AYUSH JAIN

Montreal, Canada

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EDUCATION

McGill University, Montreal *September 2015 - December 2017*
Master of Science, Computer Science Overall GPA: 3.80/4.00
Reasoning and Learning Lab, McGill (RLLab)
Co-Affiliated with Montreal Institute of Learning Algorithms (Mila)
Supervisor: Doina Precup

NSIT, University of Delhi, India *August 2008 - June 2012*
Bachelor Of Engineering, Computer Engineering Overall Percentage: 78.88/100
Ranked among **top 5** in department of 120+ students Approx. GPA: 3.82/4.00
Supervisor: Satish Chand

PUBLICATIONS

1. **Ayush Jain** and Doina Precup. 2018. **Eligibility Traces for Options.** In Proc. of the 17th International Conference on Autonomous Agents and Multiagent Systems **(AAMAS 2018)**, Stockholm, Sweden, July 10-15, 2018, IFAAMAS, 9 pages.
2. Ayush Jain. 2018. **Eligibility Traces for Options**. Master's thesis, McGill University, 2018.
3. Arushi Jain, **Ayush Jain** and Doina Precup. 2018. **Safe Actor-Critic**[**Paper**][**Poster**][**Slide**] Accepted in Safety, Risk and Uncertainty in RL, Uncertainty in AI **(UAI 2018)** Workshop. Accepted in Women in ML (WiML), **(NeurIPS 2018)** Workshop.

RESEARCH INTERESTS

• Reinforcement Learning (RL) • Artificial Intelligence (AI) • Machine Learning
• Temporal Abstraction and Hierarchical Reinforcement Learning • Multi-Step Reinforcement Learning
• Meta-learning • Safety in AI • Off-Policy Learning • Eligibility Traces

RESEARCH AND WORK EXPERIENCES

SPORTLOGiQ August 2017 - Present
AI Researcher

· Developed a model to accurately predict ball possession in Soccer from broadcast feed frames.
· Modelled hockey games as MDPs to devise sound metrics for the game. Learned policies- how teams play in different scenarios in NHL through Behavior Cloning. Learned unique value functions using rewarding defensive/offensive play, saving goal, scoring etc. Goal is to learn intrinsic reward function of each team.
· Applying temporal abstraction in multi-agent environments. Long term goal is to be able to model competitive team sports and make useful predictions.
· Developed model to predict odds of teams winning in hockey games based on historical game reports and expected team performances.

Reasoning and Learning Lab, McGill University February 2016 - August 2017
Research Assistant *advised by Prof. Doina Precup*

· Worked on temporal abstraction and hierarchical reinforcement learning.
· Thesis: tested the utility of eligibility traces with options and searched for good ways of doing multi-step intra-option updates. Proposed three algorithms, based on off-policy methods - importance sampling, tree backup and retrace(λ), for using eligibility traces with options.

Adobe Systems July 2012 - August 2015
Computer Scientist

· Released major version of Adobe Drive, a cloud based digital-asset synchronization service with version control. I was responsible for functionality allowing virtual collections of cloud assets; major improvements to Drive's kernel extension; and platform support for Windows 8, OSX Yosemite and El Capitan releases.

· Worked on a page description languages translation engine - PDFtoPS. I worked on different font technologies, vector imaging and color management and shipped major features in font handling, imaging, and reliability improvements.

National Informatics Centre, Govt. of India May 2011 - July 2011
Research Intern *advised by Shashi Kant Sharma*

· Worked on fingerprint identification methods. This resulted in a library for web-based fingerprint enrollment, feature extraction, and matching algorithm which ensures interoperability of devices and long term storage of data with technology independence.

NSIT, University of Delhi June 2010 - August 2010
Summer Research Intern *advised by Dr. Anand Gupta*

· Worked on detection of pedestrians and moving objects. I investigated performance of a model which combined body part detectors (for heads and legs) to detect total number of pedestrians in a video feed.

TEACHING EXPERIENCES

Teaching Assistant, McGill University
Courses: COMP 202 Fundamentals of Programming; COMP 208 Computers in Engineering

RESEARCH PROJECTS

- **Safe Actor Critic (2018):** Designed a novel, generic **on-policy and off-policy safe actor-critic** framework to learn safe policies that computes a direct estimate of the variance in the return which meets certain safety requirements apart from the performance demands.
- **Eligibility Trace based Methods to Supplement Backpropagation Through Time in RNNs (2016):** Experimented on a recurrent neural network which used BPTT on a temporal record over latent variables. Our experiment confirmed theoretical understanding - traces help distribute credit to a greater depth leading to faster convergence.
- **Learning Better Word Embeddings with Morphological Knowledge (2015):** Experimented on a neural network which simultaneously learns word and morpheme embeddings - capturing the explicit relationship among morphemes. I was able to derive better representation for rare morphological derivatives of words and word embeddings learnt performed better on analogical task.
- **A Generalized Architecture for EEG Data Analysis (2015):** Deploying machine learning techniques on EEG data requires a highly tuned architecture specific to task at hand. There is no common architecture to handle all EEG data irrespective of the task. We experimented on designing a generalized, task-insensitive architecture for EEG data. Used deep learning techniques to propose generic frameworks for statistical EEG data set, which dont require any hand crafted nor domain specific features for EEG classification.
- **Self Learning in Games using TD(λ) (2012):** Developed a self-learning AI Othello agent using NN to approximate large state-action pairs with TD(λ) updates. Studied the effectiveness of merging TD(λ) and Co-Evolutionary Learning.

- **Automated Car Number Plate Recognition System (2011):** Developed an automated license plate recognition system in Indian scenario. I trained a pattern recognition system as plate and non-plate regions using SVMs.

TECHNICAL SKILLS

Programming Languages	Python, Tensorflow, C, C++, Java, LaTeX
Tool & Technologies	Matlab, Eclipse, Visual Studio

RELEVANT COURSES

• Machine Learning • Reinforcement Learning • Artificial Intelligence • Expert Systems
• Natural Language Processing • Formal Verification Methods