Pratik Chaudhari

Interests: deep learning, computer vision, autonomous driving, robotics

☎ +1 (857) 272 3225
✉ pratikac@ucla.edu
pratikac.info

Work Experience

Principal Autonomous Vehicle Engineer *Sum. '14-15-16*
nuTonomy Inc.

- **Perception algorithms:** Fusing multi-laser, multi-camera and inertial sensors for object detection and tracking, 3D object detection in point-clouds
- **Urban driving simulators:** High-performance simulators for Velodyne, LIDARs, engine and vehicle dynamics. Built a traffic simulation platform for testing interaction of multiple copies of the code against each other.

Visiting Researcher *Sum. '11-12-13*
Singapore-MIT Alliance for Research and Technology
Demonstrated a campus mobility-on-demand system in the National University of Singapore.

Research Experience

Research Assistant *2014 – 2018*
Advisor: Stefano Soatto, Computer Science, UCLA

- **Generalization of SGD**: Analysis of regularization properties of SGD & variational inference via statistical physics
- **Efficient algorithms** for training deep networks that are 2-5$\times$ faster than SGD with better generalization. Distributed and federated learning variants.

Research Assistant *2010 – 2014*
Advisor: Emilio Frazzoli, LIDS, MIT

- **Formal methods**: Provably-safe autonomous driving using novel temporal logics to model road-safety rules
- **Stochastic systems**: Efficient algorithms for particle filters and POMDPs based on random geometric graphs

Teaching

- **Tutorial: Mathematics of deep learning** *CDC '17*
- **An introduction to deep learning** (2 hrs) *CS 268, UCLA*
- **Spin glasses and deep networks** (2 hrs) *MI Seminar, UCLA*
- **Teaching assistant, MIT** *Feedback Control Systems, Fall 2012*

Talks

- **Unraveling the mysteries of SGD on deep networks**
  UCLA Math, NIPS
- **A picture of the energy landscape of deep networks**
  Stanford, MIT, ENS Paris / Cachan, NYU, Amazon AWS, OpenAI
- **Sampling-based algorithms: stochastic systems and formal specifications**
  KTH, Qualcomm, Nissan, RSS

Education

2014 – 2018	**PhD, Computer Science**
GPA: 3.85/4	University of California, Los Angeles
2010 – 2014	**Engineer's & Master's, Aero-Astro**
GPA: 4.9/5	Massachusetts Institute of Technology
2006 – 2010	**B.Tech., Aerospace Engineering**
GPA: 9.2/10	Indian Institute of Technology Bombay

Awards

2014	**Balu and Mohini Balakrishnan Fellowship**, *UCLA*
2013	**Most societally beneficial video**, *IJCAI*
2010	**David and Patricia Vous Foundation Fellowship**, *MIT*
	Institute Silver Medal, *IIT Bombay*
	Aeronautical Society of India Award
2009	**Individual Achievement Award**, *Honeywell*
2004-10	**National Talent Search Scholarship**, *Govt. of India*

Publications [Google Scholar]

- SGD performs variational inference, converges to limit cycles for deep networks (submitted to ICLR '18)
- Parle: parallelizing stochastic gradient descent (in prep.)
- Deep Relaxation: PDEs for training deep networks, (in review)
- Entropy-SGD: biasing stochastic gradient descent towards wide valleys, ICLR '17
- Game theory based planning for multi-robot planning, ICRA '14
- Minimum-violation motion planning for urban navigation, CDC '13

Coursework

CS & ML	machine learning, computer vision, graphical models, statistical data processing, information theory, theory of complexity, communication complexity, adv. algorithms
Probability	measure theory, advanced stochastic processes, theoretical statistics, percolation theory
Robotics	AI, stochastic estimation & control, optimal control

Skills

Programming	C++ / C, Python (PyTorch / TF), Lua (Torch), OpenGL, CUDA, CMake, MPI
Robotics	ROS, LCM

References

Available upon request.