

Classification of blood films using machine learning for detecting sickle cell disease

Laboratory Name: Stoeber Lab

Faculty Supervisor: Prof. Boris Stoeber

Graduate Student Mentor: Pranav Shrestha

General Area of Research

Machine learning, Global health, sickle cell disease

The Project

Sickle cell disease (SCD) is an inherited blood disorder where red blood cells become crescent or sickle shaped, often resulting in blockage of narrow blood vessels and progressive organ damage. In low-income countries, the mortality rate for children born with SCD is high (50-90%), mainly due to the lack of screening and treatment options. There is a need for low-cost screening techniques to detect SCD in remote/rural settings. The sickling test is a screening technique, where blood is placed on a glass slide, mixed with a reducing agent, and observed under a microscope. Red blood cells with high concentration of hemoglobin S (as in cases of SCD) become sickled, while normal red blood cells do not. Traditionally, these microscopic observations are performed manually, but the sickling test could potentially be performed automatically using machine learning. Using blood samples from patients with SCD (from BC Children's hospital and St. Paul's hospital) and normal participants, this project aims to use machine learning to classify SCD participants from normal participants.

Tasks to be performed by the student

- Test the performance of multiple machine learning algorithms to classify SCD participants from normal participants
- Characterize accuracy of different classification algorithms
- Use existing image datasets, and dataset generated in Vancouver to train/test classification algorithms

Facilities and team

The student will have access to an office space in Kaiser for the analyses. The student will work closely with Prof. Boris Stoeber's graduate student, Pranav Shrestha (email: pranavsh@mail.ubc.ca).

Supervision Received

The student will be assisted on a regular basis by the graduate student mentor, and will receive guidance from Prof. Stoeber. The student will be provided with initial references for literature review, and background related to the overall project. The student will get access to a student office space in Kaiser, which is shared by members of the Stoeber Lab and other research groups.