Shivam Garg

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EDUCATION

University of Alberta, Canada 2019–21
Master of Science (Thesis) in Computing Science
Supervisors: Prof. Rupam Mahmood and Prof. Martha White
GPA: 4.0/4.0

Indian Institute of Technology (BHU) Varanasi, India 2014–19
Integrated Dual Degree [BTech (Hons.) + MTech] in Computer Science and Engineering
GPA: 9.77/10.0 (ranked 1/82 in my class)

INTERESTS

Artificial Intelligence, Reinforcement Learning (in particular, policy gradient methods and temporal difference learning)

PUBLICATIONS

Conferences and Journals

[1] Sina Ghiassian*, Andrew Patterson*, Shivam Garg, Dhawal Gupta, Adam White, Martha White, **Gradient Temporal-Difference Learning with Regularized Corrections**, *International Conference on Machine Learning (ICML)*, 2020.
[2] Shivam Garg and Rajeev Srivastava, **Object Sequences: Encoding Categorical and Spatial Information for a Yes/No Visual Question Answering Task**, *IET Computer Vision*, 2018.

Workshops

[3] Shivam Garg*, Homayoon Farrahi*, A. Rupam Mahmood, **Enabling Safe Exploration of Action Space in Real–World Robots**, *Virtual Conference on Reinforcement Learning for Real Life (RL4RealLife)*, 2020.
[4] Shivam Garg, **Mirror Descent for Robust Reinforcement Learning**, *Indian Workshop on Machine Learning (iWML)*, 2018.

TEACHING ASSISTANT

University of Alberta

CMPUT 653 – Theoretical Foundations of Reinforcement Learning (Grad)	Winter 2021
CMPUT 655 – Reinforcement Learning 1 (Grad)	Fall 2020
CMPUT 397 – Reinforcement Learning	Winter 2020
CMPUT 366 – Intelligent Systems	Fall 2019

IIT (BHU) Varanasi

CSE 205 – IT Workshop 2	Aug–Dec 2018
CSE 241N – Artificial Intelligence	Jan–May 2018
CSO 101 – Computer Programming	Jan–May 2019, Jan–May 2018, Aug–Dec 2017, Jan–May 2017, Aug–Dec 2016

EXPERIENCE

Internship at Samsung R&D Institute India, Bangalore May–Jul 2017
- Intern in the Android Platform team.
- Worked on inducing traces in the Linux kernel for data logging.
- Investigated various machine learning techniques for handling the above data.

SKILLS

Python · PyTorch · C · C++ · Matlab · LaTeX · Emacs

PROJECTS

Log–likelihood Baseline for Policy Gradient May 2020–Present
Supervisors: Prof. Rupam Mahmood and Prof. Martha White
- Policy gradient methods have a critic baseline to reduce the variance of their estimate. In this project, we are investigating an analogous baseline for the log-likelihood part of the policy gradient. We have some encouraging preliminary results which show that a log-likelihood baseline can improve the agent's control performance by further reducing its variance and can especially help in non-stationary environments.

Coordinated Exploration for Concurrent RL Aug 2018–Jun 2019

MTech Thesis, IIT (BHU) Varanasi | Supervisor: Prof. Lakshmanan K.

- Extended prior work on seed sampling for Concurrent reinforcement learning (RL) by proposing (1) a model based, and (2) a policy gradient based seed sampling coordinated exploration algorithm (Seed–PG).
- Implemented the Seed-PG algorithm, which basically involved implementing on–policy and off-policy versions of Policy Gradient methods (PPO, Off-PAC, and Actor-Critic) with MC and TD value functions (using importance sampling), for multiple parallel agents (running on separate processes) which share experience amongst them.
- Performed experimentation on the CartPole environment using neural networks as function approximators.

ACHIEVEMENTS

Gold Medal, IIT (BHU) Varanasi 2019

For being ranked first in the Computer Sci. & Engg. batch of 2014–19

Awarded CBSE certificate of merit 2014

For being amongst the top 0.1% candidates in Physics (class XII)

Successfully qualified Regional Mathematical Olympiad, UP 2012

State level for International Mathematical Olympiad ($\sim$ 300 students selected nationally)

National Talent Search Scholarship recipient 2010

Awarded by NCERT, Government of India ($\sim$ 1000 students selected nationally)

COURSES

Graduate at UAlberta

- RL with Robots (Grade: A+)
- Intro. to Machine Learning (Grade: A+)
- Reinforcement Learning 2 (Grade: A+)*

Undergraduate at IIT (BHU)

- Stochastic Process
- Probability and Statistics
- Optimization Techniques
- Natural Language Processing
- Computer Vision
- Linear Algebra (Online)
- Intelligent Computing (Neural Networks and Genetic Algorithms)
- Artificial Intelligence

* Unofficial grade. No official grades awarded that semester due to COVID-19.

OTHER PROJECTS

Utility of Traces in Online Value Prediction with TD(λ) [Link]	April'20
Policy Learning using Function Approximators	Aug–Nov'17
Emerging and Rare Entity Recognition (NLP)	Dec'17
Cryptography Schemes for Secure Money Transfer [Link]	Nov'17
Zoutendijk's Method for Constrained Optimization	Nov'17
Image Classification and Segmentation	Aug'16–May'17
Functional Projective Synchronization of Chaotic Systems [Link]	Nov'16
In-memory Relational Algebra System [Link]	Aug–Nov'16
Feedback Portal (a Django web application) [Link]	Aug–Nov'16
Multi–document Text Summarizer	Jan–May'16
8–bit CPU simulation on Logisim	Oct'15

EXTRA–CURRICULAR

Reviewer for SSL-RL (ICLR Workshop) 2021. Helped create Python notebooks for the "Policy Optimization in RL" tutorial at NeurIPS 2020 [Link]. Student reporter for CIFAR Deep Learning and Reinforcement Learning Summer School 2020. Sub-reviewer for one paper at ICML 2020. Served as the Vice President of the Computing Science Graduate Student Association, University of Alberta (2020–21).

I also enjoy going for long walks, cycling, and climbing; and playing harmonica, table tennis, and Go (the board game).