

KUNAL MAHATHA

☎ +1 (263) 366-6436 ✉ kunalmahatha@gmail.com 🔗 [linkedin.com/in/kunalmahatha](https://www.linkedin.com/in/kunalmahatha) 🐙 github.com/kunal-mahatha

Education

École de Technologie Supérieure, Montreal

PhD in Information Technology

Winter'26 – Present

Quebec, Canada

École de Technologie Supérieure, Montreal(GPA - 4.09/4.3)

MASc in Information Technology(with Thesis)

Fall'24 – Fall'25

Quebec, Canada

BIT, Sindri

Bachelor of Technology in Computer Science and Engineering

Fall'20 – Summer'24

India

Work Experience

Zebra Technologies

Visiting Researcher

January 2026 – Present

Montreal, Canada

- Developing a real-time object segmentation pipeline by integrating **RTMDet** for object detection with **FastSAM** for instance segmentation.
- Designing efficient inference workflows to enable low-latency mask generation for practical vision applications.

ILLS (McGill, ÉTS, Mila, CNRS, Université Paris-Saclay, CentraleSupélec)

Graduate Research Assistant

September 2024 – Present

Montreal, Canada

- Developed **training-free open-vocabulary segmentation** frameworks leveraging **diffusion models** and **CLIP**, surpassing prior state-of-the-art baselines across multiple benchmarks including **VOC**, **COCO**, **ADE20K**, and **Cityscapes** (WACV 2026).
- Developed **SPARK**: a stochastic propagation framework integrating **global semantic affinities** with **local spatial neighborhoods** via random-walk dynamics for robust unsupervised segmentation (ICML submission).
- Advancing **Vision Mamba** / **state-space architectures** with multi-directional spatial modeling to improve isotropic information propagation in vision tasks (CVPR submission).
- Benchmarked large **foundation models** on histopathology datasets, contributing to results accepted at **NeurIPS (Spotlight)**.

PharVision Capital

Quantitative Researcher

September 2023 – August 2024

Bulgaria, Sofia

- Designed a **LLM- and agent-driven** alpha generation pipeline with **RAG**-based retrieval to enable faster, broader, and more systematic exploration of alphas than conventional manual mining.
- Created **PharGPT**, a RAG-powered information-retrieval assistant for the PharVision library, improving search quality and research productivity.
- Refactored inhouse-build tools for metric evaluation from pandas to polars and hence got a reduced time **1/20th** of the previous code.

École de Technologie Supérieure

MITACS Globalink Research Intern

May 2023 – July 2023

Montreal, Canada

- Investigated **weakly supervised segmentation** methods for lesion localization in medical images using the **DeepLesion** dataset.
- Developed and trained deep learning models for **lung and liver lesion segmentation** using **bounding-box annotations** as weak supervision, incorporating geometric priors including **size constraints**, **shape regularization**, and **tightness constraints** to improve mask quality.

Birsa Institute of Technology, Sindri

Research Assistant

August 2022 – April 2023

Jharkhand, India

- Worked on medical image analysis using Deep Learning and **computer vision** based methods.
- Worked on **new esembling method** i.e., **patch based esembling** technique with added attention layer to retain the missed out spatial information and improved the accuracy from **88%** to **92%** finally obtained **95%**.

Sony India Software Centre Pvt Ltd

Deep Learning Intern

November 2021 – August 2022

Bangalore, India

- Developed a deep learning model using **self-supervised learning** with **auto-encoder** for automatic shot detection with an accuracy of **98.58%**
- Integrated a **CBIR** architecture to find the cast in the various frames from the entire scene of a video content.

Computer Vision Center

July 2022 – August 2022

Undergraduate Research Assistant

Spain, Barcelona

- Worked on extension of **DocSynth** (Synthetic Document Generation) project i.e., Synthetic Infographic Generation .
- Using **deep learning** based **vision transformers** for layout generation and a language model for textual information

Purdue University

September 2021 – May 2022

Undergraduate Research Assistant

West Lafayette, Indiana, United States

- Integrating a **deep reinforcement learning** model architecture for COVID-19 drug generation and inference.
- Analysed various datasets of size **10GB+** containg protein structures, protein sequences, ligands, binding affinity, etc

Publications

NERVE: Neighbourhood & Entropy-guided **R**andom-walk for training free open **V**ocabulary **sE**gmentation [*WACV'26*][[Link](#)]

THUNDER: Tile-level **H**istopathology image **UNDER**standing benchmark [*NeurIPS'25 (Spotlight)*][[Link](#)]

SPARK: Stochastic Propagation via Affinity-guided Random walk for training-free unsupervised segmentation [*ICML'26(submitted)*][[Link](#)]

OCTOPUS: Enhancing the Spatial-Awareness of Vision SSMs with Multi-Dimensional Scans and Traversal Selection [*(submitted)*][[Link](#)]

Technical Skills

Skills: Machine Learning, Deep Learning, Computer Vision

Programming Languages, Libraries, and Tools: Python, C, C++, Tensorflow, Keras, NNabla, OpenCV, Scikit-Learn, Numpy, Pandas, Git, PuTTY, WinSCP, Google Colab, PyMOL, Docker, Linux, tmux, AWS ec2

Awards and Achievements

Graduate Student Fellowship: Awarded on the basis of academic merit to waive-off the international student tuition fees for Masters.

Graduate Student Research Award: Received a research grant of **CAD 90,000** for the master's program.

Amazon Summer ML School 2022: Qualified to attend the ASMLS'22 program after an online assessment.

MITACS Globalink Research Intern 2023: Selected among international applicants to work at a research lab in Canada for 12 weeks.