Shun Zhang

CONTACT INFORMATION

Department of Computer Science
The University of Texas at Austin
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RESEARCH INTERESTS

Reinforcement learning, robotics, theoretical machine learning, 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 with Prof. Peter Stone.

Nanjing University of Aeronautics and Astronautics, Nanjing, China

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

- G.P.A. 88/100.
- Transferred to University of Texas at Austin in Jan. 2012.

RESEARCH EXPERIENCE

Modular Reinforcement Learning — Fall 2014 — Present

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 the complicated behavior?*
- Using Inverse Reinforcement Learning to interpret human's behavior, assuming that it is a combination of the MDPs for preliminary tasks.

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, including border, grid, and graph-based placements.
- Paper in preparation: Determining Placements of Influencing Agents in a Flock. Katie Genter, Shun Zhang and Peter Stone.

Analysis of Reinforcement Learning Convergence Time using Mixing Time Fall 2014

Department of Mathematics
University of Texas at Austin

- Supervisor: Dr. Joe Neeman.
- Research question: *Can we prove a theoratical bound of the convergence time for popular RL algorithms?*
- Markov Chain and Mixing Time course project.

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.

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 machanism in Rmax-Q to Relational Reinforcement Learning to improve the latter's sample efficiency.
- Reinforcement Learning course project.

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: Semi-Autonomous Intersection Management (Extended Abstract). Tsz-Chiu Au, Shun Zhang, and Peter Stone. Autonomous Agents and Multiagent Systems (AAMAS), 2014.

Publications

- Tsz-Chiu Au, **Shun Zhang**, and Peter Stone. Semi-Autonomous Intersection Management (Extended Abstract). Autonomous Agents and Multiagent Systems (AAMAS), 2014.

Papers in Preparation

- Katie Genter, **Shun Zhang**, and Peter Stone. Determining Placements of Influencing Agents in a Flock.

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.

Courses Taken

Graduate Level

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

Industrial Experience

SDE Intern at Amazon Summer 2014
Seattle, WA

SDE Intern at Semantic Designs Summer 2013
Austin, TX

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.