Proposed Project

An Image Signal Processing Pipeline to Streamline Cell Growth Measurements

* state the motivation (why), big picture idea (what), and methodology (how)

In biological laboratory settings, cell counting and measurement is a tedious, time-consuming task. It requires an individual to manually analyze each image through a microscope lens, which introduces room for error that can escalate due to user fatigue. This process has great potential to be streamlined and automated by implementing an image signal processing pipeline. Results would be produced more quickly and accurately, and this would free up the time of lab participants to complete other tasks. Inspired by the methodology in Giorgianni et al.

[Blood Cell Segmentation Dataset](https://www.kaggle.com/datasets/jeetblahiri/bccd-dataset-with-mask) potential dataset to use? Utilize as a proof of concept, could be applied to any similar cell or bacteria imaging

* decompose the methodology/solution into steps

This image processing pipeline will draw concepts and suggestions from Giorgianni et al, while making significant adjustments for this new application. The algorithm will consist of several steps that ultimately result in the isolation and radial measurement of the whole cells present in the image. First, the raw images will be binarized to discard unneeded color channel information. Next, the images will be cleaned to remove background noise and cut-off cells from the frame. Then the binarized images will be smoothed to get smoother cell shapes. Finally, the best fit ellipse will be applied to each object identified in the processed image, and the ellipse parameters, major and minor axes, will be exported to an excel sheet. This assumes the user will have access to the pixel to mm conversion factor for their imaging system, which is an intrinsic property of the system they chose to utilize.

* describe your end deliverables (demo)

MATLAB image processing pipeline, images from each step, example measurements in excel sheet

* team members, tentative division of work and timeline/schedule

Me and Daniel, I will do preliminary code and he can do testing and debugging, we will split the report

Timeline: Code done by X, report done by Y