Department of Computer Science
University of Texas at Austin

- Supervisor: Prof. Peter Stone.
- Research question: *Where should influencing agents be located within a flock to maximize their influence on the flock?*
- Using MASON simulator to evaluate different placements of influencing agents, including border, grid, and graph-based placements.

Reinforcement Learning on Atari Games Fall 2013
Department of Computer Science
University of Texas at Austin

- Supervisor: Prof. Peter Stone.
- Research question: *Can we apply TEXPLORE, a sample-efficient Reinforcement Learning algorithm, to complicated domains like Atari games?*
- Undergraduate research course [link].

Action Selection in Robotic Motion Learning Fall 2013
Department of Computer Science
University of Texas at Austin

- Supervisor: Prof. Peter Stone.

- Research question: *Instead of uniformly randomly selecting actions to try, can a robot explicitly select actions to explore its belief state space?*
- Implementing ASAMI (a model-learning algorithm) on Nao robot using bandit-based exploration.
- Autonomous Robots course project. Achieved in Undergraduate Research Journal in University of Texas at Austin, 2014. [link]

Structured Exploration for Relational Reinforcement Learning Spring 2013
Department of Computer Science
University of Texas at Austin

- Supervisor: Prof. Peter Stone.
- Research question: *Can we improve the exploration efficiency of the Relational Reinforcement Learning algorithm?*
- Applying the exploration mechanism in Rmax-Q to Relational Reinforcement Learning to improve the latter's sample efficiency.
- Reinforcement Learning course project. [link]

Semi-Autonomous Intersection Management Summer, Fall 2012
Department of Computer Science
University of Texas at Austin

- Supervisor: Prof. Peter Stone and Prof. Tsz-Chiu Au.
- Research question: *Can we find a policy better than traffic signals, if human-driven, semi-autonomous and fully-autonomous vehicles are sharing the road?*
- Designing and evaluating a policy that is competent with all three types of vehicles, and performs better than traffic signals.
- Related publication: Tsz-Chiu Au, Shun Zhang, and Peter Stone. Autonomous Intersection Management for Semi-Autonomous Vehicles. In Handbook of Transportation, May 2015. [link]

Publications

- Tsz-Chiu Au, **Shun Zhang**, and Peter Stone. Semi-Autonomous Intersection Management (Extended Abstract). Autonomous Agents and Multiagent Systems (AAMAS), 2014. [link]
- Tsz-Chiu Au, **Shun Zhang**, and Peter Stone. Autonomous Intersection Management for Semi-Autonomous Vehicles. In Handbook of Transportation, 2015. [link] [1]
- Katie Genter, **Shun Zhang**, and Peter Stone. Determining Placements of Influencing Agents in a Flock. Autonomous Agents and Multiagent Systems (AAMAS), 2015.

Presentation

- Intersection Management with Constraint-Based Reservation Systems. Autonomous Robots and Multirobot Systems (ARMS), 2014.

Conference Attendance

- Autonomous Agents and Multiagent Systems (AAMAS), Paris, 2014.
- AAAI Conference, Austin, TX, 2015.

Courses and Projects

Graduate Level

- Large Scale Optimization (EE 381V)
- Markov Chain and Mixing Time (M 394C)
  Final Project: *Mixing Time in Reinforcement Learning Convergence Analysis . [link]*
- Machine Learning (CS 391L)
  Project reports:
  – *Principal Component Analysis. [link]*
  – *Independent Component Analysis. [link]*

[1] This is the extended version of the Semi-Autonomous Intersection Management paper.

  - *Approximate Inference in Bayesian Networks. [link]*
  - *Reinforcement Learning. [link]*
  - *Genetic Algorithm. [link]*
- Autonomous Robots (CS 393R)
- Randomized Algorithms (CS 388R)
- Reinforcement Learning (CS 394R)
  Project reports:
  - *N-armed bandit Problem. [link]*
  - *Eligibility Traces. [link]*
  - *Bootstrapping with Function Approximation. [link]*
  - *Transfer Learning in Gridworld. [link]*

Undergraduate Level
- Artificial Intelligence (CS 343)
- Principles of Computer Systems (CS 439)
- Automata Theory (CS 341)
- Information Retrieval (CS 371R)
- Programming Languages (CS 345)
  Final Project: *List Interpreter. [link]*
- etc.

Awards

Student Awards — University of Texas at Austin
- Louis E. Rosier Memorial Endowment Scholarship. 2013-2014

Student Awards — Nanjing University of Aeronautics and Astronautics
- Department Scholarships. 2009-2011

Teaching Experience

Undergraduate Teaching Assistant (Proctor) Fall 2013, Spring 2014
CS 301K Foundations of Logical Thought
with Dr. Jacob Schrum
Department of Computer Science,
University of Texas at Austin

Industry Experience

SDE Intern at Amazon Summer 2014
Seattle, WA
- Created an internal tool that supports WebRTC in Firefox.
- Modifying an internal tool for visualizing customer data, using Scala on Spark.

SDE Intern at Semantic Designs Summer 2013
Austin, TX
- Integrating a GUI viewer to Smart Differencer (TM) tools. Using JavaCC for parsing and Swing for GUI.

Languages

- Natural languages: Mandarin Chinese (native), English (fluent), Japanese (preliminary).
- Programming languages: Proficient in programming in Python, Octave/Matlab, Java, C/C++; Familiar with Lisp, Oracle SQL, LaTeX, Web Development Languages (HTML, JavaScript, PHP), Perl, Scala.