Ali Emami

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Research Interest

Natural Language Processing, Machine Learning, Deep Learning, Artificial Intelligence.

Academic Appointment

Brock University — **St. Catharines, Canada**
Tenure-track Assistant Professor of Computer Science — *July 2021–Present*

SKEMA Business School — **Montreal, Canada**
Adjunct Professor of Computer Science — *November 2021–March 2023*

Mila - Quebec AI Institute — **Montreal, Canada**
Research Assistant — *September 2018–July 2021*

Wellcome - MRC Institute of Metabolic Science, Cambrige University — **Cambridge, England**
Research Intern — *May 2016 - August 2017*

Montreal Clinical Research Institute - IRCM — **Montreal, Canada**
Research Assistant — *September 2014–January 2017*

Department of Critical Care, McGill University Health Centre — **Montreal, Canada**
Research Assistant — *September 2013–September 2014*

Education

McGill University — **January 2017–July 2021**
PhD in Computer Science, CGPA: 4.0/4.0
Advisor: Jackie Cheung

McGill University — **September 2014–January 2017**
MSc in Computer Science, CGPA: 3.94/4.0
Advisors: Joelle Pineau & Ahmad Haidar

McGill University — **September 2010–May 2014**
BSc in Joint Physics & Computer Science, Grade: 3.73/4.0

Award and Nomination

2024: Faculty of Math and Sciences Teaching Award, Brock University, $2,500. **[Details]**

2023: Faculty of Mathematics and Science Workload Release Program, Brock University, Half-course release for outstanding research, teaching, and service (highly competitive; 5 granted per faculty)

2021: Oral Presentation at ACL 2021. **[Video]**

2020: Oral Presentation at Coling 2020

2019: Oral Presentation at EMNLP 2019

2018: Best Paper Award–NAACL SRW 2018. **[Details]**

2015: McGill University Graduate Excellence Award, $4,000

2013: William Dawson Undergraduate Excellence Award, $2,000

Research Grant

2023: Mitacs Globalink Research Internship Program (3 international students). **[Details]**

2022: New Frontiers in Research Fund (NFRF) Exploration Grant, $249,044. **[Details]**

2022: Natural Sciences and Engineering Research Council of Canada's (NSERC) Discovery Launch Supplement, $12,500. **[Details]**

2022: NSERC's Discovery Grant, $125,000. **[Details]**

2017: NSERC Canada Graduate Scholarship - PhD Program, $63,000

2017: The Fonds de recherche du Québec Nature et technologies (FRQNT) - PhD Scholarship, $63,000 [Declined]

2015–2017: Fonds de Recherche Santé Quebec (FRSQ) Master's Scholarship, $15,000 (each year)

2015: NSERC Canada Graduate Scholarships-Master's Program, $17,500

Research Collaboration (Selected)

Institutional

The School of Interactive Computing **May 2024 - Present**
Georgia Institute of Technology
Research involves prompt engineering and benchmarking of LLMs on complex, unsolved tasks in natural language processing.

The MIT Media Lab **Sep. 2022 - Present**
Massachusetts Institute of Technology
Exploring novel debiasing methods for LLMs, including protocol development for evaluating consistency in debiasing effectiveness and the examination of confidence-probability alignment.

- **Publication 1 (ACL 2024):** Confidence Under the Hood: An Investigation into the Confidence-Probability Alignment in Large Language Models
- **Publication 2 (ACL Findings 2023):** Debiasing should be Good and Bad: Measuring the Consistency of Debiasing Techniques in Language Models

Montreal Institute of Learning Algorithms (Mila) **January 2022 - June 2024**
Development of EvoGrad, a dynamic dataset creation platform for the Winograd Schema Challenge, incorporating human-in-the-loop methodologies to address model stability.

- **Publication:** EvoGrad: A Dynamic Take on the Winograd Schema Challenge with Human Adversaries

MRC Institute of Metabolic Science **May 2016 - August 2017**
Cambridge University
Collaboration with Dr. Roman Hovorka's team on studying behavioral patterns and glucose control during hybrid closed-loop therapy in type 1 diabetes.

- **Publication:** Behavioral Patterns and Associations with Glucose Control During 12-Week Randomized Free-Living Clinical Trial of Day and Night Hybrid Closed-Loop Insulin Delivery in Adults with Type 1 Diabetes

Industrial

360 Energy **June 2024 - Present**
Research on AI-driven solutions for automating invoice reading, analysis, and customer recommendation systems.

Microsoft Research **Jan 2017 - July 2021**
Research on AI-driven approaches for natural language understanding, including the development and evaluation of methods for , the Winograd Schema Challenge and related tasks.

- **Publication 1 (ACL-IJCNLP 2021):**
  ADEPT: An Adjective-Dependent Plausibility Task
- **Publication 2 (COLING 2020):**
  An Analysis of Dataset Overlap on Winograd-Style Tasks
- **Publication 3 (ACL 2019):**
  The KnowRef Coreference Corpus: Removing Gender and Number Cues for Difficult Pronominal Anaphora Resolution
- **Publication 4 (EMNLP 2018):**
  A Knowledge Hunting Framework for Common Sense Reasoning
- **Publication 5 (NAACL-HLT SRW 2018 – Best Paper Award):**
  A Generalized Knowledge Hunting Framework for the Winograd Schema Challenge

Teaching Experience

Introduction to Natural Language Processing (COSC 4P84) — **Brock University**
An advanced course covering algorithms and recent advances in NLP. — *Winter 2024*
New course introduced by me.

Essentials of Artificial Intelligence (COSC 1P71) — **Brock University**
Overview of AI principles, ML models, and their real-world applications. — *Winter 2025*
New course introduced by me.

Natural Language Processing (COSC 5P84) — **Brock University**
Focuses on deep learning models for NLP and their application — *Winter 2023, Winter 2025*
New course introduced by me.

Data Structures and Abstraction (COSC 1P03) — **Brock University**
Programming and problem-solving using high-level languages, data structures such as arrays and linked lists, and abstraction. — *Fall 2024, Winter 2024, Fall 2023, Winter 2023, Winter 2022*

Internet Technologies (COSC 2P89) — **Brock University**
The essential technologies and protocols for web and internet development — *Fall 2023, Fall 2022, Fall 2021*

Programming Languages (COSC 2P05) — **Brock University**
Examination of various programming paradigms and their implications. — *Winter 2022*

Academic Service

Area Chair

2024: ACL Rolling Review June, 8 papers.

Reviewer

2024: April 2024 ACL Rollowing Review (ARR), The 1st Conference on Language modeling (COLM 2024), 6 papers

2023–2024: EACL 2023 (ARR), NAACL 2023 (ARR), ACL 2024 (ARR) 13 papers.

2021: ACL 2021, 3 papers.

2019: ACL SRW 2019, 3 papers.

Co-organizer

2019: EMNLP-IJCNLP 2019 Workshop on Commonsense Inference in Natural Language Processing Program Committee (PC) member

Professional Experience

Brock University — **July 2021–Present**
Director, Natural Language Processing Group

Brock University Professional and Continuing Studies **April 2024–Present**
Developer and Facilitator

- **C-Suite: What you need to know about AI for your business** – Half-day workshop for business leaders.
- **Exploring large language models: Beyond ChatGPT** – Half-day workshop on practical applications of LLMs.
- **AI Essentials** – Six-week micro-credential for professionals new to AI.

Department of Computer Science, Brock University **July 2024–Present**
Hardware/Software Planning Committee Chair

Department of Computer Science, Brock University **July 2024–Present**
Undergraduate Thesis Program Coordinator

Department of Computer Science, Brock University **July 2023–Present**
Joint AI BSc + BA Artificial Intelligence Program Vice Chair

Brock University **June 2023–Present**
AI Advisory Committee Member

Faculty of Math and Sciences, Brock University **June 2023–Present**
Inclusion, Diversity, Equitability, and Accessibility (IDEA) Lead Member

Department of Computer Science, Brock University **July 2023–July 2024**
Curriculum Committee Member

Department of Computer Science, Brock University **July 2023**
AI-Day Organizer

Recent Scholarly Address

November 2024: Feature Presentation: "**In Search of Digital Truth: How Large Language Models are Shaping Our Reality (And How We are Shaping Theirs!)**", First Ontario Performing Arts Centre **[Details]**

March 2024: Colloquium Talk: "**Large Language Models: Society's Silent Mirrors**", Brock Faculty of Math and Science's Anthropocene Research Colloquium Series **[Details]**

November 2023: Expert Panelist: "**Language Models at Scale: Big Models, Bigger Questions**", Brock University's Annual AI Day Event **[Details]**

August 2023: Research Talk, AI integration seminar, SKEMA AI School for Business

April 2023: Research Talk: "**Navigating the Power and Pitfalls of Pretrained Language Models in the Prompting Era**", MIT Media Lab

October 2022: Keynote Talk: "Role of Basic Sciences for Sustainable Development", COMSTECH - OIC Standing Committee on Scientific and Technological Cooperation **[Details]**

July 2022: Research Talk, AI integration seminar, SKEMA AI School for Business

May 2022: Masterclass: "**Generalizable, Ethical, and Interpretable Natural Language Processing: Science or Science Fiction?**", SKEMA AI School for Business **[Details]** **[Video]**

October 2021: Research talk: "**Towards Interpretable, Ethical, and Generalizable NLP Models**", Graduate Seminar COMP-5111, Lakehead University **[Details]**

December 2020: Oral presentation, 28th International Conference on Computational Linguistics (COLING)

July 2019: Oral presentation, 57th Annual Meeting of the Association for Computational Linguistics (ACL)

October 2019: Keynote speaker, Annual Microsoft Research and Mila Collaborative Research Workshop

June 2018: Oral presentation (awarded **best paper**), 2018 Conference of the North American Chapter of the Association for Computational Linguistics: Student Research Workshop **[Video]**

2017 – 2020: Guest lectures, Artificial Intelligence & Machine Learning courses, McGill University:

- January 2020 & April 2019: Search Algorithms, Introduction to Artificial Intelligence
- October 2017: A brief survey of methods for feature construction and selection, Applied Machine Learning

2017 – 2018: Invited talks, McGill University's Reasoning and Learning Lab's Computational Linguistics Meetings:

- August 2018: A Simple Approach for Common-Sense Reasoning
- March 2018: Tackling Common-Sense Reasoning Problems in NLP
- January 2018: Literature Review on Recent Development in Authorship Identification, Text Summarization, and Common-Sense Reasoning
- November 2017: On-going Research: The Winograd Schema Challenge
- November 2017: Probabilistic Reasoning via Deep Learning: Neural Association Models

Student Supervision

Primary Supervisor

- MSc Students
  - **Robert Morabito**, Brock University (2022-2023, Undergraduate; 2024-Present, MSc)
  - **Kaige Chen**, Brock University (Fall 2024 – Present)
  - **Kazi Nishat Anwar**, Brock University (Fall 2024 – Present)
  - **Nikta Gohari Sadr**, Brock University (Fall 2023 – Present)
  - **Sarfaroz Yunusov**, Brock University (Fall 2023 – Present)
  - **Abhishek Kumar**, Brock University (Fall 2023 – Summer 2024, *Graduated*)
- Undergraduate Researchers
  - **Tyler Mcdonald**, Brock University (Summer 2023 – Present, *NSERC Undergraduate Student Research Awardee*)
  - **Sangmitra Madhusudhan**, Brock University (Summer 2024 - Present, *Brock Co-op Program*)
  - **Skye Reid**, Brock University (Summer 2024)
  - **QiQi Gao**, Brock University (Summer 2022 – Summer 2023)
- Summer Researchers (Mitacs Globalink Interns)
  - **Ghofrane Faidi** (Summer 2024)
  - **Angel Loredo** (Summer 2024)
  - **Harsh Lalai** (Summer 2024)

Graduate Thesis Committee Member

- **Abhishek Kumar**, MSc, Brock University (2024)
  - Thesis: *Towards Trustworthy AI: Investigating Bias and Confidence Alignment in Large Language Models*
- **Yage Zhang**, MSc, Brock University (2023)
  - Thesis: *Aligning Language Models Using Multi-Objective Deep Reinforcement Learning*
- **Amirmahdi Khosravi Tabrizi**, MSc, Brock University (2023)
  - Thesis: *Adaptive Logging system: A System Using Reinforcement Learning For Log Placement*
- **Maka Hu**, MSc, Brock University (2023)
  - Thesis: *Automatic Generation of Human Readable Proofs*
- **Cameron Andres**, MSc, Brock University (2022)
  - Thesis: *Artificial Intelligence for DNA/RNA Aptamer Drug Design*
- **Jordan Maslen**, MSc, Brock University (2021)
  - Thesis: *Mixed Media in Evolutionary Art*
- **Pawel Jocko**, MSc, Brock University (2021)
  - Thesis: *Multi-Guide Particle Swarm Optimisation for Dynamic Multi-objective Optimisation Problems*

Graduate Thesis External Examiner

- **Jessica Graham**, MSc, Brock University (May 2024)
  - Thesis: *Edge Communication Efficiency with GNNs in the Internet of Vehicles*

- **Tristan Navikevicius**, MSc, Brock University (January 2024)
  - Thesis: *Generating Models of Human Gait in Patients with Parkinson's Disease*
- **Derek Hon**, MSc, Brock University (February 2023)
  - Thesis: *Distributed MAP-Elites and its Application in Evolutionary Design*
- **Mohammad Adib Khan**, MSc, Brock University (February 2023)
  - Thesis: *Time-Series Trend-Based Multi-Level Adaptive Tracing*
- **Jeremy Blanchard**, MSc, Brock University (January 2023)
  - Thesis: *Time-Series Trend-Based Multi-Level Adaptive Tracing*

Intellectual Property

- **Humanelike** (Registered 2022)
  - *AI & Ethics Consultation Service*
- **Fava – Discover, Match, Trade** (Registered 2021)
  - *Social trading application*
- **Physical/Chemical Acid Base Calculator** (iPhone Application, Registered 2014)
  - *A practical physical-chemical acid base calculator based on the analysis of acid base in biological solutions*

Publication

Peer-Reviewed Conference Proceedings (Main Conferences)

1. Kumar, A., Yunusov, S., **Emami, A.** Subtle Biases Need Subtler Measures: Dual Metrics for Evaluating Representative and Affinity Bias in Large Language Models. In Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (**ACL 2024**)
2. Park, B., Janecek, M., Li, Y., **Emami, A.** Picturing Ambiguity: A Visual Twist on the Winograd Schema Challenge. In Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (**ACL 2024**)
3. Kumar, A., Morabito, R., Umbet, S., Kabbara, J., **Emami, A.** Confidence Under the Hood: An Investigation into the Confidence-Probability Alignment in Large Language Models. In Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (**ACL 2024**)
4. Sun, J.H., & **Emami, A.** EvoGrad: A Dynamic Take on the Winograd Schema Challenge with Human Adversaries. In The 2024 Joint International Conference on Computational Linguistics, Language Resources and Evaluation (**COLING-LREC 2024**)
5. Zahraei, Pardis Sadat, & **Emami, A.** WSC+: Enhancing The Winograd Schema Challenge Using Tree-of-Experts. In The 18th Conference of the European Chapter of the Association for Computational Linguistics (**EACL 2024**) (**Oral**)
6. Morabito, R., Kabbara, J., **Emami, A.** Debiasing should be Good and Bad: Measuring the Consistency of Debiasing Techniques in Language Models. In Findings of the 61st Annual Meeting of the Association for Computational Linguistics (**ACL 2023**)
7. **Emami, A.**, Porada, I., Olteanu, A., Suleman, K., Trischler, A., & Cheung, J. C. K. ADEPT: An Adjective-Dependent Plausibility Task. In Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (**ACL-IJCNLP 2021**) (**Oral**)
8. **Emami, A.**, Trischler, A., Suleman, K., & Cheung, J. C. K. An Analysis of Dataset Overlap on Winograd-Style Tasks. In Proceedings of the 28th International Conference on Computational Linguistics (**COLING 2020**) (**Oral**)
9. **Emami, A.**, Trichelair, P., Trischler, A., Suleman, K., Schulz, H., & Cheung, J. C. K. The KnowRef Coreference Corpus: Removing Gender and Number Cues for Difficult Pronominal Anaphora Resolution. In Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (**ACL 2019**)
10. **Emami, A.**, Trichelair, P., Trischler, A., Suleman, K., & Cheung, J. C. K. How Reasonable are Common-Sense Reasoning Tasks: A Case-Study on the Winograd Schema Challenge and SWAG. In Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and

the 9th International Joint Conference on Natural Language Processing (**EMNLP-IJCNLP 2019**) (**Oral**)

11. **Emami, A.**, De La Cruz, N., Trischler, A., Suleman, K., & Cheung, J. C. K. A Knowledge Hunting Framework for Common Sense Reasoning. In Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2018**)

Peer-Reviewed Journals

1. Alam, O., Kush, A., **Emami, A.**, & Pouladzadeh, P. (2020). Predicting irregularities in arrival times for transit buses with recurrent neural networks using GPS coordinates and weather data. Journal of Ambient Intelligence and Humanized Computing: 1-14.
2. **Emami, A.**, Willinska, M. E., Thabit, H., Leelarathna, L., Hartnell, S., Dellweg, S., ... & Pieber, T. R. (2017). Behavioral patterns and associations with glucose control during 12-week randomized free-living clinical trial of day and night hybrid closed-loop insulin delivery in adults with type 1 diabetes. Diabetes Technology & Therapeutics: 19(7), 433-437.
3. **Emami, A.**, El Youssef, J., Castle, J., Pineau, J., Haidar, A., Rabasa-Lhoret, R. (2016) Modelling Glucagon Action in Patients with Type 1 Diabetes. IEEE Journal of Biomedical and Health Informatics: 4(21), 1163 – 1171.
4. Taleb, N., **Emami, A.**, Suppere, C., Messier, V., Legault, L., Ladouceur, M., ... & Rabasa-Lhoret, R. (2016). Efficacy of single-hormone and dual-hormone artificial pancreas during continuous and interval exercise in adult patients with type 1 diabetes: randomised controlled crossover trial. Diabetologia: 59(12), 2561-2571.
5. Taleb, N., **Emami, A.**, Suppere, C., Messier, V., Legault, L., Chiasson, J. L., ... & Haidar, A. (2016). Comparison of two continuous glucose monitoring systems, Dexcom G4 Platinum and Medtronic Paradigm Veo Enlite System, at rest and during exercise. Diabetes Technology & Therapeutics: 18(9), 561-567.
6. Taleb, N., Haidar, A., Suppere, C., **Emami, A.**, Messier, V., Ladouceur, M., Chiasson, J., Legault, L., Rabasa-Lhoret, R. (2016) CO-65: Évaluation de l'efficacité du pancréas artificiel pour réguler la glycémie durant un exercice chez des patients diabètiques de type 1. Diabetes & Metabolism: 42, A19-20.
7. **Emami, A.**, Rabasa-Lhoret, R., & Haidar, A. (2015) Enhancing glucose sensor models: modeling the drop-outs. Diabetes Technology & Therapeutics: 17(6), 420-426.
8. Magder, S., & **Emami, A.** (2014) Practical Approach to Physical-Chemical Acid-Base Management. Stewart at the Bedside. Annals of the American Thoracic Society: 12(1), 111-117.

Workshops and Other Contributions

1. McDonald, T. & **Emami, A.** Trace-of-Thought Prompting: Investigating Prompt-Based Knowledge Distillation Through Question Decomposition. In Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (Student Research Workshop, August 2024) Bangkok, Thailand. Association for Computational Linguistics (August, 2024)
2. Chen Gao, Q & **Emami, A.** The Turing Quest: Can Transformers Make Good NPCs?. In Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 4: Student Research Workshop, July 2023), pages 93–103, Toronto, Canada. Association for Computational Linguistics (July 2023)
3. **Emami, A.**, Abramson, D. A Critical Analysis of GitHub Copilot. In Free Software Foundation: Philosophical and Legal Questions around Copilot, 2022).
4. **Emami, A.**, Trischler, A., Suleman, K., & Cheung, J. C. K. (2018, June). A generalized knowledge hunting framework for the winograd schema challenge. In Proceedings of the 2018 Conference of the North American Chapter of the Association for Computational Linguistics: Student Research Workshop (pp. 25-31).
5. **Emami, A.**, Trichelair, P., Trischler, A., Suleman, K., & Cheung, J. C. K (2018, December). On the Evaluation of Common-Sense Reasoning in Natural Language Understanding. In Proceedings of the 2018 Conference on Neural Information Processing Systems: Critiquing Current Trends in Machine Learning Workshop.

Contributions to Published Textbooks

1. **Emami, A.** "Natural Language Processing: Current Methods and Challenges." Engineering Mathematics and Artificial Intelligence: Foundations, Methods, and Applications (2023): 261. (July 2023)

Preprints and Submitted Articles

1. Yunusov, S., Sidat, H., **Emami, A.** MirrorStories: Reflecting Diversity through Personalized Narrative Generation with Large Language Models. In The 2024 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2024**) (August 2024)
2. Zahraei, Pardis Sadat, & **Emami, A.** Translate With Care: Addressing Gender Bias, Neutrality, and Reasoning in Large Language Model Translations. In The 2024 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2024**) (August 2024)
3. Morabito, R., Madhusudan, S., McDonald, T., **Emami, A.** STOP! Benchmarking Large Language Models with Sensitivity Testing on Offensive Progressions. In The 2024 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2024**) (August 2024)
4. **Emami, A.**, Abramson, D. An Application of Pseudo-Log-Likelihoods to Natural Language Scoring." arXiv preprint arXiv:2201.09377 (2022).