HAAG Weekly Report Week 4

Mercedes Quintana

Time-Log

What did you do this week?

- Rewrote landmarking software in with a new set of software (plotly/dash instead of matplotlib
- Evaluated the quality of landmarks (at the base of the toe is too hard to see for consistent accuracy)
- Experimented with contrast for ease of landmarking
- Experiment with different zoom options for best viewing

What are you going to do next week

- Now that I really know what I need from my program I am going to finish it and start landmarking
- Prepare to meet with computational advisors
- Keep website updated

Blockers, things you want to flag, problems, etc.

- None

Abstracts:

Link: https://pmc.ncbi.nlm.nih.gov/articles/PMC8427638/

Investigation of Different Free Image Analysis Software for High-Throughput Droplet Detection

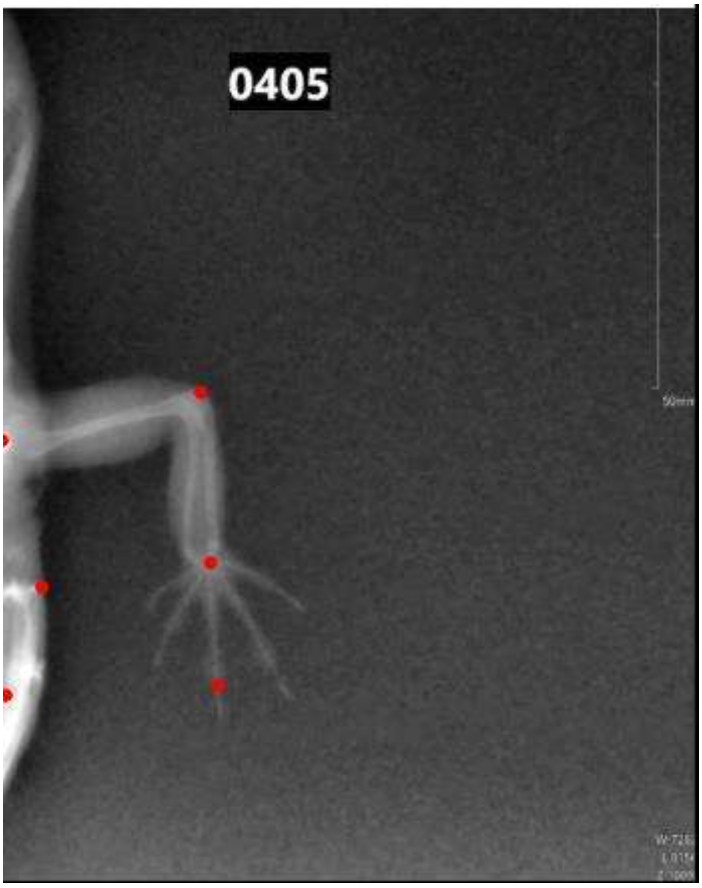
Droplet microfluidics has revealed innovative strategies in biology and chemistry. This advancement has delivered novel quantification methods, such as droplet digital polymerase chain reaction (ddPCR) and an antibiotic heteroresistance analysis tool. For droplet analysis, researchers often use image-based detection techniques. Unfortunately, the analysis of images may require specific tools or programming skills to produce the expected results. In order to address the issue, we explore the potential use of standalone freely available software to perform image-based droplet detection. We select the four most popular software and classify them into rule-based and machine learning-based types after assessing the software's modules. We test and evaluate the software's (i) ability to detect droplets, (ii) accuracy and precision, and (iii) overall components and supporting material. In our experimental setting, we find that the rule-based type of software is better suited for image-based droplet detection. The rule-based type of software also has a simpler workflow or pipeline, especially aimed for non-experienced users. In our case, CellProfiler (CP) offers the most user-friendly experience for both single image and batch processing analyses. Summary: This paper describes software that trains a model for pixel classification, object classification and counting and tracking as a human expert works through images.

Summary: The group looked at four different softwares and categorized them into rule-based and machine learning based according to their workflow. The goal of all software was to categorize pixels based on whether they were droplets or not. The found Cell Profiler to be the most accurate with low quality images providing the worst outcomes.

What did you do and prove it

After discovering I needed a zoomed in image to accurately classify the toes, I created a new program that had a dynamic zoom feature. This turned out to be slow and cumbersome, so I went back to the matplotlib version and divided each image into 4 so that it is zoomed in enough. This was great because I was able to see well enough to classify and I didn't have to zoom in. I still need to switch over to another plotting library, cv2, so the image can be big enough on the screen.

I also needed to see if contrasting the image more will help me see the separations in the bone for the other toes in the back foot. The image seems to be too low quality to be improved by changing the contrast. Below you can see how image quality is affecting getting the rest of the toes and how a quarter image makes the toes large enough and the program run fast enough.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