Kamyar Azizzadenesheli

Computing + Mathematical Sciences
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Research Interests

My research interest is mainly in the area of Machine Learning, from theory to practice, with the main focus in Reinforcement Learning. I work on Learning Theory, Deep Learning, Robotics, Spectral Method, Non-Convex Optimization, Distributed Optimization, Online Learning, Active Learning, Safety, Fairness, Adversarial Attacks, and Generative Models.

Current Positions

Assistant Professor, Department of Computer Science *Start Aug. 2020*
Purdue University, West Lafayette, IN, USA

Postdoctoral Scholar, Department of Computing + Mathematical Sciences *Since 2019*
California Institute of Technology, Pasadena, CA, USA.

Education

Ph.D. Candidate in Electrical Engineering & Computer Science *2014-2019*
advised by Prof. Anima Anandkumar, University of California, Irvine, CA, USA.

M.Sc. in Electrical Engineering & Computer Science *2014-2015*
advised by Prof. Anima Anandkumar, University of California, Irvine, CA, USA.

B.Sc. in Electrical Engineering *2010-2014*
advised by Prof. F. Ashtiani & Prof. F. Marvasti, Sharif University of Technology, Tehran, Iran.

Positions

- I will be joining the CS department at **Purdue University** as an Assistant Professor in Fall 2020.
- `Postdoctoral Scholar` at **Caltech**, Pasadena , CA, USA. *(July 2019-Present)*
  Hosts: Prof. Animashree Anandkumar & Prof. Yisong Yue
- `Special Student` at **Caltech**, Pasadena , CA, USA. *(April 2019-June 2019)*
  Hosts: Prof. Animashree Anandkumar & Prof. Yisong Yue
- `Visiting Researcher` at **Caltech**, Pasadena , CA, USA. *(June 2018-April 2019)*
  Hosts: Prof. Animashree Anandkumar & Prof. Yisong Yue
- `Visiting Researcher` at **Stanford University**, Palo Alto, CA, USA. *(October 2017-June 2018)*
  Hosts: Prof. Emma Brunskill
- `Long term visiting researcher` at **Simons Institute**, **UC Berkeley**, CA, USA. *(Jan 2017-May 2017)*

- `Guest Researcher` at **INRIA, France**, *(August 2016-November 2016)*
  Hosts: Dr. Alessandro Lazaric
- `Short-term Visiting Researcher` at **MSR, New York City**, *(2016)*
- `Short-term Visiting Researcher` at **MSR, New England**, *(2016)*

Awards and Honors

- **EECS Department Fellowship**, University of California, Irvine, CA, USA, 2014.
- **Silver Medal** in International Olympiad in Astronomy & Astrophysics, Beijing, China, 2010.
- **Gold Medal** in National Olympiad in Astronomy & Astrophysics, Tehran, Iran, 2009.
- **First rank elite student** in National Elite Foundation, Iran, 2009-2014.
- **Second prize** in Sharif RoboCup Competition, Machine vision section, Tehran, Iran, 2012.

Books

- **Deep Learning - The Straight Dope**, an online Deep Learning book on Amazon Mxnet Library. Zachary C. Lipton, Mu Li, Alex Smola, Sheng Zha, Aston Zhang, Joshua Z. Zhang, Eric Junyuan Xie, K. Azizzadenesheli, Jean Kossaifi, Stephan Rabanser, `[link]`

Papers

∗ Chiyu (Max) Jiang, Soheil Esmaeilzadeh, Kamyar Azizzadenesheli, Karthik Kashinath, Mustafa Mustafa, Hamdi A. Tchelepi, Philip Marcus, Prabhat, Anima Anandkumar. MeshfreeFlowNet: A Physics-Constrained Deep Continuous Space-Time Super-Resolution Framework, 2020.
`[paper]`

∗ Jonathan D. Smith, K. Azizzadenesheli, Zachary E Ross. EikoNet: Solving the Eikonal equation with Deep Neural Networks, 2020.
`[paper]`

∗ Sahin Lale, K. Azizzadenesheli, Babak Hassibi, Animashree Anandkumar. Logarithmic Regret Bound in Partially Observable Linear Dynamical Systems, 2020.
`[paper]`

∗ Sahin Lale, K. Azizzadenesheli, Babak Hassibi, Animashree Anandkumar. Regret Bound of Adaptive Control in Linear Quadratic Gaussian (LQG) Systems, 2020.
`[paper]`

∗ Zongyi Li, Nikola Kovachki, K. Azizzadenesheli, Burigede Liu, Kaushik Bhattacharya, Andrew Stuart, Anima Anandkumar. Neural Operator: Graph Kernel Network for Partial Differential Equations,
Appeared at International Conference on Learning Representations (ICLR) 2020 Workshop.
`[paper]`

∗ Sahin Lale, K. Azizzadenesheli, Babak Hassibi, Animashree Anandkumar. Regret Minimization in Partially Observable Linear Quadratic Control,
Appeared at Neural Information Processing Systems (NeurIPS) 2019 Workshop.
`[paper]`

* Zachary E Ross, Daniel T Trugman, K. Azizzadenesheli, Animashree Anandkumar. Directivity Modes of Earthquake Populations with Unsupervised Learning,
Appeared at the Journal of Geophysical Research 2020,
[paper]

* Amy Zhang, Zachary C Lipton, Luis Pineda, K. Azizzadenesheli, Animashree Anandkumar, Laurent Itti, Joelle Pineau, Tommaso Furlanello. Learning Causal State Representations of Partially Observable Environments,
Appeared at the Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM) 2019.
[paper]

* K. Azizzadenesheli. Maybe a few considerations in Reinforcement Learning Research?, 2019.
[paper]

* K. Azizzadenesheli. Reinforcement Learning in Structured and Partially Observable Environments, 2019.
[Thesis]

* K. Azizzadenesheli, Manish Kumar Bera, Animashree Anandkumar. Trust Region Policy Optimization of POMDPs, 2018.
[paper]

* Sahin Lale, K. Azizzadenesheli, Babak Hassibi, Animashree Anandkumar. Stochastic Linear Bandits with Hidden Low Rank Structure,
Appeared at Neural Information Processing Systems (NeurIPS) 2019 Workshop.
[paper]

* K. Azizzadenesheli, Anqi Liu, Fanny Yang, Animashree Anandkumar. Regularized Learning for Domain Adaptation under Label Shifts,
Appeared at International Conference on Learning Representations (ICLR) 2019.
[paper]

* Jeremy Bernstein, Jiawei Zhao, K. Azizzadenesheli, Anima Anandkumar. signSGD with Majority Vote is Communication Efficient and Fault Tolerant,
Appeared at International Conference on Learning Representations (ICLR) 2019.
[paper]

* Guanya Shi, Xichen Shi, Michael OConnell1, Rose Yu, K. Azizzadenesheli, Animashree Anandkumar, Yisong Yue, and Soon-Jo Chung. Neural Lander: Stable Drone Landing Control using Learned Dynamics,
Appeared at International Conference on Robotics and Automation (ICRA) 2019.
[paper] [video]

* K. Azizzadenesheli, Brandon Yang, Weitang Liu, Zachary C Lipton, Animashree Anandkumar. Surprising Negative Results for Generative Adversarial Tree Search,
Appeared at International Conference on Machine Learning (ICML) 2018 workshop.
[paper]

* Jeremy Bernstein, Yu-Xiang Wang, K. Azizzadenesheli, Anima Anandkumar. signSGD: Compressed Optimisation for Non-Convex Problems,
Appeared at International Conference on Machine Learning (ICML) 2018.
[paper]

* Jeremy Bernstein, K. Azizzadenesheli, Yu-Xiang Wang, Anima Anandkumar. Compression by the signs: distributed learning is a two-way street,
Appeared at International Conference on Learning Representations (ICLR) 2018 Workshop.
[paper]

* Guneet S. Dhillon, K. Azizzadenesheli, Jeremy D. Bernstein, Jean Kossaifi, Aran Khanna, Zachary C. Lipton, Animashree Anandkumar. Stochastic activation pruning for robust adversarial defense,
Appeared at International Conference on Learning Representations (ICLR) 2017.
`[paper]`

* K. Azizzadenesheli, Animashree Anandkumar. Efficient Exploration through Bayesian Deep Q-Networks,
Appeared at Neural Information Processing Systems (NeurIPS) 2017 Workshop.
`[paper]` `[talk]`

* K. Azizzadenesheli, Alessandro Lazaric, Anima Anandkumar. Reinforcement Learning in Rich Observation MDPs using Spectral Methods,
Appeared at Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM) 2017.
`[paper]`

* Zachary C. Lipton, K. Azizzadenesheli, Abhishek Kumar, Lihong Li, Jianfeng Gao, Li Deng. Combating Reinforcement Learnings Sisyphean Curse with Intrinsic Fear,
Appeared at Neural Information Processing Systems (NeurIPS) 2016 Workshop.
`[paper]`

* K. Azizzadenesheli, Alessandro Lazaric, Anima Anandkumar. Experimental paper: Reinforcement Learning of POMDPs using Spectral Methods,
Appeared at Neural Information Processing Systems (NeurIPS) 2016 Workshop.
`[paper]`

* K. Azizzadenesheli, Alessandro Lazaric, Anima Anandkumar. Open Problem: Approximate Planning of POMDPs in the class of Memoryless Policies,
Appeared at Conference on Learning Theory (COLT) 2016.
`[paper]` `[talk]`

* K. Azizzadenesheli, Alessandro Lazaric, Anima Anandkumar. Reinforcement Learning of POMDPs using Spectral Methods,
Appeared at Conference on Learning Theory (COLT) 2016.
`[paper]` `[talk]`

News

- `Podcast` interview by TalkRL *(October, 2019)*
- `Talk` on Statistical Learning Theory in Practice, UC. San Diego, CA, USA *(March, 2019)*
- `Talk` Reinforcement Learning in Structured Environments, UT Austin, Tx, USA *(October, 2018)*
- `Interview` by This Week in Machine Learning AI (TWiML & AI) *(August, 2018)*
- `Talk` on Exploration in Reinforcement Learning workshop, ICML 2018, Stockholm, Sweden *(July, 2018)*
- `Talk` on Bayesian deep Reinforcement Learning , Stanford, CA, USA *(May, 2018)*
- `Talk` on Reinforcement Learning in rich observable environment , Stanford, CA, USA *(February, 2018)*
- `Talk` at MLTrainon workshop, NeurIPS 2017, Long Beach, CA, USA *(December, 2017)*
- `Talk` on Deep Learning, Deep RL and MxNet at Stanford University, CA, USA *(November, 2017)*
- `Invited talk` at Amazon AWS, Palo Alto, CA, USA *(April, 2017)*
- `Talk` at "Interactive Learning" workshop, Simons Institute, UC Berkeley, CA, USA *(Feb, 2017)*

- Talk on "RL of Partially Observable Environment" Caltech, CA, USA *(Jan, 2017)*
- Talk at "Open Problem" , *Colombia University, (COLT), (June, 2016)*
- Talk at "Bandit and Reinforcement Learning", *Colombia University, (COLT), (June, 2016)*
- Certified in "Topological Data Analysis" *NSF-CBMS, (June, 2016)*

Mentees

Guneet S Dhillon (UT Austin, Amazon), Weitang Liu (UC, Davis), Jeremy Bernstein (Caltech), Sahin Lale (Caltech), Brandon Yang (Stanford, Google Brain), Manish Kumar Bera (IIT Kanpur, Caltech), Jiawei Zhao (Nanjing University, Caltech), Hongjie Chen (Shanghai Jiao Tong University, Caltech), Zongyi Li (Washington University in St. Louis, Caltech), Vivek Bharadwaj (Caltech), Akshay R. Vegesna (Caltech), Ravi Tej Akella (IIT Roorkee), Manish Prajapat (ETH), Albert Zhai (Caltech), Abhijeet Vyas (IIT), Jihwan Bae (Gwangju Institute of Science and Technology), Sirui Li (MIT), Saturnin J. Pugnet (Caltech)

Professional Services:
Reviewer: JMLR, ACM SIGMETRICS, IJCLA, AAAI, COLT, ICLR, ICML, LOD, NeurIPS, RLDM, IEEE, Springer STCO