Somjit Nath

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Research Interests

Reinforcement Learning (RL), Representation Learning, Model Based RL, Real World RL

Education

McGill University & Mila — Montréal, Canada
Ph.D. in Electrical and Computer Engineering — *Mar 2022 – present*
Advisors: Prof. Derek Nowrouzezahrai, Prof. Samira Ebrahimi Kahou
Transferred from École de technologie supérieure in Jan 2024.

University of Alberta — Edmonton, Canada
Master of Science (Thesis) in Computing Science; ***GPA: 4.0/4.0*** — *Sep 2017 – Sept 2019*
Advisor: Prof. Martha White
Thesis: Fixed Point Propagation: A New Way To Train Recurrent Neural Networks Using Auxiliary Variables

Jadavpur University — Kolkata, India
Bachelor of Engineering in Electrical Engineering; ***GPA: 9.08/10.00*** — *Aug 2013 – Jul 2017*

Research & Work Experience

4Division & Mila — Montréal, Canada
Scientist in Residence — *June 2024 – Sep 2024*

- Working on developing a scalable Robotics Transformer model that leverages open-ended, task-agnostic training on diverse robotic data to achieve high performance in real-world tasks, demonstrating generalization capabilities critical for robotics.

Borealis AI — Montréal, Canada
Machine Learning Research Intern; (Advisors: Siqi Liu, Yik Chau Lui) — *May 2023 – Aug 2023*

- Developed an Unsupervised Outlier Detection Framework in Continuous-Time Event Sequences using Reinforcement Learning.

Tata Consultancy Services, Research and Innovation — Mumbai, India
Researcher; Data and Decision Sciences Team (Advisor: Dr. Harshad Khadilkar) — *Nov 2019 – Jan 2022*

- Applied Reinforcement Learning techniques to solve multi-product, multi-node inventory management problem in Supply Chains, leading to ~20% improvement over current practices.
- Developed a generic Reinforcement Learning Framework for handling delayed actions and observations.

Indian Statistical Institute — Kolkata, India
Research Intern; Computer Vision and Pattern Recognition Department — *May – Jul 2015*

- Contributed to character segmentation methods for Bengali language using tesseract and cowboxer.
- Implemented an Optical Character Recognition for English Language with an accuracy of 95%.

Teaching Experience

University of Alberta — Edmonton, Canada
Teaching Assistant; CMPUT 275, Introduction to Tangible Computing-II — *Jan – April 2018*

- Instructed Lab Sessions & Graded Projects and Assignments for ~120 students

University of Alberta — Edmonton, Canada
Teaching Assistant; CMPUT 274, Introduction to Tangible Computing-I — *Sept – Dec 2017*

- Instructed Lab Sessions & Graded Projects and Assignments for ~150 students

Publications

1. **Task-Oriented Slot-Based Cumulant Discovery in General Value Functions**
   RLBrew Workshop, Reinforcement Learning Conference (RLC), 2024
   Vincent Michalski, **Somjit Nath**, Derek Nowrouzezahrai, Doina Precup, Samira Ebrahimi Kahou

2. **Spectral Temporal Contrastive Learning**
   Self-Supervised Learning - Theory and Practice, NeurIPS Workshop, 2023
   Sacha Morin*, **Somjit Nath***, Samira Ebrahimi Kahou, Guy Wolf

3. **Prioritizing Samples in Reinforcement Learning with Reducible Loss**
   Neural Information Processing Systems (NeurIPS) 2023; Deep RL Workshop, NeurIPS 2022
   Shivakanth Sujit, **Somjit Nath**, Pedro H.M. Braga, Samira Ebrahimi Kahou

4. **Discovering Object-Centric Generalized Value Functions From Pixels**
   International Conference on Machine Learning (ICML) 2023
   Somjit Nath, Gopeshh Raaj Subbaraj, Khimya Khetarpal, Samira Ebrahimi Kahou

5. **Follow your Nose: Using General Value Functions for Directed Exploration in Reinforcement Learning**
   International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2023; Reinforcement Learning in Games Workshop, AAAI 2022
   Durgesh Kalwar, Omkar Shelke, **Somjit Nath**, Hardik Meisheri, Harshad Khadilkar

6. **Locally Constrained Representations in Reinforcement Learning**
   Deep RL Workshop, NeurIPS 2022
   Somjit Nath, Samira Ebrahimi Kahou

7. **A Learning Based Framework for Handling Uncertain Lead Times in Multi-Product Inventory Management**
   European Workshops on Reinforcement Learning (EWRL) 2022
   Hardik Meisheri, **Somjit Nath**, Mayank Baranwal, Harshad Khadilkar

8. **Revisiting State Augmentation methods for Reinforcement Learning with Stochastic Delays**
   Conference on Information and Knowledge Management (CIKM) 2021
   Somjit Nath, Mayank Baranwal and Harshad Khadilkar

9. **Scalable Multi-Product Inventory Control with Lead Time Constraints using Reinforcement Learning**
   Neural Computing and Applications Journal [Impact Factor = 5.102]
   Hardik Meisheri, Nazneen N Sultana, Mayank Baranwal, Vinita Baniwal, **Somjit Nath**, Satyam Verma, Balaraman Ravindran, Harshad Khadilkar

10. **SIBRE: Self Improvement Based REwards for Adaptive Feedback in Reinforcement Learning**
    International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2021
    Somjit Nath, Richa Verma, Abhik Ray, Harshad Khadilkar

11. **Training Recurrent Neural Networks Online by Learning Explicit State Variables**
    International Conference on Learning Representations (ICLR) 2020
    Somjit Nath, Vincent Liu, Alan Chan, Xin Li, Adam White, Martha White

12. **Two-Timescale Networks for Nonlinear Value Function Approximation**
    International Conference on Learning Representations (ICLR) 2019
    Wesley Chung, **Somjit Nath**, Ajin Joseph, Martha White

13. **A Fixed-Point Formulation for Recurrent Neural Networks**
    Continual Learning Workshop, NeurIPS 2018
    Somjit Nath, Taher Jafferjee and Martha White

14. **Rejection Sampling for Off-Policy Learning**
Continual Learning Workshop, NeurIPS 2018
Wesley Chung, Sina Ghiassian, **Somjit Nath** and Martha White

15. **Smartphone Camera Based Analysis of ELISA using Artificial Neural Network**
IET Computer Vision Journal [Impact Factor = 1.95]
Somjit Nath, Subhannita Sarcar, Biswendu Chatterjee, Rhishita Chourashi, Nabendu Sekhar Chatterjee

16. **Arduino Based Door Unlocking System with Real Time Control**
IEEE International Conference on Contemporary Computing and Informatics (IC3I) 2016
Somjit Nath, Paramita Banerjee, Rathindra Nath Biswas, Swarup Kumar Mitra and Mrinal Kanti Naskar

Awards & Achievements

Outstanding Reviewer: Selected as one of the outstanding reviewers at International Conference on Computer Vision (ICCV) 2023

McGill Engineering Doctoral Award: Received award worth $153,000 for pursuing PhD at McGill University

TCS Citation Award: Received the award **twice** (Feb 2022 & Oct 2021) for research contributions and publications.

Scholarship for Academic Excellence, State Electrical Engineers' Association: Awarded to undergraduate students who have been ranked in the top 3 students of their batch.

Runner-up in KSHITIJ, the technology fair of IIT Kharagpur: Participated and reached the Final of the Autonomous Robotics Event, "Sherlock" contested by ~30 teams.

Summer Fellow, Indian Academy of Sciences: Only person from Jadavpur University, Electrical Engineering Department to be selected for the year 2015.

Skills

Programming: Python, C++, C

Tools: Tensorflow, Pytorch, Jax, MATLAB, Octave, Arduino, Processing

Languages: English (Professional), Bengali (Native), Hindi (Professional)

Relevant Learning

Training Programs: Trustworthy & Responsible AI Learning Certificate (TRAIL), Mila, 2022

Summer School: CIFAR Deep Learning & Reinforcement Learning Summer School, 2019

Coursework: Introduction to Machine Learning (*CMPUT 551, Prof. Martha White*), Reinforcement Learning & AI (*CMPUT 603, Prof. Rich Sutton*), Optimization Principles in Reinforcement Learning (*CMPUT 659, Prof. Martha White*), Theoretical principles for deep learning (*IFT 6169, Prof. Ioannis Mitliagkas*)

Other Interests

Sports: Table Tennis (Rating: 377). Played in Edmonton Chinatown Open 2018 & CUSTTA Open 2018, Calgary