UNIVERSITY OF MANITOBA
Faculty of Engineering

Manitoba Learning and Artificial Intelligence Research
MLAIR

SIGLab
Sustainable Infrastructure and Geotechnical Laboratory

Ph.D. in Artificial Intelligence / Deep Learning for Satellite Imaging and Climate Change

Manitoba Learning and Artificial Intelligence Research (MLAIR), Department of Electrical and Computer Engineering, University of Manitoba, Winnipeg, Canada

Sustainable Infrastructure and Geotechnical Laboratory (SIGLAB), Department of Civil Engineering, University of Manitoba, Winnipeg, Canada

POSITION OVERVIEW:

This is an interdisciplinary position at the intersection of artificial intelligence, deep learning, and climate change. The Ph.D. student will work on research projects focused on developing innovative **computer vision**, **image analytics**, **artificial intelligence**, and **deep learning** solutions for localization of **critical infrastructure in northern Canada** from **satellite imaging**. Using satellite data captured over multiple decades the student would track the localizations over time to estimate the displacement in structures due to melting permafrost. This information will then be used for predicting the effects of melting permafrost in the future.

The student will primarily be admitted to the Department of Electrical and Computer Engineering. The project will be conducted jointly between the Manitoba Learning and Artificial Intelligence Research (MLAIR) lab in the Department of Electrical and Computer Engineering and Sustainable Infrastructure and Geotechnical Laboratory (SIGLAB) in the Department of Civil Engineering at The University of Manitoba in Winnipeg (MB), Canada.

SUMMARY OF JOB FUNCTIONS:

- Algorithm design and development for computer vision, machine learning, and statistical modeling solutions.

- Design and Development of Artificial Intelligence and Deep Learning-driven Solutions for Satellite imaging.

- Image alignment, registration, and correction for satellite motion.

- Perform necessary quality control procedures to ensure accuracy and completeness of the research data.

- Preparing scientific manuscripts and reports.

QUALIFICATIONS AND EDUCATION REQUIREMENTS

- Masters in Computer Science, Computer Engineering, Electrical Engineering or related fields.

- Strong background in **computer vision** and **computational imaging**.

- Strong background in **machine (deep) learning** and **statistical analysis**.

- Proven experience in **artificial intelligence-driven solutions for imaging applications.**

- Strong scientific programming skills with **Python**; Matlab and Fortran are an asset.

- Facility with **deep learning frameworks** such as PyTorch, Keras, and Tensorflow.

- Hands-on in virtual environments.

- Proven research-based publications in deep learning and image analysis.

- Excellent technical writing for scientific publications.

- A **minimum G.P.A. of 3.5/4.5** or equivalent in your last 60 credit hours of study is required.

- A **minimum IELTS score of 7.0** is required.

- Excellent problem-solving skills.

- Ability to work well with a team and to use initiative in achieving goals.

- *Experience with multi modal satellite imaging is a plus. Candidates with no experience in satellite imaging per se, but with excellent background in computer vision, multi-camera geometry are encouraged to apply.*

DEPARTMENT DESCRIPTION

At the **Manitoba Learning and Artificial Intelligence Research (MLAIR) lab**, we conduct high impact research in developing novel artificial intelligence and deep learning architectures for multimodality imaging, computer vision, machine learning and data driven discovery of radiogenomic markers of disease progression, hybrid neural architectures for multi-format, multi-source spatiotemporal imaging data.

Research at the **Sustainable Infrastructure and Geotechnical Laboratory (SIGLAB)** focuses on establishing interdisciplinary and collaborative research related to infrastructure resilience to climate change, natural- and human-induced hazards, permafrost engineering, monitoring, non-destructive testing, risk assessment, geothermal energy and geotechnical earthquake engineering and ground vibration.

HOW TO APPLY?

Interested applicants should send their applications to **Dr. Ahmed Ashraf** (Ahmed.Ashraf@umanitoba.ca), Manitoba Learning and AI Research (MLAIR), and **Dr. Pooneh Maghoul** (Pooneh.Maghoul@umanitoba.ca), Sustainable Infrastructure and Geotechnical Lab (SIGLAB).

A complete application should include

- A cover letter including a brief description of research interests relative to the above topics and a motivation of why the applicant's expertise and background is appropriate for the position.

- Curriculum Vitae (CV) including a complete list of scientific publications.

- Copies of transcripts (BSc & MSc).

- Contact information for two references.

The successful applicant should have the ability to relocate to Winnipeg, Manitoba beginning **September 1, 2019**. Remuneration (salary plus benefits) will be negotiated based on the candidate's experience and aligned with similar positions held in the Faculty of Engineering at The University of Manitoba.

The University of Manitoba is committed to creating a diverse and inclusive workplace. Applications are encouraged from qualified applicants including members of visible minorities, Aboriginal peoples, persons with disabilities and people of all sexual orientations and genders. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority.