Jacob Rafati

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RESEARCH
INTERESTS
⋄ Machine Learning

⋄ Numerical Optimization

⋄ Deep Learning

⋄ Reinforcement Learning

EDUCATION ⋄ **University of California, Merced**, Merced, CA (Fall 2013 – Present)
Ph.D. Candidate in Electrical Engineering and Computer Sciences
(Graduation expectation date: May 17th, 2019)

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

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

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.*

⋄ **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)*.

HONORS,
AWARDS &
FELLOWSHIPS

◇ UC Merced Graduate Dean's Dissertation Fellowship (Spring Semester 2019)

◇ AAAI Travel Schoalrship Award (2019)

◇ ICLR Travel Schoalrship Award (2019)

◇ UC Merced Graduate Excel Peer Mentorship Program Fellowship (Fall 2018, Spring 2019)

◇ UC Merced EECS Bobcat Fellowships (2014 – 2019)

◇ Best ISI Student Paper in Nanotechnology, Funded by Iran Nanotechnology Council (2011, 2013)

◇ Best M.Sc. Thesis in Nano-Mechanics, Funded by Iran Nanotechnology Council (2010)

◇ Ranked 131st in the Iranian National Entrance Exam for Graduate Admission (2007)

◇ Ranked 141st in the Iranian National University Entrance Exam (2003) among 350,000 participants

AFFILIATIONS
AND
MEMBERSHIPS

◇ Member of Institute of Electrical and Electronics Engineers (IEEE)

◇ Member of Association for Computing Machinery (ACM)

◇ Member of Society of Industrial and Applied Mathematics (SIAM)

◇ Member of the Association for the Advancement of Artificial Intelligence (AAAI)

RECENT
PROJECTS

◇ **Ph.D. Dissertation "Learning Representations in Reinforcement Learning"** (2014-now)
Supervised by Dr. David C. Noelle

◇ **Representations in Model-Free Hierarchical Reinforcement Learning** (2017 – present).

◇ **Learning Sparse Representations of state in Reinforcement Learning.** (2014 – 2016).

◇ **Optimization Methods in Reinforcement Learning.** (2018 – present).

◇ **Neural Correlates and Phenomenology of HRL.** (2018 – present).
With Dr. Jeffrey Yoshimi, Associate professor of Cognitive and Information Science, UC Merced.

◇ **Quasi-Newton optimization methods in deep learning.** (2017 – present).
With Dr. Roummel F. Marcia, Professor of Applied Mathematics, UC Merced.

◇ **Network compression methods in deep learning** (2017)
The Advanced Study in Machine Learning course project.

PAST
PROJECTS

◇ **M.Sc. Thesis** "Stability Analysis of hybrid nanotubes based on the nonlocal continuum theories" (2008-2010). Supervised by Dr. Mohsen Asghari.

◇ **B.Sc. Thesis** "Dynamical simulation of a wagon passing upon a symmetrical non-smooth rail and obtaining the wearing stresses" (2005-2006). Supervised by Dr. Mohamad Durali.

RECENT
TALKS

◇ "Unsupervised Methods for Subgoal Discovery". AAAI 2019. Honolulu, Hawaii.

◇ "Improving L-BFGS Initialization For Trust-Region Methods". ICMLA 2018. Orlando, FL.

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

◇ "Hierarchical Reinforcement Learning". (2018). UC Merced SIAM graduate student chapter seminar.

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

TEACHING
EXPERIENCE

◇ **Teaching Assistant**

  ○ Introduction to Artificial Intelligence. Fall 2017. Fall 2018.

  ○ Computational Cognitive Neuroscience. Spring 2017. Spring 2018.

  ○ Computer organizations. Spring 2016. Summer 2018.

  ○ Introduction to Computing. Fall 2015. Spring 2015. Fall 2016.

  ○ Engineering Computing. Fall 2013.