Post Assessment Answer Key

Instructions: Answer the following questions.

Understanding Data Conversion:

- How does converting a .wav file to a .csv file help in data analysis? Converting a .wav file to a .csv file transforms the audio signal into numerical data that is easier to manipulate, analyze, and visualize using various data analysis tools and techniques.
- What challenges might arise during the conversion process?
 Challenges might include handling large data sizes, ensuring accurate downsampling and smoothing without losing important information, and managing noise in the data.

Analyzing Neural Data:

- 3. What differences do you observe between the neural signals of finger and wrist movements? Differences may include variations in amplitude and frequency, reflecting the different muscle groups involved and the intensity of the movements.
- 4. How can downsampling and smoothing impact the quality of your data? Downsampling can reduce data size and make it more manageable but may also result in loss of detail. Smoothing helps remove noise but can also obscure finer details in the signal.

Interpreting Visualizations:

- 5. What patterns or trends do you notice in visualized neural data? Students may notice consistent patterns corresponding to specific movements, variations in signal strength, and periodicity related to repetitive movements.
- 6. How can these patterns help in understanding muscle activity during different movements? Patterns can indicate the timing, duration, and intensity of muscle activity, helping to differentiate between different types of movements and their corresponding neural signals.

Critical Thinking:

- Why is it important to remove noise from the neural data? Removing noise is crucial to obtain a clear and accurate representation of the true neural signal, which is essential for meaningful analysis and interpretation.
- How would you improve the data collection and processing methods for better accuracy? Improvements could include using higher quality recording equipment, refining the downsampling and smoothing algorithms, and implementing more advanced noise reduction techniques.





Application of Computational Thinking:

- 9. How did you apply decomposition, pattern recognition, abstraction, and algorithm design in this activity? Decomposition was used to break down the problem into manageable steps (collecting, converting, analyzing data). Pattern recognition was applied to identify trends in the data. Abstraction helped in focusing on relevant data features by filtering noise. Algorithm design was crucial for creating the scripts to process and visualize the data.
- 10. Can you think of other real-world applications where similar data analysis techniques might be useful? Similar techniques are used in medical diagnostics (e.g., analyzing ECG or EEG signals), speech recognition, image processing, and financial data analysis.





Visualizing Neural Data: Analyzing and Drawing Graphs With Python Activity - Post Assessment Answer Key