YASAMIN ZARGHAMI

+1(647) 774-2805 ⋄ yasamin.zarghami@mail.utoronto.ca ⋄ [LinkedIn](#) ⋄ [GitHub](#)

EDUCATION

Master of Science, University of Toronto   **Sep 2023 - Apr 2025**
Computer Science
Thesis: Integration of Diffusion Models and Large Language Models for Generating Facial Pain Images
Relevant Coursework: Algorithms for Private Data Analysis, HCI: Topics in Ubiquitous Computing, Statistical Learning Theory, Natural Language Computing

Honours Bachelor of Science, University of Toronto   **Sep 2018 - Apr 2023**
Computer Science Specialist with a Focus in Artificial Intelligence (**GPA: 3.85/4**)
Relevant Coursework: Machine Learning, Deep Learning, Visual Computing, Linear Algebra, Multivariable Calculus, Probability and Statistics, Data Structures, Algorithm Design, Numerical Methods, Operating Systems, Probabilistic ML, Computational Linguistics

PUBLICATIONS AND CONFERENCES

[1] **Zarghami, Y**., Mafeld, S., Conway, A., Taati, B. (2023). *Pain Detection in Masked Faces during Procedural Sedation.* 2023 IEEE 17th International Conference on Automatic Face and Gesture Recognition (FG), Waikoloa Beach, HI, USA, pp. 1-6, doi: 10.1109/FG57933.2023.10042502.

[2] **Zarghami, Y**., Mafeld, S., Conway, A., Taati, B. 2022. *Pain Detection in Masked Faces during Procedural Sedation.* [Poster]. AGE-WELL's Annual Conference, 2022

[3] Chen, Z., Ma, X., Sharma, I., **Zarghami, Y**., Zhang, A. Giannari, D. 2022. *Improving Genome-Scale Metabolic Models of the Human Gut Microbiome through Phylogenetic Protein Analysis.* [Online poster]

[4] Chen, Z., Ma, X., Sharma, I., **Zarghami, Y**., Zhang, A. Giannari, D. Improving Genome-Scale Metabolic Models of the Human Gut Microbiome through Phylogenetic Protein Analysis [abstract]. In: STEM Fellowship Journal; 2022

PREPRINTS

[1] Adeli, V., Mehraban, S., Campbell, I., **Zarghami, Y**., Taati, B., Laboni, A. (2024). *Estimating Parkinson's Disease Severity in Walking Sequences.* 2024 IEEE 18th International Conference on Automatic Face and Gesture Recognition (FG)

[2] **Zarghami, Y**., Mafeld, S., Conway, A., Taati, B. 2024. *Enhancing Automated Pain Detection with Synthetic Facial Expression Data.* [Poster]. International Conference on Aging, Innovation and Rehabilitation, 2024

AWARDS, HONOURS AND GRANTS

Vector Scholarship in Artificial Intelligence ($17,500)   2023
University of Toronto Wolfond Entrance Award ($10,000)   2023
Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Awards (USRA) ($8,000)   2022
Gerald Allen Hollingshead Memorial Scholarship ($4 × $5,000$)   2018, 2019, 2020, 2022
University of Toronto Scholar Award ($7,500)   2018
Dean's List Scholar   2019, 2020, 2022, 2023

RESEARCH EXPERIENCE

KITE Institute, University Health Network   **May 2022 - Oct 2022, Jul 2023 - Present**
Machine Learning Researcher   *Toronto, ON*
Supervisor: Dr. Babak Taati

- Designed a multi-modal deep generative model **in PyTorch** that generates face images of specific emotions, age, or pain intensity while maintaining the subject's identity, by integrating a Large Language Model (LLM) and a Stable Diffusion framework with identity encodings.
- Enhanced Parkinson's disease gait assessment on a **SLURM cluster** by leveraging motion encoder models, outperforming traditional feature-based approaches and **improving score estimation accuracy by 6%**.

- Trained a CNN for facial pain detection on a video dataset of 17 patients (**483,336 total image frames**) and achieved an **AUC of 0.82** which outperformed baseline methods of HOG + SVM and Random Forest by 26%.
- Performed temporal analysis of model pain predictions and applied a causal uniform filter which reduced prediction noise and **improved AUC by 7%**.
- Augmented a pose sequence dataset with mixup, Gaussian blur and Gaussian noise and trained a Graph Convolutional Network on them for skeletal action prediction.

Medical Computer Vision and Robotics Lab, University of Toronto   **Sep 2022 - Apr 2023**
Machine Learning Researcher   *Toronto, ON*
Supervisor: Dr. Lueder Kahrs

- Created a simulated **da Vinci Research Kit (dVRK)** Unity dataset with a stereo camera setup, depth images, semantic segmentation and object bounding boxes used for 3D surgical tool-tracking.
- Achieved real-time surgical tool-tracking by fine-tuning a pre-trained object tracking model on the dVRK dataset to predict semantic segmentation, disparity and 3D object bounding boxes.
- Established a pipeline for generating disparity images, leveraging camera calibration techniques and **Unity** simulation properties, improving the simulation of real-world conditions.

Indicium Research Program, University of Toronto   **Dec 2021 - May 2022**
Research Assistant   *Toronto, ON*
Supervisor: Dafni Giannari

- Improved the genome-scale metabolic model of the human gut microbiome through phylogenetic protein analysis.
- Used the Treegrafter software tool for phylogenetic analysis of proteins.
- Co-authored a full manuscript with a team of 5 students.

PROFESSIONAL EXPERIENCE

Veeva Systems Inc.   **May 2021 - Aug 2022**
Software Engineer Intern   *Toronto, ON*

- Implemented and maintained a backend framework, leveraging Java Spring, J2EE and OOP technologies, which was used by a team of **11 developers** to support **6 different wizard**s.
- Developed **4 UI pages** for navigating through a record-handling wizard, integrating React, JQuery and Ajax for an enhanced UX. Included query functionalities to the backend, allowing seamless interaction with the database.
- Created an automated completion job for a wizard, streamlining the task finalization process and notifying users with automated summary notifications upon completion.
- Upgraded the product's data model to support new objects that were used by **5 different teams**.

PROJECTS

Neural Machine Translation (NMT)   *Python, PyTorch*
Implemented a Transformer-based NMT model from scratch incorporating Greedy and Beam Search algorithms for efficient sentence generation. Trained the model on the Canadian Hansards Dataset and evaluated its performance using BLEU scores.

Language Sentiment Analysis   *Python, PyTorch, SpaCy, Scikit-Learn*
Developed feature-based and Language Model (LM)-based classifiers to predict Reddit users' political affiliations by analyzing posts. Compared the performance of the two models through experiments.

Patch-Based Image In-Painting   *Python, OpenCV*
Re-implemented an exemplar-based image inpainting algorithm that restores images with complex structures and large missing areas through adaptive patch sizing and rotation-invariant matching.

SKILLS

Programming Languages	Python, Java, C, C++, JavaScript, React, HTML, CSS, SQL, R, MATLAB, C#
Frameworks and Libraries	PyTorch, TensorFlow, OpenCV, NLTK, SpaCy, Hugging Face, pandas, scikit-learn
Tools	GitHub, GitLab, SLURM, Jupyter, Jira, CAD, Unity, AWS, Maven, Gradle