MEng Research Projects at Intelligent Medical Informatics Computing Systems (*IMICS*) Lab, The Hospital for Sick Children

Research Area: Deep Learning, Large Language Models, Medical Image Analysis, Precision Medicine

Supervisor: Prof. Farzad Khalvati

Description:
At Intelligent Medical Informatics Computing Systems (*IMICS*) Lab at The Hospital for Sick Children, we design, develop, validate, and deploy AI tools for the early diagnosis, prognosis, and individualized treatment planning of various diseases, including cancer. By leveraging multimodal data such as medical imaging and health informatics, our goal is to advance precision medicine and deliver individualized healthcare to patients. Our research program also focuses on developing interpretable, human-centred, and optimized AI for medicine, as well as promoting equitable access to healthcare through AI.

Here's What You Will Get To Do (examples for projects):

- Algorithm design and development for medical image analysis, machine (deep) learning for different tasks (e.g. tumour segmentation and classification)
- Design and development of multimodal deep learning for medicine: Utilizing imaging (radiology and digital pathology images), text, and clinical data for disease diagnosis and prognosis
- Explainable and human-in-the-loop AI for medicine
- AI for clinical workflow optimization
- Scheduling optimization for patient appointments

Here's What You Will Need:

- Strong knowledge in multimodal machine (deep) learning, computer vision, medical image analysis, and natural language processing including large language models
- Strong scientific programming skills with Python (PyTorch)
- Ability to work well with a team and to use initiative in achieving goals

Project Benefits:
By joining our lab, you will have the opportunity to work closely with radiologists at SickKids Hospital and gain access to world-class medical data and high-performance computing facilities. You will collaborate with a team of researchers, as well as graduate and undergraduate students, who explore various aspects of AI in medicine. Additionally, you will work closely with the deployment team to integrate newly developed algorithms into the existing system. You are also encouraged and supported to pursue your project to the extent necessary to prepare and publish a journal or conference paper.

Based at SickKids Hospital, *IMICS* Lab is affiliated with the Department of Medical Imaging, Institute of Biomedical Engineering, Institute of Medical Science, Department of Mechanical and Industrial Engineering, and Department of Computer Science at the University of Toronto.

IMICS Lab: www.imics.ca

How To Apply:
If you are interested in *IMICS* lab projects, please send your CV and transcripts (graduate and undergraduate) to Professor Farzad Khalvati at farzad.khalvati@utoronto.ca with a brief explanation on why you think an *IMICS* project is a good match for you.