Comprehensive Research Experience for Medical Students (CREMS)  
2022 Supervisor and Project Information Form

Please complete and return via email ONLY to crems.programs@utoronto.ca by February 18, 2022.

Supervisor Information
NOTE: CREMS will not support pre-determined pairings of students and supervisors. Supervisors must agree to open their projects to all students and interview all that are interested.

Name: Andrew Brown
Email: Andrew.brown@unityhealth.to

Department: Radiology
Hospital/Research Institution: St. Michael's Hospital

SGS Department(s) (if applicable):
Click or tap here to enter text.

ORCID ID (see https://orcid.org/ - if you do not have an ORCID ID we encourage you to sign up for one):
0000-0002-5389-308X

Location of Work:
Remote/St. Michael's Hospital

Field of Research (up to 4 keywords):
Machine Learning, Radiology, Patient Education, Patient-centered care

Student contact time (number of hours per week YOU are available to the student for any concerns or to review progress):
10 hours/week
**Project Information**

*NOTE: If this project is selected, this information will be posted on CREMS website for interested student applicants to view research opportunities.*

**PROJECT TITLE:**

Machine Learning Techniques for the Automated Translation of Radiology Reports into Layperson’s Language

**PROJECT DESCRIPTION:**

Including background, aim(s), methodS and significance of the project. **Maximum 300 words.**

**Background**

Patients are increasingly encouraged to take an active role in their health care by accessing and contributing to their health records. However, health records are complex documents created by healthcare professionals for medical, legal and administrative purposes. These documents are not optimized for patient comprehension. Some research suggests that access to medical records can have unintended consequences such as increased anxiety. If the language of radiology reports could be translated patients could have direct access to their results in a format that supports patient-centered care.

**Aim**

This work explores the feasibility of using machine learning techniques to automatically translate narrative medical imaging results into layperson language.

**Methods**

Radiology reports will be manually translated into layperson’s language. A machine learning model will be created to automatically translate report text and translation performance will be measured with quantitative metrics of translation accuracy such as the BLEU (BiLingual Evaluation Understudy) score.

**Significance**

This work has the potential to change how patients interact with their medical records and improve the quality of radiology service delivery. For many patients the medical lexicon is like a foreign language. If radiology reports could be translated into patient-focused, layperson’s language, providing patients with accessible imaging information might help them overcome the uncertainty and anxiety associated with waiting for imaging results. In the future, electronic medical records could implement similar machine translation models as described here, which may provide benefit to a substantial number of patients receiving medical imaging services.

**Is this project remote-capable (in case of new restrictions) or have an alternative remote option?**

☑ Yes, remote capable  ☐ No

☐ Yes, alternate remote option. Please specify (100 words max): Click or tap here to enter text.

**If human subjects are involved, have the appropriate Research Ethics Board approvals been obtained?**

☐ Yes  ☒ No  ☐ Not Applicable
If yes, please list the application submission date:

Do you expect this work will be published?
☒ Yes  ☐ No  ☐ Uncertain / Other
Research Environment and Student Roles and Responsibilities

Please be specific as possible. Please describe the research environment, including availability of required facilities/equipment/expertise, supervisor’s experience and mentorship plans. Please clearly outline the student role(s) and responsibilities related to the project, potential educational value, and indicate who will serve as the student’s direct report for daily oversight (PI, PHD student, technician, etc.). Maximum 300 words.

The student will work directly with the principal investigator. Dr. Andrew D. Brown, is an interventional radiologist at St. Michael's Hospital and MIT trained data scientist with expertise in the application of machine learning in healthcare. His recent articles have demonstrated the potential of machine learning models to further automation and efficiency in medicine.

The student’s roles and responsibilities related to the project will include:

- Conduct a literature review
- Design and modify research techniques and experiments
- Writing reproducible code in python, if interested
- Interpret, synthesize and analyze data
- Write and edit materials for publication and presentation
- Meet with the faculty supervisor on regular basis to maintain ongoing communication regarding the project progress and student needs

The potential education value for the student is vast and will be geared toward the objectives of the student. Machine learning and artificial intelligence are hot topics in medicine and this project will provide students with hands-on experience in these areas. If students are interested in radiology, this project will provide an introduction to the role of the radiologist as communicator as well as different diseases entities commonly encountered in radiology. Students interested in patient education and the patient experience will learn how to effectively communicate with patients and better understand the patient perspective.