Information about data recordings

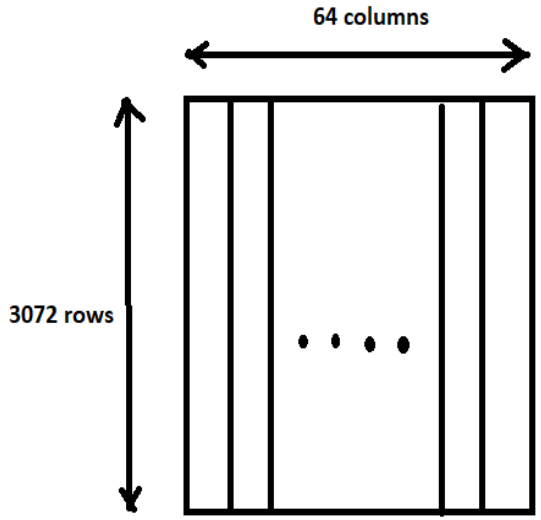
- BCI concepts
  - P300: Brain detects an odd patten amongst familiar patterns (audio, visual)
  - SSVEP: Brain tunes to a specific frequency visually
  - Motor Imagery: Brain creates a pattern while imagining a specific motor movement

- For Robotic Arm, we are using Motor Imagery BCI
  - We are capturing the EEG recordings of “Push”, “Pull” and “Nothing” movements
  - We are going to process the recordings, train the neural network with this recorded data and predict the movements of the test data using our classifier

Robotic Arm Data Extraction (Current State)

Data Extraction:

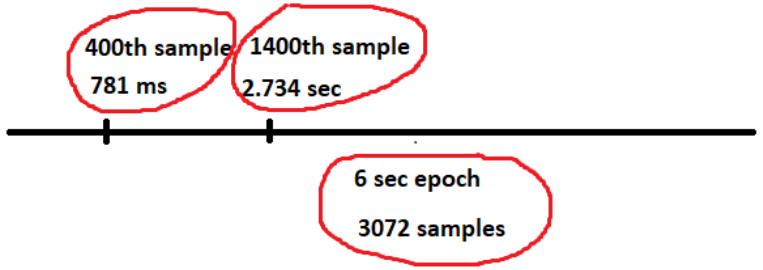
- Input
  - Truncated data from (0 to 6 sec) with Matlab for each “recorded sample”
  - Given sampling frequency of 512 Hz, this will correspond to 512 x 6 = 3072 samples per channel
  - Our EEG device has 64 channels
  - So totally we will have 3072 x 64 samples in one recorded sample
  - The data matrix for one recorded sample looks like, in the adjacent image



Robotic Arm Data Extraction (Current State)

Data Extraction:

- Processing
  - Out of 3072 time samples, we extracted epochs from 400 to 1400 (which maps to 781ms to 2.734sec)
  - We chose these samples, because they seem to be more effective
  - The effectiveness is based on trial and error and observations, during model creation with different epochs
  - We are doing it across all 64 channels



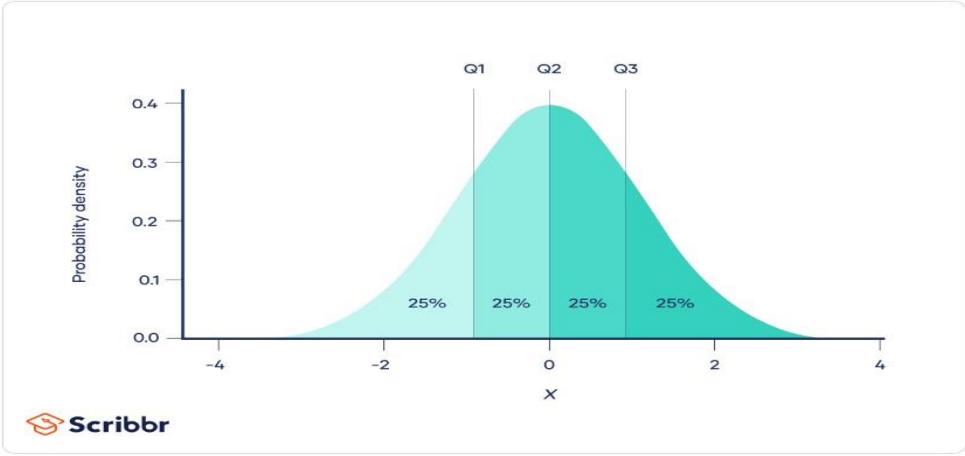
Note: We are not extracting exactly 2 sec epoch. It is little less than 2 sec. It is of length 1.95 sec

Robotic Arm Data Extraction (Current State)

Data Extraction

- Processing
  - We decimated/downsampled the data by 2, to reduce the samples in the epoch
  - We removed the outliers in the data which are above 80% quantile and which are below 20% quantile
  - The removal of outliers, minimizes the effect of “eye-blinking” or “eye movement”

Signal Decimation by 2



Robotic Arm Data Extraction (Current State)

Data Extraction

- Processing
  - Transpose (required for classifier)
  - Flatten (required for classifier)
  - Save in Comma Separated File (CSV)