Sharad Chitlangia

Anuraddha and Prashanth Palakurthi Centre for AI Research
Department of Electrical and Electronics Engineering
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Google Scholar

Education

BITS Pilani K K Birla Goa Campus *2017 - 2021*
B.E. in Electronics and Instrumentation
GPA: 8.05/10 *(First Division)*
Advisor: Prof. Ashwin Srinivasan & Prof. Tirtharaj Dash

Work Experience

APP Centre for AI Research, BITS Pilani *Jan 2021 - April 2021*
Undergraduate Researcher
Advisors: Dr. Gautam Shroff & Dr. Lovekesh Vig
Work on Wake-Sleep Bayesian Neural Program Learning and its applications to Bongard Problems

Safe AI Lab, Carnegie Mellon University *August - December, 2020*
Remote Research Intern (Bachelor's Thesis)
Advisors: Prof. Ding Zhao
Work on Safe Model Based Reinforcement Learning and examining the Interplay between LiDAR Placement and Perception Performance of an Autonomous Vehicle.

India Machine Learning, Amazon Research *May - December, 2020*
Research Engineering Intern
Advisors: Sachin Farfade
Worked on Search Query Disambiguation as part of the larger Guided Search Project

Real World Reinforcement Learning, Microsoft Research *April - August, 2020*
Independent Developer
Advisors: Rajan Chari
Worked on integrating Flatbuffers as an input format for Vowpal Wabbit. Demonstrated speedups by upto 60%

APP Centre for AI Research, BITS Pilani *January - May, 2020*
Undergraduate Researcher
Advisors: Prof. Ashwin Srinivasan & Dr. Lovekesh Vig
Worked on Interpretable Causal Neuro-symbolic Machines

Edge Computing Lab, Harvard University *June - August, 2019*
Research Intern
Advisors: Prof. Vijay Janapa Reddi
Worked at the intersection of Systems and Reinforcement Learning.

CERN-HSF *May - August, 2019*
Google Summer of Code Intern
Advisors: Dr. Andreas Salzburger
Worked on Track Reconstruction using Machine Learning.

UnFound.ai *May - July, 2018*
Machine Learning Intern
Advisors: Ankur Pandey
Pre-training large scale NLP models & Deploying NLP-based services

Publications

6. **Improving Perception via Sensor Placement: Designing Multi-LiDAR Systems for Autonomous Vehicles**
Sharad Chitlangia, Zuxin Liu, Akhil Agnihotri, Ding Zhao
*Autonomous Driving: Perception, Prediction and Planning Workshop at **37th CVPR, 2021**.*

5. **Widening Access to Applied Machine Learning**
   Reddi *et. al.* including Sharad Chitlangia
   (under review), 2021.

4. **ActorQ: Quantization for Actor-Learner Distributed Reinforcement Learning**
   Maximilian Lam*, **Sharad Chitlangia***, Srivatsan Krishnan*, Zishen Wan, Gabriel-Barth Maron, Aleksandra Faust and Vijay Janapa Reddi.
   *Hardware Aware Efficient Training Workshop at **9th ICLR, 2021***

3. **Incorporating Domain Knowledge into Neural Networks**
   Tirtharaj Dash, **Sharad Chitlangia**, Aditya Ahuja, Ashwin Srinivasan
   arXiv:2103.00180 (under review), 2021.

2. **Reinforcement Learning and its Connections with Neuroscience and Psychology**.
   Ajay Subramanian, **Sharad Chitlangia**, Veeky Baths.
   arXiv:2007.01099 (under review), 2020

1. **Quantized Reinforcement Learning (QuaRL)**
   Maximilian Lam*, **Sharad Chitlangia***, Srivatsan Krishnan*, Zishen Wan, Gabriel-Barth Maron, Aleksandra Faust and Vijay Janapa Reddi.
   *Resource Constrained Machine Learning Workshop (ReCoML) at **3rd MLSys, 2020***
   arXiv:1910.01055 (under review), 2019

Thesis

1. **On the Interplay between LiDAR Placement and Perception Performance in Autonomous Vehicles** .
   Sharad Chitlangia, Zuxin Liu and Ding Zhao.
   College of Engineering, Carnegie Mellon University.

Software

1. **GenRL: A Pytorch Reinforcement Learning Library**.
   Society for Artificial Intelligence and Deep Learning, 2020
   Stats as of February 2021: ★ 352

Selected Awards and Honors

- Selected among 3 undergraduate (out of 200+ applicants) candidates globally to take part in the Reinforcement Learning Open Source Festival *2020*
- Selected among 50 students to attend Google Research India's AI Summer School (AI4SG track) *2020*
- Selected among 250 (out of 1000) candidates globally to take part in Montreal Institute of Learning Algorithms' Deep Learning and Reinforcement Learning Summer School (DLRL SS) *2020*
- Winner of the special Bounty Prize (US$500) at HackInOut, India's largest Community Hackathon *2019*
- Selected among 40 students globally to be participate in the Google Summer of Code 2019 under CERN-HSF *2019*
- Top 1% by Percentile in JEE Mains & Advanced *2017*

Talks

- **Pushing the limits of Vowpal Wabbit with Flatbuffers**
  - Microsoft Research, NYC

Professional Responsibilities

- *Undergraduate Teaching Assistantship*
  - Meta Learning - *Dr. Gautam Shroff & Prof. Tirtharaj Dash* *Spring 2021*
  - Reading Course on AI+Neuroscience - *Prof. Veeky Baths* *Fall 2020*
- *Positions of Responsibility* - BITS Pilani, K K Birla Goa Campus
  - President, Society for Articial Intelligence and Deep Learning *2019-2020*
  - Coordinator, Society for Articial Intelligence and Deep Learning *2019*
  - Panel Coordinator, Quark (Annual Technical Festival) *2019*
- *Contributor*

– tinyML EdX professional certificate program - *Prof. Vijay Janapa Reddi* *Fall 2020*

Selected Projects

1. **Quantized Reinforcement Learning (QuaRL)**
   - Applied and benchmarked uniform, symmetrical Quantizer based Post Training Quantization techniques on state-of-the-art RL algorithms (PPO, DDPG) on common RL environment suites such as Gym, Atari, Mujoco, etc
   - Experimented on Quantization Aware training to explore application of Fake Quantization to enable more stable quantized RL agents
   - Established (through experiments) that quantization noise results in increase of reward in traditional RL training
   - Collaborated with team to design and evaluate experiments on speeding up distributed RL training through a novel training algorithm, ActorQ, that runs actors on quantized precision (8/16) to show speedups of up to 1.5-2.5x
   - Researched formulation of Quantization Noise as Exploration Process; benchmarked on ProcGen

2. **Pushing the limits of Vowpal Wabbit with Flatbuffers**
   - Integrated Flatbuffers protocols as an input format into VowpalWabbit; inference speedups increased up to by 60%
   - Modified CI/CD DevOps workflows for automatic installation of Flatbuffers in Docker Images

3. **On the Interplay between LiDAR Placement and Perception Performance in Autonomous Vehicles**
   - Designed a novel Information Theoretic Surrogate Cost function to represent placement position as an optimization problem
   - Designed an automated experimental data collection pipeline and tool based on Carla with specification on Traffic Scenarios
   - Benchmarked state-of-the-art pointcloud based 3D object detection machine learning models on the generated data to demonstrate placement optimization can lead to better perception performance.

CourseWork

On-Campus
Machine Learning, Applied Statistical Methods, Neural Networks and Fuzzy Logic, Object Oriented Programming, Digital Image Processing, Probability and Statistics, Linear Algebra and Complex Analysis, Multivariable Calculus, Differential Equations, Digital Design, Microprocessors and Interfacing, Control Systems, Meta-Learning (as a Teaching Assistant)
Online
Machine Learning (Stanford), CS231n (Stanford), CS224n (Stanford), CS284 (UCB)

Technical Skills

Languages: Python, C++, Java, Javascript, Scala, Spark, LaTeX
Operating Systems: Unix, MacOS
Technologies: AWS EC2, GCP, Heroku, Docker, Git, Hadoop, CI CD, DevOps