

# Shivam Garg

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EDUCATION	<b>University of Alberta, Canada</b> Master of Science (Thesis) in Computing Science Supervisors: Prof. Rupam Mahmood and Prof. Martha White GPA: 4.0/4.0 2019–21
	<b>Indian Institute of Technology (BHU) Varanasi, India</b> Integrated Dual Degree [BTech (Hons.) + MTech] in Computer Science and Engineering GPA: 9.77/10.0 (ranked 1/82 in my class) 2014–19
INTERESTS	Artificial Intelligence, Reinforcement Learning (in particular, policy gradient methods and temporal difference learning)
PUBLICATIONS	<b>Conferences and Journals</b> [1] Sina Ghiassian*, Andrew Patterson*, Shivam Garg, Dhawal Gupta, Adam White, Martha White, <b>Gradient Temporal-Difference Learning with Regularized Corrections</b> , <i>International Conference on Machine Learning (ICML)</i> , 2020. [2] Shivam Garg and Rajeev Srivastava, <b>Object Sequences: Encoding Categorical and Spatial Information for a Yes/No Visual Question Answering Task</b> , <i>IET Computer Vision</i> , 2018.  <b>Workshops</b> [3] Shivam Garg*, Homayoon Farrahi*, A. Rupam Mahmood, <b>Enabling Safe Exploration of Action Space in Real-World Robots</b> , <i>Virtual Conference on Reinforcement Learning for Real Life (RL4RealLife)</i> , 2020. [4] Shivam Garg, <b>Mirror Descent for Robust Reinforcement Learning</b> , <i>Indian Workshop on Machine Learning (iWML)</i> , 2018.
TEACHING ASSISTANT	<b>University of Alberta</b> CMPUT 655 – Reinforcement Learning 1 (Grad) Fall 2020 CMPUT 397 – Reinforcement Learning Winter 2020 CMPUT 366 – Intelligent Systems Fall 2019  <b>IIT (BHU) Varanasi</b> 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	<b>Internship at Samsung R&amp;D Institute India, Bangalore</b> 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 · $\text{\LaTeX}$ · Emacs
PROJECTS	<b>Log-likelihood Baseline for Policy Gradient</b> May 2020–Present <i>Supervisors: Prof. Rupam Mahmood and Prof. Martha White</i> – 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.

- 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+)
- 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( $\lambda$ ) [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).