AVISHEK (JOEY) BOSE

joey.bosr@gmail.com // Not a typo

EDUCATION

University of Oxford — Februrary 2024 - Present
Post-Doc — Supervisor: **Prof. Michael Bronstein**

McGill University & — September 2018 - September 2023
Mila - Quebec AI Institute — Supervisors: **Prof. Prakash Panangaden**
Phd in Computer Science — **Prof. William Hamilton**
Prof. Gauthier Gidel

University of Toronto — September 2017 - August 2018
M.aSc Department of Electrical and Computer Engineering — Supervisor: **Prof. Parham Aarabi**

University of Toronto — September 2012 - April 2017
B.aSc Department of Electrical and Computer Engineering
Minor in Mechatronics

EMPLOYMENT

Dreamfold — July 2023 - Present
Machine Learning Scientist

- Research on Equivariant Generative models for de novo proteins design.

Qualcomm AI research — Oct 2022 - Feb 2023
Research Intern, Supervisors: Johann Bremer and Taco Cohen

- Research on Equivariant Diffusion Models for trajectory optimization in Reinforcement Learning.

Facebook AI Research — May 2021 - Dec 2021
Research Intern, Supervisor: Aditya Grover

- Research on investigating the causal structure learned by Deep Generative Models.
- Research on extending score based generative models to Riemannian manifolds.

D-ID — Jun 2020 - Dec 2020
Consultant

- Consultant to D-ID research interest in privacy preserving Machine Learning based on the acquisition of FaceShield.

Uber AI — May 2019 - Aug 2019
Research Intern, Supervisors: Ankit Jain and Piero Molino

- Research on Meta-Learning for Graph Representation Learning with real world applications to Uber Eats. Published NeurIPS 2019 workshop paper.

FaceShield (Acquired in 2020 by D-ID) — Aug 2018 - Jun 2020
Founder and CEO

- Founded FaceShield Inc. as a way to bring research done during Masters to the masses. The main mandate of FaceShield is to increase awareness of issues surrounding the digital privacy.
- Created a tool that allows anyone to apply a privacy filter to their own photos.

Borealis AI May 2017 - July 2018

Research Intern, Supervisor: Yanshuai Cao

- Published a paper to ACL on Adversarial Contrastive Estimation that effectively improves over Noise Contrastive Estimation approaches by using an Adversarial Adaptive Conditional Negative Sampler to sample harder negatives leading to better and faster convergence.
- Improved the performance of word embedding, knowledge graph embeddings and ordered embeddings on multiple benchmark tasks

Architech May 2015 - Aug 2016

Junior Machine Learning Engineer

- Created a novel Eye Gaze Tracking algorithm using input video inputs from webcam's
- Applied Topic Modeling techniques to twitter to discover new emergent sentiments on news stories before they became viral

University of Toronto May 2014 - Aug 2014

Research Assistant

- Created demos of Veillance Flux and Augmented Reality with the help of Prof. Steve Mann.
- Hardware technologies used include Meta Space Glasses, Microsoft Kinect, and Depth Sense.
- Co-author in a paper published to IEEE GEM 2014 conference

TEACHING EXPERIENCE

McGill University Sept 2022 - Dec 2022

Co-Instructor

- Formulated a new graduate seminar course COMP760 at McGill/Mila at the intersection of geometric deep learning and generative models.
- The course was co-taught with my supervisor Prof. Prakash Panangaden and was the first ever *graduate seminar course* co-taught by a PhD student at McGill. Course Website.

McGill University Jan 2019 - Dec 2019

Head TA

- Responsible for the successful organization of COMP 551: Applied ML Graduate Course.

University of Toronto Sept 2017 - Dec 2017

Co-Head TA and Co-Lecturer

- Created and delivered Lectures and Tutorials for a probability course aimed at 3rd/4th year ECE students.
- Responsible for creating and marking of quizzes and assignments

JOURNAL AND CONFERENCE PUBLICATIONS

A. J. Bose*, T. Akhound-Sadegh*, K. Fatras, G. Huguet, J. Rector-Brooks, C.H. Liu, A.C. Nica, M. Korablyov, M. Bronstein, A. Tong, "SE(3) Stochastic Flow Matching for Protein For Protein Backbone Generation", International Conference on Learning Representations (ICLR 2024) **Spotlight**. arXiv link

Q. Bertrand, **A. J. Bose**, A. Duplessis, M. Jiralerspong, G. Gidel, "On the Stability of Iterative Retraining of Generative Models on their own Data", International Conference on Learning Representations (ICLR 2024) **Spotlight**. arXiv link

J. Bremer*, **A.J. Bose***, P. de Haan, T. Cohen, "EDGI: Equivariant diffusion for planning with embodied agents" Neural Information Processing Systems (NeurIPS 2023) arXiv link.

M. Jiralerspong, **A.J. Bose**, G. Gidel, "Feature Likelihood Divergence: Evaluating Generalization of Generative Models Using Samples" Neural Information Processing Systems (NeurIPS 2023). arXiv link

D. Ferbach*, C. Tsirigotis*, G. Gidel, **A.J. Bose**, "A General Framework For Proving The Equivariant Strong Lottery Ticket Hypothesis" International Conference on Learning Representations (ICLR) 2023 **OpenReview link**

A.J. Bose, R. P. Monti, A. Grover "Controllable Generative Modelling via Causal Reasoning" Transactions on Machine Learning Research 2022 (TMLR 2022) **link**

C. Huang*, M. Aghajohari*, **A.J. Bose**, P. Panangaden, A. Courville "Riemannian Diffusion Models" Neural Information Processing Systems (NeurIPS 2022) **arXiv link**

H. Ben-Hamu, S. Cohen, **A.J. Bose**, B. Amos, M. Nickel, A. Grover, R. Chen, Y. Lipman "Matching Normalizing Flows and Probablity Paths on Manifolds" International Conference on Machine Learning (ICML) 2022 **arXiv link**.

A. Mladenović*, **A.J. Bose***, H. Berard*, W.L. Hamilton, S. Lacoste-Julien, P. Vincent, G.Gidel "Online Adversarial Attacks" International Conference on Learning Representations (ICLR) 2022. **arXiv link**

N. Dziri, A. Madotto, O. Zaiane, **A. J. Bose** "Neural Path Hunter: Reducing Hallucination in Dialogue Systems via Path Grounding" Empirical Methods in Natural Language Processing 2021 **arXiv link**

A. J. Bose*, G. Gidel*, H. Berard*, A. Cianflone, P. Vincenct, S.L. Julien, W. L. Hamilton. (2020) "Adversarial Example Games" Neural Information Processing Systems 2020 (NeurIPS) **arXiv link**.

K. Ahrabian *, A. Feizi *, Y. Salehi*, W. L. Hamilton, **A. J. Bose** "Structure Aware Negative Sampling in Knowledge Graphs" Empirical Methods in Natural Language Processing 2020.

A. J. Bose, A. Smofsky, R. Liao, P. Panangaden, W. L. Hamilton. (2019) "Latent Variable Modeling with Hyperbolic Normalizing Flows" International Conference of Machine Learning 2020. paper link

X. Peng, H. Saghir, J. Kang, T. Long, **A. J. Bose**, Y. Cao, J. Cheung (2019) "A Cross-Domain Transferable Neural Coherence Model." In Proceedings of Association for Computational Linguistics 2019. paper link

A. J. Bose, W. L. Hamilton. (2019) "Compositional Invariance Constraints for Graph Embeddings" International Conference of Machine Learning 2019.

A. Cianflone, Z. Ahmed, R. Islam*, **A. J. Bose***, W.L. Hamilton. (2019) "Discrete off-policy policy gradient using continuous relaxations" Reinforcement Learning and Decision Making 2019.

A. J. Bose, P. Aarabi (2018) " Adversarial Attacks on Face Detectors using Neural Net based Constrained Optimization.", IEEE MMSP, Vancouver, Canada. **ORAL and Best Paper Nominee arXiv link**

A. J. Bose*, Y. Cao*, H. Ling* (2018) " Adversarial Contrastive Estimation." **ORAL** In Proceedings of Association for Computational Linguistics 2018, Melbourne, Australia. **arXiv link**

R. Janzen, S. N. Yasrebi, **A. J. Bose**, A. Subramanian, S. Mann, " Walking through sight: Seeing the ability to see in a 3-D augmediated reality environment", Proc. IEEE Gaming Entertainment Media, pp. 313-4, 2014. **link**

WORKSHOP PUBLICATIONS

K. Panford-Quainoo, **A. J. Bose** (2019), M. Defferrard, "Bilateral Trade Modeling with Graph Neural Networks" International Conference on Learning Representations 2020 Workshop.

A. J. Bose, A. Jain, P. Molino, W. L. Hamilton. (2019) "Meta-Graph: Few Shot Link Prediction via Meta Learning" NeurIPS Graph Representation Learning Workshop, Montreal, Canada.

A. J. Bose, A. Cianflone, W. L. Hamilton. (2019) "Graph Attacks with Latent Variable Noise Modelling" NeurIPS Graph Representation Learning Workshop, Montreal, Canada.

A. J. Bose, P. Aarabi (2019) " Virtual Fakes: DeepFakes for Virtual Reality.", IEEE MMSP, Kuala Lumpur, Malaysia, **IEEE link**

P.N. Ward*, A. Smofsky*, **A. J. Bose** (2019) "Improving Exploration in Soft-Actor-Critic with Normalizing Flows Policies" Invertible Neural Networks and Normalizing Flows Workshop ICML 2019. **Spotlight talk**

A. J. Bose, W. L. Hamilton. (2018) "Compositional Fairness Constraints for Graph Embeddings" NeurIPS Relational Representation Learning Workshop, Montreal, Canada. **paper link**

A. J. Bose*, H. Ling*, Y. Cao (2018) "Compositional Hard Negative Mining for Visual Semantic Embeddings via an Adversary" NeurIPS Visually Grounded Language and Interaction Workshop, Montreal, Canada. **paper link**

PREPRINTS AND PATENTS

T. Akhound-Sadegh*, J. Rector-Brooks*, **A.J. Bose***, S. Mittal, P. Lemos, C.H. Liu, M. Sendera, S. Ravanbaksh, G. Gidel, Y. Bengio, N. Malkin, A. Tong "Iterated Denoising Energy Matching for Sampling from Boltzmann Densities" Preprint. arXiv link

A.J. Bose, M. Brubaker, I. Kobyzev "Equivariant Finite Normalizing Flows" Preprint. arXiv link

A. J. Bose, A. Jain, P. Molino, W. L. Hamilton. (2020) "Meta-Graph: Few Shot Link Prediction via Meta Learning" **arXiv link**.

Bose, Avishek Joey, and Parham Aarabi. "Disruption of Face Detection" U.S. Patent No. P7847US00. 13 Sept. 2018.

ACADEMIC ACHIEVEMENTS

NSERC Post-Doctoral Fellowship Sept 2023

- Awarded a Post-doctoral fellowship by NSERC Canada based on academic excellence in research conducted duing doctoral studies. The award comes with 90000 over a span of 2 years.

NeurIPS 2022 Top Reviewer Award Oct 2022

- Awarded a top reviewer for being among the top reviewers at NeurIPS 2022. This award is based on the feedback of meta-reviewers and is awarded for excellence in service while providing constructive feedback to authors.

ICML 2020 Top Reviewer Award Sept 2020

- Awarded a top reviewer for being among the top 33% best reviewers at ICML 2020. This award is based on the feedback of meta-reviewers and is awarded for excellence in service while providing constructive feedback to authors.

IVADO Ph.D. Fellowship June 2019

- The goal of the excellence fellowship program is to support promising students in their training as future highly qualified personnel (researchers, professors, professionals) and more generally, future actors in the field of data science, mainly in IVADO members areas of excellence: operations research, machine learning, decision sciences. The award comes with $100000 over a 4 year span.

IEEE MMSP Best Paper Honorable Mention Aug 2018

- Runner up prize for the best paper at IEEE MMSP. The paper focused on crafting adversarial attacks against modern face detectors and showed the existance of such attacks using parametric methods.

Top 5 Impressive Graduating Students Nov 2018

- Presented to 5 students graduating from the University of Toronto who have made the most of their time. This led to an interview with Uoft News and an article feature.

Young Stars Estes Award May 2018

- Awarded on a competitive basis to graduate students and post-docs attending the Deep, fast and shallow learning in humans and machines conference in Indiana State University.

Gordon Slemon Design Award Oct 2017

- The Gordon Slemon Design Award is awarded for excellence in engineering design. It is awarded for the best 4th year design project based as judged by the department based on effective planning, scheduling, reporting, and excellence in design, execution, creativity, etc. The award is in the form of a $1000 cash prize along with an engraved plaque of all team members.

Centennial Thesis Award May 2017

- This award is offered to the fourth year student that receives the highest grade in the 4th year Design Project. One award is given for each program: electrical and computer engineering programs. Each award is in the form of a $500 prize and an accompanying certificate.

Dean's List April 2015,2017

- Awarded for academic performance for having an average higher than 80%

Uoft TrackOne Scholarship April 2012

- Awarded $2000 based on academic merit

Uoft ECE Presidents Scholarship (declined) April 2012

- Awarded $4000 based on academic merit

INVITED TALKS AND PANELS

University College London May 2020

- Talk on using Meta Learning for Few-Shot Link Prediction in Graph Datasets.

Facebook AI Research (FAIR) February 2020

- Talk on latent variable modeling with hyperbolic flows. The research from this version of the talk was later published at ICML 2020.

University of Toronto & Vector Institute October 2019

- Talk on using Meta Learning for Few-Shot Link Prediction in Graph Datasets.

Mila Graph Representation Learning Group February 2019

- Talk on enforcing compositional invariance constraints for Node Embeddings in graph data structures. The research from this version of the talk was submitted to ICML 2019.

McGill Computational Linguistics Group November 2018

- Talk on applying Adversarial Contrastive Estimation for Image Caption Retrieval. The research from this version of the talk was later published at NeurIPS Visually Grounded Language and Interaction Workshop.

Facebook AI Research (FAIR) November 2018

- Talk on enforcing compositional fairness constraints for Node Embeddings in graph data structures. The research from this version of the talk was later published at NeurIPS Relational Representation Learning Workshop.

GeekPwn at DefCon: AI/Robotics and Cybersecurity June 2018

- Talk on Adversarial Attacks against break face detectors to an audience of security experts.

Huawei AI and Security Workshop June 2018

- Presented Research on Adversarial Attacks against face detectors to Huawei and other expert researchers in the field of adversarial machine learning.

UofT Engineering Science Math, Statistics, and Finance Panel Discussion April 2018

- Participated as a panelist for 2nd and 3rd year Engineering Science students. Provided advice and direction to students entering machine learning and research in general.

PRESS COVERAGE

University of Toronto News "Meet five impressive graduating students who got the most of their U of T experience" **article link**

University of Toronto News "U of T Engineering AI researchers design privacy filter for your photos that disables facial recognition systems" **article link**

Forbes "AI Researchers Create 'Privacy Filter' That Disrupts Facial Recognition Technology" **article link**

CBC "U of T researchers developing tool to jam facial recognition software" **article link**

VentureBeat "University of Toronto researchers develop AI that can defeat facial recognition systems" **article link**

Toronto Star "U of T researchers design algorithm that dupes facial recognition detectors" **article link**

Science Daily "AI researchers design 'privacy filter' for your photos" **article link**

COMMUNITY SERVICE

Workshops Organized

Lead organizer for the first workshop on Differential Geometry Meets Deep Learning held virtually at NeurIPS2020. This involved driving the workshop proposal, creating a website, recruiting reviewers and invited speakers and chairing the workshop. **DiffGeo4DL**

Reviewing

Member of the Program Committee for **ICML 2020,2021,2023**, **NeurIPS 2020,2021,2022**, **AAAI 2021**, **ICLR 2022**, **AISTATS 2022**, Transactions of Machine Learning Research **TMLR**, and reviewer for Transactions in Pattern Analysis and Machine Intelligence (**TPAMI**).