Namrata **Deka**

Computer Science · MSc.

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Education

The University of British Columbia
Vancouver, Canada

Master of Science in Computer Science — *2020 - Present*

- GPA: 91.33/100

Indraprastha Institute of Information Technology (IIITD)
New Delhi, India

Bachelor of Technology in Computer Science and Engineering — *2013 - 2017*

- GPA: 8.41/10
- Among the 10% in the class to graduate with Honors

Experience

Borealis AI
Vancouver, Canada

Machine Learning Research Intern — *September 2022 - Present*

- Advisor: Dr. Frederick Tung
- Auditing deep learning models for automated discovery of systematic errors in under-represented groups

The University of British Columbia
Vancouver, Canada

Graduate Research Assistant — *September 2020 - Present*

- Advisor: Dr. Danica J. Sutherland
- I am working in the intersection of representation learning and kernel methods with applications in causality and fairness.
- Developed a novel fair representation learning paradigm using statistical two-sample tests.
- Researching kernel measures of conditional independence to learn counterfactually invariant representations.

École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland

Research Intern, Summer@EPFL — *June 2021 - August 2021*

- Advisor: Dr. Amir Zamir
- Conducted research for a self-supervised method to learn articulated object models that describe part segmentations and motion dynamics from videos using 3D optical flow and depth estimates.

Wadhwani Institute for Artificial Intelligence
Mumbai, India

Research Fellow — *August 2018 - August 2020*

- Advisors: Dr. Rahul Panicker and Dr. Alpan Raval
- Built a 3D vision-based solution to screen low birth-weight babies using smartphone-captured videos for public health sectors in rural India.
- Built a pipeline to generate and annotate synthetic videos of infants using a differentiable renderer.
- Created a novel deep learning algorithm to reconstruct 3D infant meshes to metric scale using deform-able models of reference objects in the scene.
- Mentored and managed interns and their research projects.

Microsoft Research
Bengaluru, India

Research Intern — *January 2018 - July 2018*

- Advisor: Dr. Sreangsu Acharyya
- Built a classifier to identify very rare personally identifiable information (P.I.I.) of customers using a pairwise-AUROC optimization method.
- Achieved an AUROC of 99.8% for the rarest P.I.I. tag which accounted for only 0.54% of the entire dataset.
- The resulting model was adopted by internal teams across Microsoft to comply with the EU-GDPR mandate.

Research

- **N. Deka**, D. Sutherland. MMD-B-Fair: Learning Fair Representations with Statistical Testing. *Currently under review.* arXiv:2211.07907
- R. Pogodin*, **N. Deka***, Y. Li*, D. Sutherland, V. Veitch, A. Gretton. Efficient Conditionally Invariant Representation Learning. *Currently under review.* arXiv:2212.08645
- **N. Deka**, D. Sutherland. Learning Privacy-Preserving Deep Kernels with Known Demographics. *In Proceedings of the 36th AAAI Conference on Artificial Intelligence. Workshop on Privacy-Preserving Artificial Intelligence, 2022.* https://aaai-ppai22.github.io/files/30.pdf
- D. Sutherland, **N. Deka**. Unbiased estimators for the variance of MMD estimators. *Technical report, 2022*. arXiv:1906.02104

Invited Talks

Perceiving Systems Department, Max Planck Institute for Intelligent Systems (MPI-IS) *Tübingen, Germany*

Neonatal Anthropometry and Growth Tracking via model based 3D Reconstruction from Video *November 2019*

Projects

Open-ended Evolution of Embodied Intelligence in Mutating Environments *Vancouver, BC*

Graduate Course Project, UBC *October 2021 - December 2021*

- Mentor: Dr. Jeff Clune
- Developed an open-ended algorithm using reinforcement learning and evolutionary strategies to continuously co-evolve agent morphologies and environmental complexities to create a diverse population of agents that can learn to perform tasks faster and better.
- Tools & Frameworks: PyTorch, OpenAI Gym

Amortized Inference with Rejection Loops for Autonomous Vehicles *Vancouver, BC*

Graduate Course Project, UBC *March 2021 - April 2021*

- Mentor: Dr. Frank Wood
- Created a probabilistic generative model for traffic at road intersections using the CARLA simulation engine and PyProb.
- Performed amortized inference over number of cars in intersections using inference compilation and rejection loop-based importance sampling.
- Tools & Frameworks: PyTorch, PyProb, CARLA Python API

Push-Nav: Self-Supervised Learning of Task-Based Object Representations for Navigation Through Clutter *Vancouver, BC*

Graduate Course Project, UBC *October 2020 - December 2020*

- Mentor: Dr. Ian Mitchell
- Developed a reinforcement learning-based system where a robot can learn task-based physical properties of objects that can maximize expected rewards.
- Augmented policy learning with a self-supervised dense optical flow objective to incentivise the learning of physical representations.
- Tools & Frameworks: PyBullet, OpenAI Gym, PyTorch, Weights & Biases

Novel Scene Generation via Decomposition *Vancouver, BC*

Graduate Course Project, UBC *September 2020 - December 2020*

- Mentor: Dr. Helge Rhodin
- Developed a deep generative model to synthesize novel scenes by rearranging objects in images.
- Used a stacked VAE architecture with W-GANs to learn plausible distributions of object-centric shifts for each object in the image.
- Tools & Frameworks: PyTorch, Weights & Biases

Understanding Human Behaviour for Autonomous Vehicle Path Planning *New Delhi, India*

Undergraduate Research Project, IIITD *July 2016 - August 2017*

- Advisors: Dr. Saket Anand and Dr. Sanjit Kaul
- Studied and implemented simple imitation learning methods infer implicit cost-maps of drivers on urban roads in India.
- Collected data and trained detection and tracking algorithms for pedestrians and vehicles.
- Also performed sensor cross-calibrations, 3D mapping of outdoor scenes and analysis of vehicle trajectory in response to other traffic agents.
- Tools & Frameworks: Python, Matlab, TensorFlow, ROS

Teaching

The University of British Columbia *Vancouver, Canada*

Graduate Teaching Assistant *Multiple Semesters*

- Intelligent Systems - Level 400 (>100 students)

Indraprastha Institute of Information Technology (IIITD) *New Delhi, India*

Teaching Assistant *Multiple Semesters*

- Computer Vision - Graduate Level (42 students)
- Advanced Programming - Undergraduate Level (200 students)