Namrata **Deka**

Machine Learning · Ph.D. Student

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Summary

I am a Machine Learning Ph.D. student at Carnegie Mellon University. My research interest spans the intersection of machine learning, causality, computer vision and reinforcement learning for learning robust representations and world models. I am proficient in Python and work extensively with deep learning frameworks like PyTorch and Tensorflow. **Actively seeking student research positions starting May 2024.** *I have authorization to work full-time in Canada (PGWP) and can obtain authorization to work in the USA (CPT).*

Education

Carnegie Mellon University · *Pittsburgh, USA*
Ph.D., Machine Learning · *2023 - Present*
  Advisors: Kun Zhang, Jeff Schneider

University of British Columbia · *Vancouver, Canada*
M.Sc., Computer Science · *2020 - 2023*
  Advisor: Danica J. Sutherland
  Thesis: Kernel Methods for Invariant Representation Learning: Enforcing Fairness and Conditional Independence

Indraprastha Institute of Information Technology · *New Delhi, India*
B.Tech., Computer Science and Engineering (Honors) · *2013 - 2017*
  Advisors: Saket Anand, Sanjit K. Kaul

Publications

Peer-Reviewed Conferences

- R. Pogodin*, **N. Deka***, Y. Li*, D. Sutherland, V. Veitch, A. Gretton. Efficient Conditionally Invariant Representation Learning. *In Proceedings of the 11th International Conference on Learning Representations (**ICLR**), 2023. (Oral/Top 5%)* *Equal Contribution. arXiv:2212.08645
- **N. Deka**, D. Sutherland. MMD-B-Fair: Learning Fair Representations with Statistical Testing. *In Proceedings of the 26th International Conference on Artificial Intelligence and Statistics (**AISTATS**), 2023.* arXiv:2211.07907

Workshops & Technical Reports

- **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.* 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

Experience

Machine Learning Research Intern, Borealis AI · *Vancouver, Canada*
Advisor: Frederick Tung · *September 2022 - January 2023*
- Audited deep learning models for automated discovery of systematic errors in under-represented groups.

Graduate Research Assistant, University of British Columbia · *Vancouver, Canada*
Advisor: Danica J. Sutherland · *September 2020 - April 2023*
- Worked in the intersection of representation learning and kernel methods with applications in invariance and fairness.
- Developed a novel fair representation learning paradigm using statistical two-sample tests.
- Developed kernel measures of conditional independence to learn counterfactually invariant representations.

Research Intern, Summer@EPFL, École Polytechnique Fédérele de Lausanne (EPFL) · *Lausanne, Switzerland*
Advisor: Amir Zamir · *June 2021 - August 2021*
- Conducted research to learn articulated object models from video using 3D optical flow and depth estimates.

Research Fellow, Wadhwani Institute for Artificial Intelligence · *Mumbai, India*
Advisors: Rahul Panicker, Alpan Raval · *August 2018 - August 2020*
- 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.
- Developed a novel deep learning algorithm to reconstruct 3D infant meshes to metric scale with deform-able models of reference objects.
- Mentored and managed intern research projects.

Applied Research Intern, Microsoft Research *Bengaluru, India*

Advisor: Sreangsu Acharyya *January 2018 - July 2018*

- 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.
- Resulting model was adopted by internal teams across Microsoft to comply with the EU-GDPR mandate.

Talks and Presentations

26th International Conference on Artificial Intelligence and Statistics (AISTATS) *Valencia, Spain*

MMD-B-Fair: Learning Fair Representations with Statistical Testing (Poster) *April 2023*

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 (Invited Talk) *November 2019*

Projects

Open-ended Evolution of Embodied Intelligence in Mutating Environments [GITHUB] *Vancouver, Canada*

Mentor: Jeff Clune *October 2021 - December 2021*

- 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.
- Hierarchically combined POET and DERL to evolve agent morphologies across changing environments.
- Tools & Frameworks: PyTorch, OpenAI Gym

Push-Nav: Self-Supervised Learning of Task-Based Object Representations for Navigation Through Clutter [GITHUB] *Vancouver, Canada*

Mentor: Ian Mitchell *October 2020 - December 2020*

- 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 [GITHUB] *Vancouver, Canada*

Mentor: Helge Rhodin *September 2020 - December 2020*

- 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

Teaching

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)