

Mahdi Alam

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Professional Summary

Computer Science graduate and MSc candidate with Python experience implementing deep learning research and retrieval algorithms. Built an AI-assisted document-search prototype with JSON REST endpoints, BM25 ranking, evidence responses, and HTTP integration tests. Skills include PyTorch, TensorFlow, scikit-learn, SQL, Git, Docker, and Linux.

Education

Toronto Metropolitan University (formerly Ryerson)

MSc, Artificial Intelligence - Research Thesis | Sep 2023 - Expected Dec 2026

BSc (Honours), Computer Science | Sep 2019 - May 2023

Coursework: Machine Learning, Computer Vision, Algorithms, Probability and Statistics, Research Methods in Computer Science.

Technical Skills

Python, C++, C, SQL

REST API prototype, JSON, BM25 retrieval, input validation, HTTP integration tests

PyTorch, TensorFlow, scikit-learn, NumPy, SciPy, Pandas, OpenCV

Deep learning, self-supervised learning, computer vision, model evaluation

Git, Docker, Linux, reproducible experiments, ablation studies

Research Experience

Machine Learning Researcher - Medical Image Registration | Aug 2019 - Present

Toronto Metropolitan University | Toronto, ON

- Extended the On-the-Fly Guidance (OFG) framework in Python-based training pipelines without changing model architecture or inference pathways.
- Conducted reproducible experiments, benchmark comparisons, and ablation studies; evaluated deformation quality using Jacobian determinant analysis.
- Designed a two-phase coarse-to-fine training strategy combining multi-resolution curriculum learning and adaptive optimization for self-supervised deep learning.
- Improved Dice Similarity Coefficient (DSC) by up to 1.7 points across LPBA40, IXI, and OASIS benchmarks.

Projects

Document Search API - AI-assisted prototype | Python | Oct 2026

- Implemented BM25 ranking, JSON REST search and evidence endpoints, source IDs, and input validation; verified eight automated tests, including HTTP integration cases.
- Returned ranked sources and explicit no-evidence responses. Code:
github.com/mahdi-alam360/search-engine-nlp/tree/main/prototype

Search Engine - NLP and Retrieval | Python | Oct 2022 - Nov 2022

- Implemented TF-IDF and BM25 retrieval; trained Naive Bayes and linear SVM baselines and compared retrieval effectiveness across models.

Colour Clustering Pipeline | Python, scikit-learn | Sep 2023 - Dec 2023

- Extracted dominant colour distributions; applied K-means clustering to identify recurring palettes and evaluate clustering stability.

Manuscript

Enhancing On-the-Fly Guidance for Medical Image Registration through Multi-Resolution Curriculum and Adaptive Optimization. Manuscript in preparation, 2025.