VIGNESH SUBRAMANIAN

PhD Candidate, University of California Berkeley

Email: @ vignesh.subramanian@eecs.berkeley.edu   Website: % people.eecs.berkeley.edu/ vignesh.subramanian   Linkedin: in vigneshs258

RESEARCH PROJECTS

Harmless fitting of Noise in Linear Regression and Classification

Collaborators: Prof Anant Sahai, Prof. Daniel Hsu, Prof. Mikhail Belkin

📅 Aug '19 - Present   📍 UC Berkeley

- Related the regression and classification error in overparameterized linear models to statistical signal processing concepts of shrinkage and false-discovery and computed sharp upper and lower bounds for these quantities.
- Showed the existence of a new regime where asymptotically classification performs well but regression does not.

Learning Stabilizing Control under Multiplicative Noise

Collaborators: Prof. Gireeja Ranade

📅 July '19 - Jan '20   📍 UC Berkeley

- Used neural networks to discover control strategies for stabilizing a control system under multiplicative noise.
- Proposed an architecture and training procedure tailored for the control problem and learned a control strategy that beats previous best strategies.

Machine learning for Physical Layer Wireless Communication

Collaborators: Prof. Anant Sahai

📅 Aug '18 - Present   📍 UC Berkeley

- Designed a blind interactive learning protocol for modulation schemes in the multi-agent setting and experimentally verified its universality and robustness.
- Working on incorporating meta-learning techniques that enable agents to rapidly adapt.

PUBLICATIONS

Journals

- Vidya Muthukumar, Kailas Vodrahalli, Vignesh Subramanian, Anant Sahai, "Harmless interpolation of noisy data in regression", IEEE Journal on Selected Areas in Information Theory, Special Issue on Deep Learning: Mathematical Foundations and Applications to Information Science, 2019. (link)
- Vidya Muthukumar, Adhyyan Narang, Vignesh Subramanian, Mikhail Belkin, Daniel Hsu, Anant Sahai "Classification vs regression in overparameterized regimes: Does the loss function matter? ", Journal of Machine Learning Research (JMLR), 2020. (arxiv.org/abs/2005.08054)
- Anant Sahai, Joshua Sanz, Vignesh Subramanian, Caryn Tran, Kailas Vodrahalli, "Blind interactive learning of modulation schemes: Multi-agent cooperation without co-design ", IEEE Access, Special Section: Artificial Intelligence for Physical-layer Wireless, 2019 (link)

Conference Proceedings

- Vignesh Subramanian, Moses Won, Gireeja Ranade, "Learning a Neural-Network Controller for a Multiplicative Observation Noise System ", IEEE International Symposium on Information Theory (ISIT), 2020. (link)
- Vignesh Subramanian, Laura Brink, Nikunj Jain, Kailas Vodrahalli, Akhil Jalan, Nikhil Shinde, Anant Sahai, "Some new numeric results concerning the Witsenhausen Counterexample", 56th Annual Allerton Conference on Communication, Control, and Computing, 2018. (link)

EDUCATION

Doctor of Philosophy
Electrical Engineering and Computer Science

Grade Point Average – 4.0/4.0

Aug '17 – Present | UC Berkeley

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Master of Technology, Bachelor of Technology
Electrical Engineering

Cumulative Performance Index – 9.86/10.0
Minor – Computer Science & Engineering

July '10 – May '15 | IIT Bombay

WORK EXPERIENCE

WorldQuant Research (India)
Quantitative Researcher   📅 July'15-July'17

Graduate Student Instructor
Machine Learning   📅 Aug'20-Dec'20

Convex Optimization   📅 Jan-May'19, Jan-May'20

Plus, Cupertino
Machine Learning Internship   📅 May'21-Aug'21

PROGRAMMING SKILLS

Python ●●●●●
PyTorch ●●●●●
MATLAB ●●●●○
C++ ●●●●○

RESEARCH INTERESTS

- Applications of Machine Learning in Wireless Communication, Control and Perception
- Machine Learning Theory

COURSES

- Machine Learning, Deep Reinforcement Learning, Digital Signal Processing, Wireless Communication
- Probability and Stochastic Processes, Convex Optimization, Stochastic Control Systems, Information Theory, Theoretical Statistics

AWARDS

- (2017) Department Fellowship, EECS
- (2015) Institute Gold Medal, IIT Bombay
- (2015) Institute Silver Medal, IIT Bombay