December 1,2022

# IOSS Mini Project Guidelines

Assessment Project

Basic GUI for Waveform Analysis

The aim of this project is manifold as it tests the candidate for his abilities to solve a basic problem, code a GUI accurately using Python, push the candidate to his/her limits, and learn about his/her researching skills. The basics of the GUI will be implemented as a start and then the details will be incorporated in batches. The GUI can be a desktop application or web-based.

The Objective:

Design a GUI that has the following simple functionality using the data provided (s1_12_1_2022.txt)

1. **Create a button that reads a file** from a folder that contains a waveform as shown below and **extracts the date** in a variable. (The date is embedded in the filename 12_1_2022).
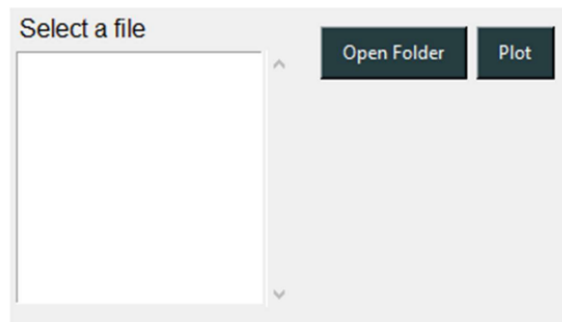
2. **Create a button that displays the waveform** in a plot box embedded in the GUI (the figure needs to be labeled: x-axis, y-axis and the extracted date as the title). **The title of this figure needs to be the extracted date in the filename.**

3. **Add a scroll bar to increase/decrease the width** of the plotted waveform in the display and **a dropdown menu** where a user can select the color of the waveform from 3 options (black, blue, red). Below you find a sample.
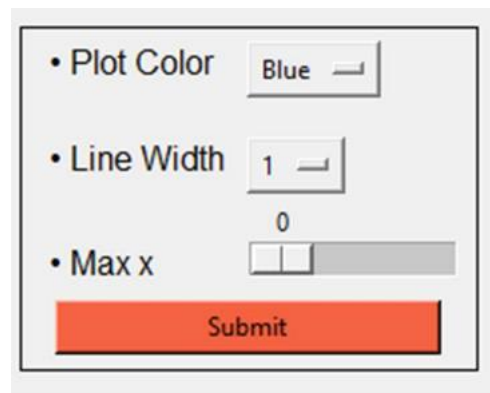
4. **Create a button that calculates simple statistics** from the waveform signal such as the mean, variance, kurtosis, and skewness. The button also generates **a histogram/bar graph** that shows these values at a specific **reserved location** on the GUI.

5. **Create another button that computes the Fourier Transform** of the time series data and displays it in a second tab (or figure side by side) called spectral analysis. Clearly label the x and y axes.

   (OR create a button that filters the data with the user specified bandwidth. Example: you can use two numerical boxes that have default values and can be changed by the user. Once the button is pressed, the signal is filtered in that bandwidth. (You can a Butterworth filter for instance). Add a button to display the filtered signal.)

6. **(Optional) Add a functionality** to the cursor to read the x and y coordinate of a point in the plotted figures and display them automatically in a textbox or a location of your choice.

7. **Ideate-Enhance the representation of the GUI design, suggest possible extensions** (tabs, dropdown , design ideas, …), machine learning, and others (Just a description of what you think can be a good design for the application based on what we have discussed during the interview).

Notes:

1. The code needs to be **commented.**
2. There are many ready to use code online and they can be used directly in this mini-project and they **we encourage you to reference them.**
3. **A short descriptive report** describing the steps of the development of the GUI. (Don't go into details)
4. For each section of the GUI above numbered from 1-7, **an approximate time (in hours**) is to be reported. Make sure you log how much time each one is taking. Task 5 contains two options and you can tackle either or both of them. Task 6 is optional.
5. Feel free to contact us whenever you have questions. We can meet once at the beginning to explain the project and schedule other short video calls for clarification). Please discuss possible times via email to schedule the first meeting in case you need to.
6. The project report is due on **Sunday December 11**, (PLEASE SUBMIT WHEREVER YOU REACHED). The project discussion will be held on the 12th or 13th based on your availability via a zoom call where you will be presenting your work.