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

- Transfer Learning Approach (still working on)
    - As WESAD (Wearable Stress and Affect Detection) dataset provides several physiological signals that collected 15 datasets from Empatica E4 and RespiBAN Professional under three different situations (Amusement, Baseline, Stress). Therefore, the dataset is very beneficial for sake of transfer learning 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).

    - AffectiveRoad is a dataset that is collected from drivers' state indicators such as stress and arousal under 14 different driving situations. In the

dataset, the level of stress has been rated on a continuous scale from 0 (no stressful) to 1 (extremely stressful).

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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