ECG Signal Processing and Heart Rate Calculation Link to files

This script processes an ECG signal from an Excel file, detects R-peaks, and calculates the heart rate over time. Below is a step-by-step breakdown of the implemented methodology:

Loading ECG Data:
The script reads ECG data from an Excel file using the pandas library.
Visualizing the Raw ECG Signal.
The ECG signal is plotted to observe its waveform.

Defining Sampling Rate:
The script sets the sampling rate to 200 Hz, since each data point represents 5 milliseconds (1 / 0.005s).

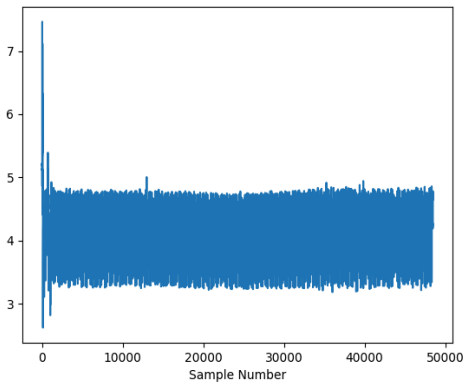
Detecting R-Peaks:
The neurokit2 library is used to detect R-peaks, which represent heartbeats.
Heart Rate Calculation:
The time interval between successive R-peaks is used to compute the heart rate in beats per minute (bpm). The average heart rate over the entire recording is also calculated.
Plotting Results:
The detected R-peaks are marked on the ECG signal plot.
The computed heart rate over time is plotted, with the average heart rate displayed in the title.

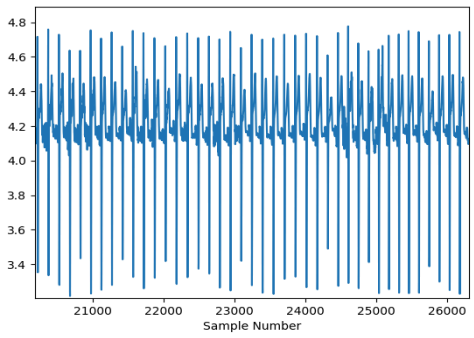
Summary

This script efficiently processes ECG data by detecting R-peaks and calculating heart rate variations over time. The visualizations provide insights into the heart's activity, helping with further analysis of cardiac performance.

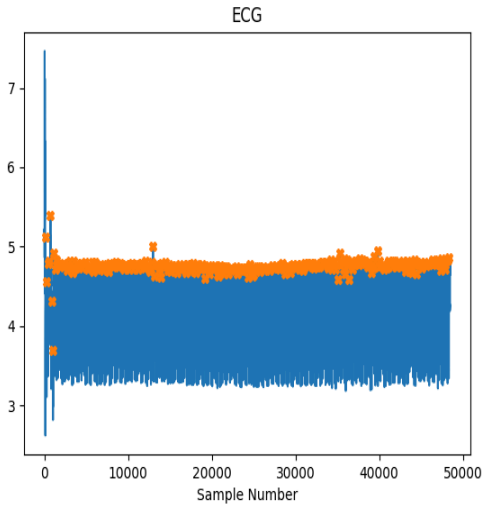
Outputs

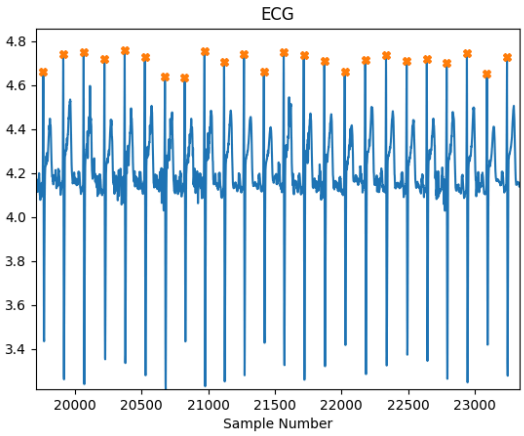
- ECG Signal Plot: Displays the raw ECG data, showing overall waveform characteristics.





- R-Peak Markers: Identifies and marks detected R-peaks on the ECG signal.





- Heart Rate Plot: Graph showing heart rate variations over time.
- Average Heart Rate: Displayed in the title of the heart rate plot, representing the overall bpm calculated from the data.