Rebuilding and Improving a Visual Software GUI for Aquatic Gametes

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Introduction

- Our project focuses on enhancing the current GUI developed by the Summer and Fall team to support research of frog eggs and oyster seeds.
- We aim to create a more advanced display and integrate special features for the oyster lab, leveraging a collaborative effort with the Louisiana Sea Grant Research Lab.
- Key challenges include managing a complex codebase and ensuring seamless integration of updates while balancing academic responsibilities and the accessibility of the interface. This required a major change of the backend and library over the winter.

Objectives

- Our objective is to enhance the efficiency and functionality of the existing GUI made by Louisiana Sea Grant and previous teams. The codebase is primarily constructed in Python with some JSON components and is compiled into an executable using PyInstaller.
- The main application runs through Pagse.py, which initializes the Mainframe. Additional windows are triggered by corresponding buttons, while background operations handle settings, Excel layout management, research-specific tasks, and Excel export functionality.
- Settings and Excel editing are supported by JSON files, enabling the program to load and save configurations from previous sessions.

GUI Features and Changes

Figure 1.

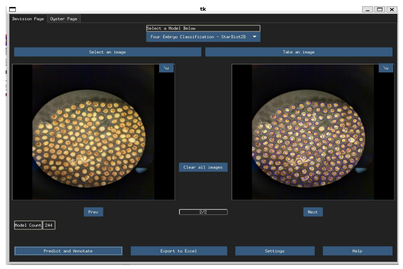
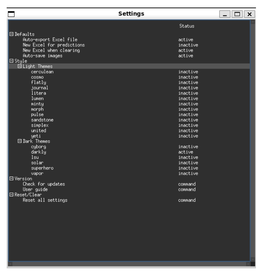


Figure 2

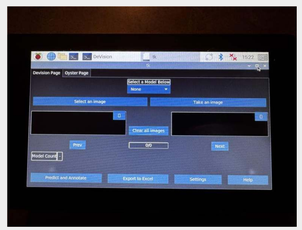


- Major Formatting and organization changes over the winter updated and streamlined our pages.
- Current functionality allows users to calculate sample weight based on a sub-sample's weight. Future updates will include improving the flexibility of the export method for creating a formatted Oyster Page as per Sea Grant's specifications and completing our hardware support for a Raspberry Pi device (figure 1).
- Backend changes allowed for customizable GUI interface with dropdown settings menus (figure 2).

Major Codebase Components

- Python is used as our programming language for both front end and backend operation. Json files are used to manage our individual settings.
- Our project uses over 74 different python libraries, with some of the most notable being Tkinter for our front end and StarDist for our machine learning predictions.

Predictions and Raspberry Pi Hardware



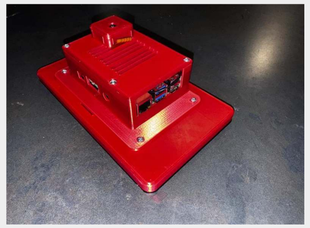


Figure 3, 4.

- The GUI provides an efficient platform for individuals and businesses seeking to use the model's predictions, with multiple applications and models available for use on uploaded images
- This interface pairs well with a hardware implementation like a Raspberry Pi device and touchscreen. This way, users can take photos with a handheld device and quickly upload them to the application to begin processing.
- We have made significant strides and a prototype for the purpose of implementing the project on Raspberry Pi hardware.

Docs

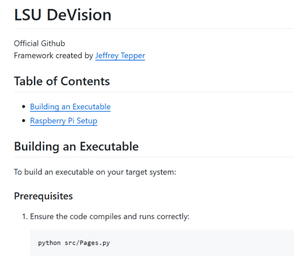


Figure 5.

- Making sure that the program can run without a hitch requires more careful documentation and a smooth user process without errors or misunderstanding.
- In addition to various new comments, we made many edits to the README file, graphical changes, and removed redundancies in the interface.

Future work

For future work, we plan to add more flexibility to the Excel page maker, add calculation features, improve documentation, and add features related to egg development over time.

More quality-of-life and graphics changes are incoming, as well as completing the necessary changes and builds to make this program usable in Raspberry Pi.

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References

1. https://github.com/LSU-Devision/GUI.
2. https://www.laseagrant.org/outreach/aquaculture/oyster-research-lab/lab-staff/