Development of a Java Application to Expedite Microscopy Image Analysis

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Research Question

Can the efficacy of current image analysis be improved with the creation of a new Java program?

Abstract

Previous modes of image analysis were determined to be unfit for efficient usage in laboratory analysis tasks. Improvements were made upon the Java application created during Summer 2020 FURI, including heightened automation ability, cell counting, and overlayed signal characterization. The precision tools included in the customizable program allow for time efficient and accurate analysis of colorimetric (i.e. horseradish peroxidase) and fluorescence (i.e. immunofluorescence) staining in tissue samples.

User Interface: * new aspects

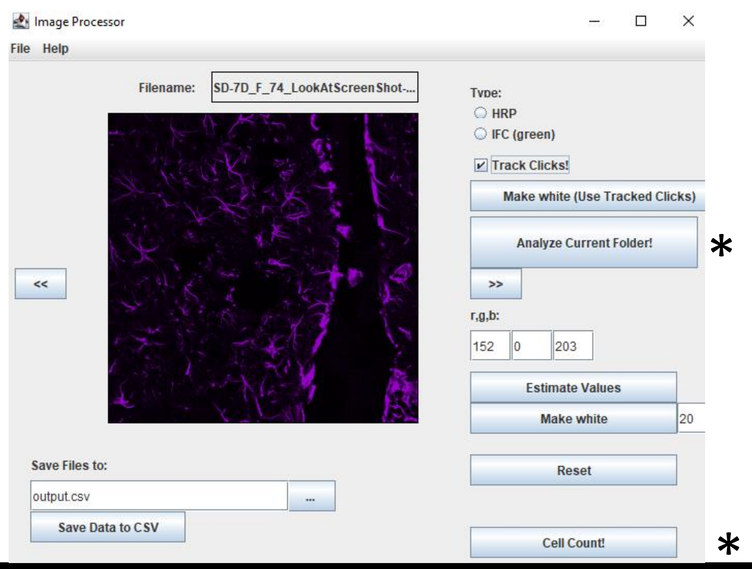
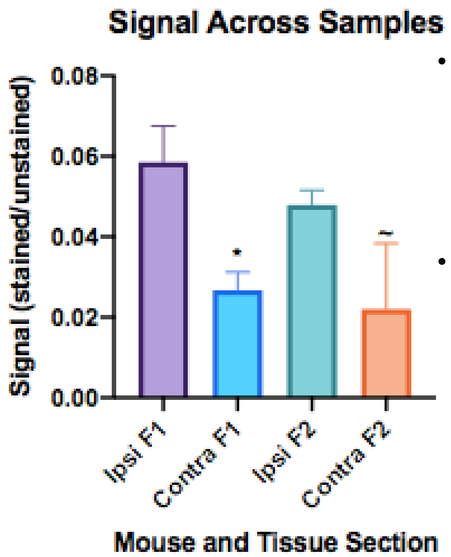


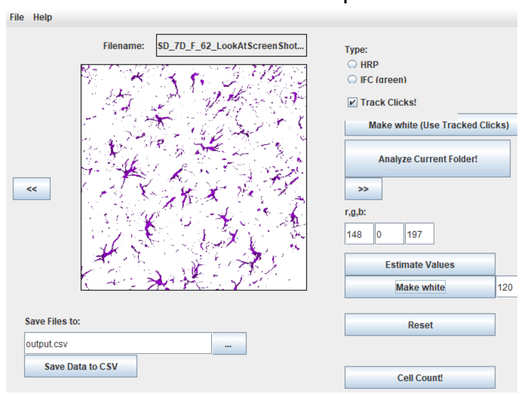
Image Analysis

- One way ANOVA
  - Female mice
  - Varying Contra vs. Ipsi Stains
    - Control vs Experimental

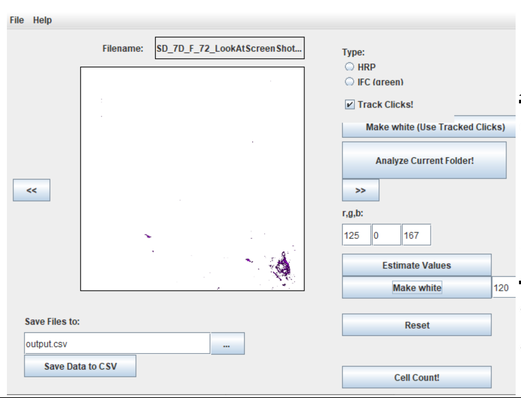


- * Demonstrates significant difference between Ipsi F1 and Contra F1 signal values
  - Sidak's Multiple Comparison Test (alpha of 0.05).
- ~ demonstrates significant difference between Ipsi F2 and Contra F2 signal values
  - Due to optimal staining & consistent program results

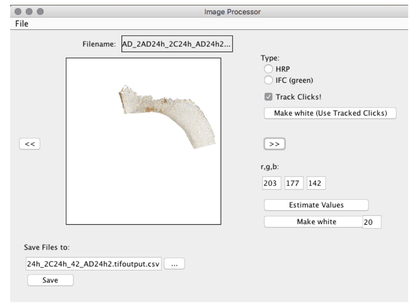
Ipsi

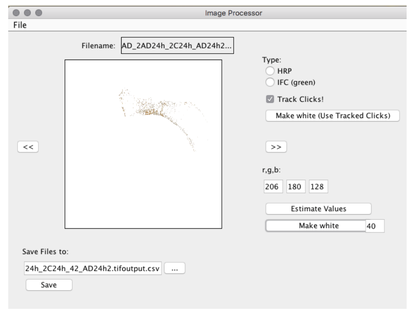


Contra



Before vs. after analysis HRP images





In Lab Contribution

- TUNEL, RIPK1, MLKL stains are being completed for continued analysis

Outlook

- The code is available on GitHub at: https://github.com/kswizzle67/FuriImageProcessor.git
- The code is available for download at kristinhuber.com
- Images gained in future semesters will be analyzed with the application.

Acknowledgement

- I would like to thank Dr. Sarah Stabenfeldt and Connor Copeland for their involvement in the success of this project.

References

- https://github.com/haraldk/TwelveMonkeys.git
- Java Swing Libraries

FURI

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