Part 1) <u>Physiological Signal Analysis</u>

- Electrodermal Activity Signal
    - Fixed window size segmentation (40 secs with 10 secs overlapping)
    - Time span according to the total time length of 114 song snippets
    - Noise reduction (Butterworth filter)
    - Features Extraction
        - Statistical domain
        - Spectral domain
        - Temporal domain
        - cvxEDA

- Heart Rate (Derived from BVP)
    - Mean value/Standard deviation (STD)
    - Max/Min

- Blood Volume Pulse Signal (Still Working on)
    - Fixed window size segmentation (40 secs with 10 secs overlapping)
    - Time span according to the total time length of 114 song snippets
    - To obtain heart rate analysis, applying dynamic threshold difference (DTD) with cubic spline interpolation
    - Three non-overlapping subbands - low frequency(LF), middle frequency(MF), and high frequency(HF)
    - And then, compute the spectral entropy for each subband

As the WESAD (Wearable Stress and Affect Detection) dataset provides several physiological signals that collected 15 datasets from Empatica E4 and RespiBAN Professional under

three different conditions (Amusement, Baseline, Stress). Thus, the dataset is very suitable to be applied with transfer learning method in machine learning techniques. A trained machine learning model with the WESAD dataset predicts an emotional status among the three conditional settings. A predicted emotional status can be treated as a selection of a Three-Point scale (dislike, neutral, like).

Part 2) <u>Music/Audio Signal Analysis and Spotify API</u>

- Audio Signal Analysis (still working on)

    - Features Extraction
        - Spectrum
        - Root-Mean-Square (RMS)
        - Zero Crossing Rate
        - Mel Frequency Cepstral Coefficients
        - Chroma

- Metadata by Spotify API (Still working on)
    - Metadata extraction with Spotify API
        - Valence
        - Genre
        - Loudness, etc

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