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

University of Alberta

ASSISTANT

CMPUT 655 – Reinforcement Learning 1 (Grad)

CMPUT 397 – Reinforcement Learning

CMPUT 366 – Intelligent Systems

Fall 2020

Winter 2020

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.

ACHIEVE-MENTS

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 (~ 300 students selected nationally)

National Talent Search Scholarship recipient

2010

Awarded by NCERT, Government of India (~ 1000 students selected nationally)

COURSES

Graduate at UAlberta

- RL with Robots (Grade: A+)

- Reinforcement Learning 2 (Grade: A+)*

- Intro. to Machine Learning (Grade: A+)

Undergraduate at IIT (BHU)

- Stochastic Process - Linear Algebra (Online)

Probability and Statistics
 Optimization Techniques
 Intelligent Computing (Neural Networks

- Natural Language Processing and Genetic Algorithms)

- Computer Vision - Artificial Intelligence

OTHER PROJECTS

Utility of Traces in Online Value Prediction with $TD(\lambda)$ [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

I serve 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 playing Harmonica, Table Tennis, and Go (the board game).

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