


# Nikhil Vemgal

 Nikhil-Vemgal —  NikhilVemgal  Portfolio

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## EDUCATION

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- **M.Sc. in Computer Science, McGill University and Mila, GPA: 4.0/4.0** Montreal, Canada  
*Courses: Deep Learning, Reinforcement Learning, Applied Machine Learning* 2021-2024
- **B.Tech. in Computer Science, PES University, GPA: 8.97/10.0** Bengaluru, India  
*Courses: Natural Language Processing, Computer Vision, Artificial Intelligence, Linear Algebra & Statistics* 2014-2018

## TECHNICAL SKILLS

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- **Programming Languages:** Python, C#, Java, R, C, SQL
- **Frameworks/ Tools:** PyTorch, Keras, Tensorflow, Numpy, Scikit-Learn, Scipy, Pandas, Azure DevOps, PowerBI, Tableau, LaTeX, Slurm, Git, MySQL, MongoDB, Azure, GCP, Plotly, Matplotlib, Agile, Docker, CI/CD, .NET
- **Web Technologies:** Node.js, D3.js, Django, Flask, Javascript, RESTful APIs, ASP.NET, HTML, PHP

## PUBLICATIONS

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- **Nikhil Vemgal**, Elaine Lau, Doina Precup, *An Empirical Study of the Effectiveness of Using a Replay Buffer on Mode Discovery in GFlowNets. ICML Workshop 2023.*
- Elaine Lau, **Nikhil Vemgal**, Doina Precup, Emmanuel Bengio, *DGFN: Double Generative Flow Networks. NeurIPS Workshop 2023.*

## ACADEMIC RESEARCH

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- **M.Sc. Thesis, Advised by Prof. Doina Precup** Montreal, Canada
  - Developed a method to enhance the mode discovery in **GFlowNets** for **drug discovery**.
  - Integrated **Reinforcement Learning** techniques such as **experience replay** and **target network** into GFlowNets, showcasing improvements in mode discovery, convergence speed, and the quality of modes discovered.

## PROFESSIONAL EXPERIENCE

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- **Software Engineer - Machine Learning, Shell, Bengaluru, India** July 2018 - Feb 2021
  - Engineered an ensemble of **Bidirectional LSTM** classifiers in **Keras** for automated document classification and developed a web application using **Python Flask** and **JavaScript**.
  - Developed and deployed containerized **RESTful APIs** with **Docker**, secured by **OAuth 2.0**, ensuring scalable solutions.
  - Built and integrated a finance-focused **chatbot** using **C# .NET** into an **ASP.NET** web application, hosted on **Azure** with a **CI/CD** pipeline managed via **Azure DevOps**.
  - Developed a real-time impact analysis **PowerBI dashboard** by leveraging chatbot usage data from **Azure Application Insights**, enhancing data-driven decision-making.
- **Research Intern, SymphonyAI, Bengaluru, India** Jan 2018 - May 2018
  - Developed a classifier using **XGBoost** to categorize breast cancer severity into five stages and created an interactive **dashboard** with **Plotly Dash** for visualizing patient data.
  - Worked on a proof-of-concept project leveraging **Generative Adversarial Networks (GANs)** for facial attribute manipulation and image super-resolution.
- **Data Science Intern, Mantra Labs, Bengaluru, India** May 2017 - July 2017
  - Analyzed shopper satisfaction by implementing real-time expression tracking during retail visits, using **Convolutional Neural Networks (CNNs)** in **Python Keras** for expression classification and a Haar-like feature cascade for precise face detection.
- **Intern, KAnOE, PES University, Bengaluru, India** May 2016 - Aug 2016
  - Developed an **interactive data visualization** tool in **Python** to track entity frequency, location, and sentiment in news articles using **NLP** techniques, and created dynamic, data-driven graphs with **D3.js**.

## PROJECTS

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- **Vision Transformer (ViT), Course Project, Representation Learning,** Feb 2022 - April 2022
  - Built an image classifier using **ViT** in **PyTorch**, and conducted comparative experiments on Layer Normalization, exploring both Pre-LN and Post-LN configurations.
- **Training RL agents on Hopper, Course Project, Reinforcement Learning,** Mar 2022 - April 2022
  - Implemented **policy gradient** algorithms in **PyTorch**, including **PPO**, **Actor-Critic**, **TRPO**, and **SAC**, for the Hopper task. Analyzed trade-offs between model capacity and sample efficiency for optimal algorithm selection.
- **Diabetic Retinopathy Detection, Course Project, Computer Vision,** Aug 2017 - Dec 2017
  - Developed an algorithm in **Python** for diabetic retinopathy severity detection by counting microaneurysms, using **morphological operations** to extract blood vessels and microaneurysms from fundus images.