ANIKET DIDOLKAR

Website ◇ **GitHub** ◇ **Google Scholar** ◇ **adidolkar123@gmail.com**

EDUCATION

- **University of Montreal/Mila**
  PhD in Computer Science *Sep 2021 - Present*
  CGPA: 4.3/4.0
  - Supervised by Prof. Yoshua Bengio, Dr. Anirudh Goyal, and Prof. Michael Mozer
  - Fast-tracked from MSc in May 2023.
- **Manipal Institute of Technology, Manipal** *August 2016 - June 2020*
  Bachelor of Technology
  Department of Computer Science and Engineering CGPA: 9.19/10.0
  - Awarded a gold medal by the director for excellent academic performance in the third semester.

SELECTED PAPERS (* = EQUAL CONTRIBUTION)

- **MetaCognitive Reuse: Turning Recurring LLM Reasoning Into Concise Behaviors** [pdf]
  Preprint *(In submission)*
  Aniket Didolkar, Nicolas Ballas, Sanjeev Arora, Anirudh Goyal
- **Rethinking Thinking Tokens: LLMs as Improvement Operators** [pdf]
  Preprint *(In submission)*
  Lovish Madaan, **Aniket Didolkar**, Suchin Gururangan, John Quan, Ruan Silva, Ruslan Salakhutdinov, Manzil Zaheer, Sanjeev Arora, Anirudh Goyal
- **Metacognitive Capabilities of LLMs: An Exploration in Mathematical Problem Solving** [pdf]
  NeurIPS 2024
  Aniket Didolkar, Anirudh Goyal, Nan Rosemary Ke, Siyuan Guo, Michal Valko, Timothy Lillicrap, Danilo Rezende, Yoshua Bengio, Michael Mozer, Sanjeev Arora
- **CTRL-O: Language-Controllable Object-Centric Visual Representation Learning** [pdf]
  CVPR 2025
  Aniket Didolkar*, Andrii Zadaianchuk*, Rabiul Awal*, Maximilian Seitzer, Efstratios Gavves, Aishwarya Agrawal
- **On the Transfer of Object-Centric Representation Learning** [pdf]
  ICLR 2025
  Aniket Didolkar*, Andrii Zadaianchuk, Anirudh Goyal, Michael Mozer, Yoshua Bengio, Georg Martius, Maximilian Seitzer*
- **Cycle Consistency Driven Object Discovery** [pdf]
  ICLR 2024
  Aniket Didolkar, Anirudh Goyal, Yoshua Bengio
- **Temporal Latent Bottleneck: Synthesis of Fast and Slow Processing Mechanisms in Sequence Learning** [pdf]
  NeurIPS 2022
  Aniket Didolkar, Kshitij Gupta, Anirudh Goyal, Alex Lamb, Nan Rosemary Ke, Yoshua Bengio
- **Coordination Among Neural Modules Through a Shared Global Workspace** [pdf]
  ICLR 2022 (Oral)
  Anirudh Goyal, **Aniket Didolkar**, Alex Lamb, Kartikeya Badola, Nan Rosemary Ke, Nasim Rahaman, Jonathan Binas, Charles Blundell, Michael Mozer, Yoshua Bengio
- **Neural Production Systems** [pdf]
  NeurIPS 2021
  Aniket Didolkar*, Anirudh Goyal*, Nan Rosemary Ke, Charles Blundell, Philippe Beaudoin, Nicolas Heess, Michael Mozer, Yoshua Bengio
- **Systematic Evaluation of Causal Discovery in Visual Model Based RL** [pdf]
  NeurIPS Datasets and Benchmarks Track 2021
  Nan Rosemary Ke*, **Aniket Didolkar***, Sarthak Mittal, Anirudh Goyal, Guillaume Lajoie, Stefan Bauer, Danilo Rezende, Yoshua Bengio, Michael Mozer, Christopher Pal

WORK EXPERIENCE

- **Meta** Sep 2024 - Present
  Visiting Researcher *Advisor - Nicolas Ballas*
  - Lead the ideation and implementation of the paper titled "MetaCognitive Reuse: Turning Recurring LLM Reasoning Into Concise Behaviors" in which we present a method to improve the token-efficiency of reasoning LLMs.
  - Contribute to various efforts in self-supervised representation learning for videos with the goal of building general purpose world models for planning in real-world environments.

- **Recursion Pharmaceuticals / Valence Labs** June 2023 - Nov 2023
  Research Intern *Advisor - Jason Hartford*
  - Worked on experimental design strategies for estimating the effects of gene knockouts in cells.

- **Microsoft Research** Aug 2022-Nov 2022
  Research Intern *Advisor - Alex Lamb*
  - Worked on approaches to learn strong representations to allow agents to play simple to complex grid based games via reinforcement learning.

- **MILA - Quebec AI Institute, Montreal** Aug 2020-Aug 2021
  Research Intern *Advisors - Anirudh Goyal and Yoshua Bengio*
  - Lead and contributed to various deep learning projects across broad range of topics. Work published at NeurIPS 2021 and ICLR 2022.

- **Indian Institute of Science, Bangalore** Jan 2020 - July 2020
  Research Intern *Advisors - Aditya Gopalan and Himanshu Tyagi*
  - Worked on modeling city pollution levels over time using various forecasting strategies.

- **Google Summer of Code [Final Report]** May 2019 - August 2019
  Student Developer
  - Implemented various recurrent architectures - LSTM, GRU, RNN - in cuda for ChainerX - a deep learning library built by Preferred Networks.

- **MIDAS Lab, IIIT Delhi** April 2019 - Aug 2020
  Research Intern *Advisor - Rajiv Ratn Shah*
  - Lead various applications-focused NLP projects. Work published at ACL (Student Research Workshop) 2019 and COLING 2020.

- **Ubisoft** May 2019 - July 2019
  Automation Intern
  - Used deep neural networks to automate the detection of UI bugs in video game frames.

SCHOLARSHIPS AND AWARDS

- Awarded the UNIQUE Excellence Scholarship worth 15000 CAD in support of my research.
- Awarded a 1500 CAD to visit the AI Upperbound 2023 organized by The University of Alberta.
- Awarded a 1500 CAD to visit the AI Week 2022 organized by The University of Alberta.
- Awarded a 4000 CAD by The University of Montreal and The Quebec Ministry of Higher Education.
- Awarded a full scholarship to pursue my masters at The University of Montreal.
- Awarded the ACM SIGWEB SIGSTAP Travel Grant to present my paper at ACM Hypertext 2019 at Germany.

INVITED TALKS

- **Microsoft Research**: Temporal Latent Bottleneck: Synthesis of Fast and Slow Processing Mechanisms in Sequence Learning. September 2022.
- **FAIR at Meta**: Metacognitive Capabilities of LLMs: An Exploration in Mathematical Problem Solving. Nov 2024
- **KAIST-MILA Annual AI Workshop**: CTRL-O: Language-Controllable Object-Centric Visual Representation Learning. Dec 2024.