Jacob Rafati

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RESEARCH INTERESTS	⬦ Machine Learning
	⬦ Convex and Nonconvex Optimization Methods
	⬦ Reinforcement Learning
	⬦ Artificial Intelligence

EDUCATION

⬦ **University of California, Merced**, Merced, CA (2013 – 2019)
Ph.D. in Electrical Engineering and Computer Sciences

⬦ **Sharif University of Technology**,
Tehran, Iran, (2008 - 2010)
M.Sc. in Mechanical Engineering.

⬦ **Sharif University of Technology**,
Tehran, Iran, (2003 - 2007)
B.Sc. in Mechanical Engineering.

RECENT PROJECTS

⬦ **Ph.D. Dissertation "Learning Representations in Reinforcement Learning"** (2014-2019)

⬦ **Learning Representations in Model-Free Hierarchical Reinforcement Learning.**

⬦ **Learning Sparse Representations of state in Reinforcement Learning.**

⬦ **Trust-region Optimization For Empirical Risk Minimization Methods in Deep Reinforcement Learning.**

⬦ **Quasi-Newton Optimization Methods in Deep Learning.**

⬦ **Improving initialization of limited-memory BFGS Methods.**

⬦ **Neural Network compressions in deep learning.**

⬦ **Optical flow and edge detection to detect interesting objects in ATARI video games.**

PAST PROJECTS

⬦ **M.Sc. Thesis** "Stability Analysis of hybrid nanotubes based on the nonlocal continuum theories" (2008-2010).

⬦ **B.Sc. Thesis** "Dynamical simulation of a wagon passing upon a symmetrical non-smooth rail and obtaining the wearing stresses" (2005-2006).

WORK EXPERIENCES

⬦ **Ph.D. Graduate Student Researcher**. Computational Cognitive Neuroscience Laboratory. Electrical Engineering and Computer Science. University of California, Merced. (June 2014 - Present)

⬦ **Graduate Teaching Assistant** for 13 semesters (2013 - 2018). School of Engineering. UC Merced.

⬦ **M.Sc. Graduate Student Researcher**. Sharif University of Technology. (2008 - 2010)

⬦ **Mechanical Engineer**. Iran Powerplant Development Company. (2009 - 2012).

TECHNICAL SKILLS

⬦ Programming Languages: `Python`, `MatLab`, `Java`, `C++`, `C#`, `Javascript`, `Bash`.

⬦ Machine Learning Libraries: `TensorFlow`, `Keras`, `scikit-learn`, `PyTorch`.

⬦ High Performance Computing on CPU Clusters and GPU using AWS.

Publications from Ph.D. Dissertation

PUBLICATIONS ◇ **Jacob Rafati**, David C. Noelle. (2019). Unsupervised Subgoal Discovery Method for Learning Hierarchical Representations. *7th International Conference on Learning Representations, ICLR 2019 Workshop on "Structure & Priors in Reinforcement Learning", New Orleans, LA, USA.*

◇ **Jacob Rafati**, David C. Noelle. (2019). Learning Representations in Model-Free Hierarchical Reinforcement Learning. *33rd AAAI Conference on Artificial Intelligence, Honolulu, HI.*

◇ **Jacob Rafati**, David C. Noelle. (2019). Unsupervised Methods For Subgoal Discovery During Intrinsic Motivation in Model-Free Hierarchical Reinforcement Learning. *AAAI (2019) workshop on Knowledge Extraction From Games.*

◇ **Jacob Rafati**, Roummel F. Marcia. (2018). Quasi-Newton Optimization in Deep Q-Learning for Playing ATARI Games. *ArXiv e-print (arXiv:1811.02693).*

◇ **Jacob Rafati**, Roummel F. Marcia. (2018). Improving L-BFGS Initialization For Trust-Region Methods In Deep Learning. *17th IEEE International Conference on Machine Learning and Applications, Orlando, FL.*

◇ **Jacob Rafati**, Omar DeGuchy, and Roummel F. Marcia (2018). Trust-Region Minimization Algorithms for Training Responses (TRMinATR): The Rise of Machine Learning Techniques. *26th European Signal Processing Conference (EUSIPCO 2018), Rome, Italy.*

◇ **Jacob Rafati**, David C. Noelle. (2017). Sparse Coding of Learned State Representations in Reinforcement Learning, *1st Cognitive Computational Neuroscience Conference, New York City, NY.*

◇ **Jacob Rafati**, David C. Noelle. (2015). Lateral Inhibition Overcomes Limits of Temporal Difference Learning, *37th Annual Meeting of Cognitive Science Society, Pasadena, CA.*

Publications from M.Sc. Dissertation

◇ **Jacob Rafati**, Mohsen Asghari and Sachin Goyal. (2014) Effects of DNA Encapsulation on Buckling Instability of Carbon Nanotube based on Nonlocal Elasticity Theory. *Proceedings of the ASME 2014 14th International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Buffalo, New York, USA.*

◇ Mohsen Asghari, **Jacob Rafati**, and Reza Naghdabadi. (2013). Torsional Instability of Carbon Nano-Peapods based on the Nonlocal Elastic Shell Theory. *Physica E: Low-dimensional Systems and Nanostructures*, 47: p. 316-323.

◇ Mohsen Asghari, Reza Naghdabadi, and **Jacob Rafati**. (2011). Small Scale Effects on the Stability of Carbon Nano-Peapods under Radial Pressure, *Physica E: Low-dimensional Systems and Nanostructures*, 43(5): p. 1050-1055.

◇ Mohsen Asghari, **Jacob Rafati**. (2010). Variational Principles for the Stability Analysis of Multi-Walled Carbon Nanotubes Based on a Nonlocal Elastic Shell Model, *ASME 2010 10th Biennial Conference on Engineering Systems Design and Analysis (ESDA2010).*

TALKS ◇ "Quasi-Newton Optimization in Large-scale Machine Learning". (April 2019). SOMACS, CalTech.

◇ "Learning Representations in Reinforcement Learning". (April 2019). Ph.D. dissertation defense.

◇ "Unsupervised Methods for Subgoal Discovery". (2019). AAAI KEG workshop. Honolulu, HI.

◇ "Trust-Region Methods In Deep Learning". (2018). ICMLA Conference, Orlando, FL.

◇ "Optimization Methods in Deep Reinforcement Learning". (2018). EECS Technical Seminar Series.

◇ "Hierarchical Reinforcement Learning". (2018). SIAM Graduate Student Chapter Seminar.

◇ "State Representations in Reinforcement Learning". (2017). EECS Technical Seminar Series.

HONORS & AWARDS	⬦ University of California, Merced Graduate Dean's Dissertation Fellowship (Fall 2018)
	⬦ AAAI Travel Schoalrship Award (2019)
	⬦ ICLR Travel Schoalrship Award (2019)
	⬦ University of California, Merced Graduate Excel Peer Mentorship Program Fellowship (Fall 2018)
	⬦ UC Merced EECS Bobcat Fellowships (2014 – 2019)
	⬦ Best Student Paper Award from Iran Nanotechnology Council (2011,2013)
	⬦ **Ranked 131st** in the Iranian National Entrance Exam for Graduate Admission (2007)
	⬦ **Ranked 141st** in the Iranian National University Entrance Exam among 350,000 Participants (2003)

SOCIETIES & MEMBERSHIP	⬦ Member of Institute of Electrical and Electronics Engineers (IEEE)
	⬦ Member of Association for Computing Machinery (ACM)
	⬦ Member of Society of Industrial and Appiled Mathematics (SIAM)
	⬦ Member of the Association for the Advancement of Artificial Intelligence (AAAI)

TEACHING EXPERIENCE	⬦ **Graduate Teaching Assistant** (2013 - 2018)
	○ Introduction to Artificial Intelligence. Fall 2017, Fall 2018.
	○ Computational Cognitive Neuroscience. Spring 2017, Spring 2018.
	○ Computer organizations. Spring 2016. Summer 2018.
	○ Introduction to Computing. Spring 2015, Fall 2016.
	○ Engineering Computing. Fall 2013.