* **Start splitting the data into smaller segments**
  + Data has been split into the ~100 events, the code works for both the first and second subjects data with a varying number of events, (100 and 103), this code will not work for any more that 999 events in a single signal at this point, although that may not be necessary to worry about at this given moment.
  + Should I look into segmenting the signal into a specific window of time?
* **Look at the data**
  + I have done a simple threshold-based classification for a single channel within the data to see if an extreme event has been detected or not, binary classification so that I can later compare these values for future machine learning algorithms
* **Look at MATLAB conversion or python implement-ability**
  + Current data has been converted to a mat file and should therefore be applicable to other languages for a plug and play basis
* **Get some signals where nothing happens**
* **Get some signals that are before an event**
* **Get some signals during an event**
* **Get some signals after an event has occurred**
* **Figure out if there is a specific timescale in which the signal occurs**
  + Estimated 2000ms per signal, although this varies between 1800ms and 2200ms.
* **Only focus upon the down-sampling – this may not be necessary, otherwise just focus upon the raw data for the time being.**
  + I have kept the sampling rate at the original 1000Hz for the raw data analysis
* **ICA – merging all of the channels into a single average one.**
  + We’re not doing this at the moment
* **Individual channels**
  + We are however doing this at the moment
* **PCA once per month, don’t worry about it too much**
* **Start setting up a GITHUB repository for the project code, report and the work outline that has been set out / recorded.**

*The following are the main signal processing (feature extraction techniques) that I have covered previously that are fairly straightforward to implement within MATLAB - or at least that I have done before and therefore have reference material for the syntax. - They each look towards the time - frequency domain crossovers - non-linear time series signals.*

*Producing a BCI (brain-computer interface) is the aim of a system that interacts and assists individuals in direct control over some form of brain activity without use of peripheral (external? / additional?) nerves and muscles. monitoring and understanding different signals is one of the major precursory stages to this end.*

* **Fast Fourier Transform (FFT)**
* **Short time Fourier transform (STFT)**
* **Wavelet Transform (WT)**
* **Continuous wavelet transform (CWT)**
* **Discrete wavelet transform (DWT)**

*The following are further possible techniques that could be used for feature extraction that i will from here discuss with the project supervisor and then move onto implementation details if at all possible, within MATLAB. - some of these are indicated within the project proposal (of which the citation is as follows:), others are indicated from the following report citation:*

(https://www.hindawi.com/journals/isrn/2014/730218/) :

@article{al2014methods,

title={Methods of EEG signal features extraction using linear analysis in frequency and time-frequency domains},

author={Al-Fahoum, Amjed S and Al-Fraihat, Ausilah A},

journal={ISRN neuroscience},

volume={2014},

year={2014},

publisher={Hindawi Publishing Corporation}}

* **Eigenvector methods (EM)**
  + Pisarenko method
  + music method
  + minimum norm method
* **Autoregressive method (ARM)**
  + Yule-walker method
  + Burg's method
* **Phase space reconstruction (PSR)**
  + *# these make use of amplitude-frequency analysis in the state space of EEG signal preliminary information about this has been found via the following link and citation:*
  + https://www.sciencedirect.com/science/article/pii/S1746809414000159?casa\_token=monGRHPN6L8AAAAA:xCQSBHI8fB155E7\_OxfX7wf0aMzsyZf65FWt2fzV4LMeQc9urmcuUwElclojBvDFxATuXsnR

@article{chen2014phase,o

title={Phase space reconstruction for improving the classification of single trial EEG},

author={Chen, Minyou and Fang, Yonghui and Zheng, Xufei},

journal={Biomedical Signal Processing and Control},

volume={11},

pages={10--16},

year={2014},

publisher={Elsevier}}

* **fractal intercepts (FI)**
  + **ictal and interictal signals**
    - ictal = clinical and electrographic occurrences during a seizure.
    - interictal = clinical and electrographic occurrences in between seizures.
    - I’m pretty sure that this is an offshoot of what I’m actually looking for, but I’ll make a note of it just in case.
    - Specific towards epileptic seizure detection. There are shown to be differences between the two.
  + <https://arxiv.org/ftp/arxiv/papers/1803/1803.05985.pdf#:~:text=Fractal%20dimension%20(FD)%20of%20a,similarity%20in%20the%20time%20domain.&text=The%20fractal%20dimension%20of%20EEG,2001%3B%20Castiglioni%2C%202010).>
  + Read this on fractal intercepts to understand it a bit more, but don’t waste time, make sure to implement those that I already know ready for next week.