Meeting 6

10/14/21

Rolando Martinez

Deliverables

- Explain Fourier Transform
- Expand application of welch function to all 64 electrodes

Methodology and Learnings

How did I do it?

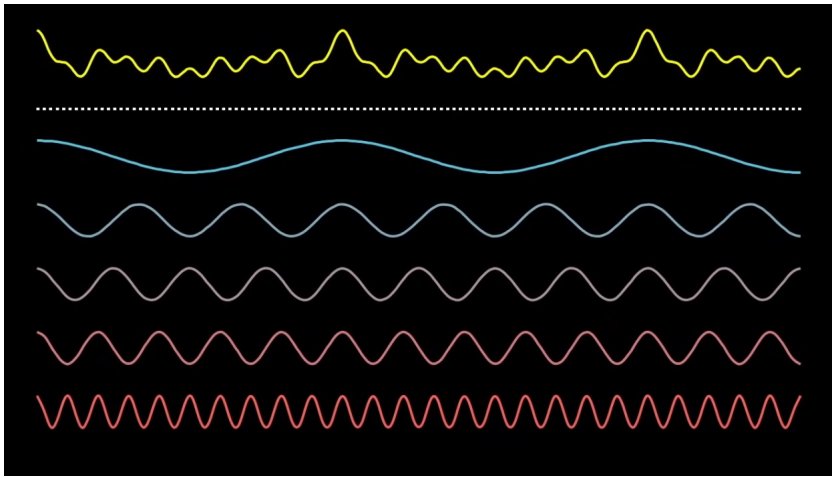
- Online research

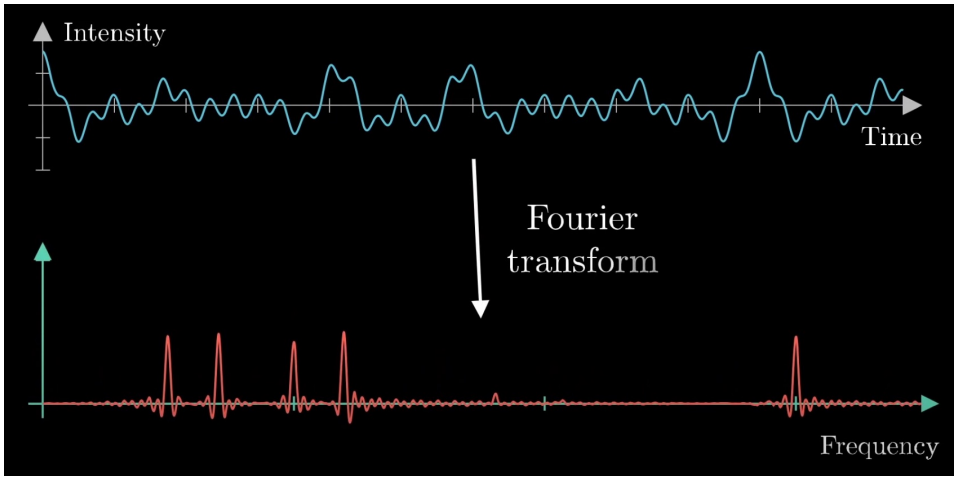
What did I learn on the way?

- Fourier transform

Fourier transform

- Another way to represent a waveform
- Multiple applications
- Useful with EEG signals

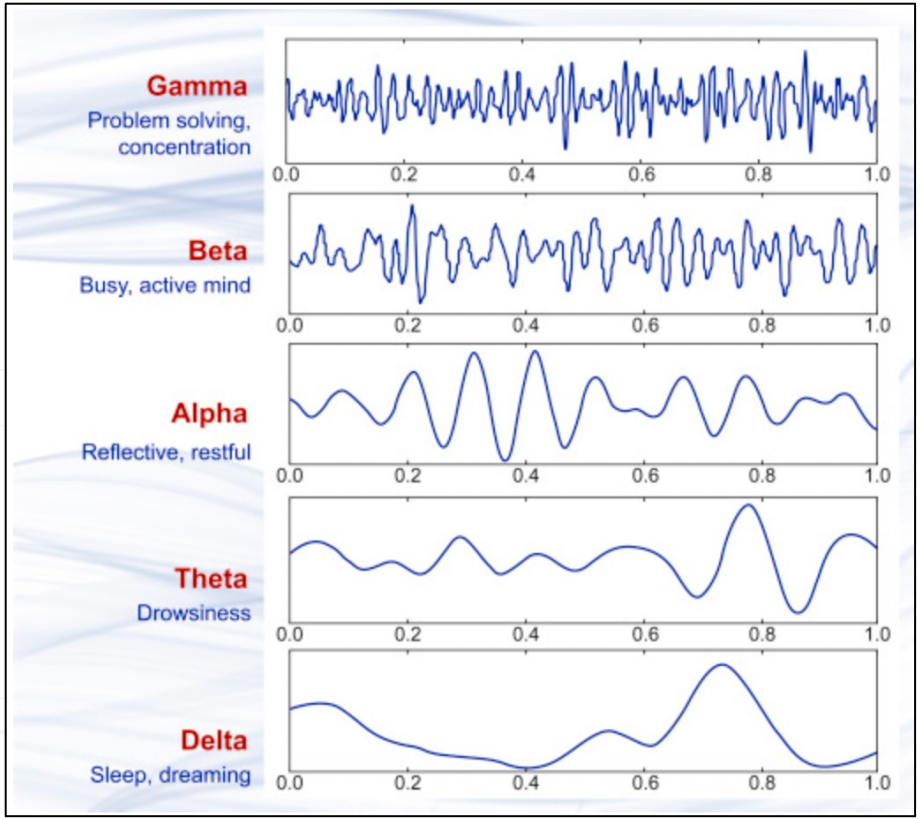




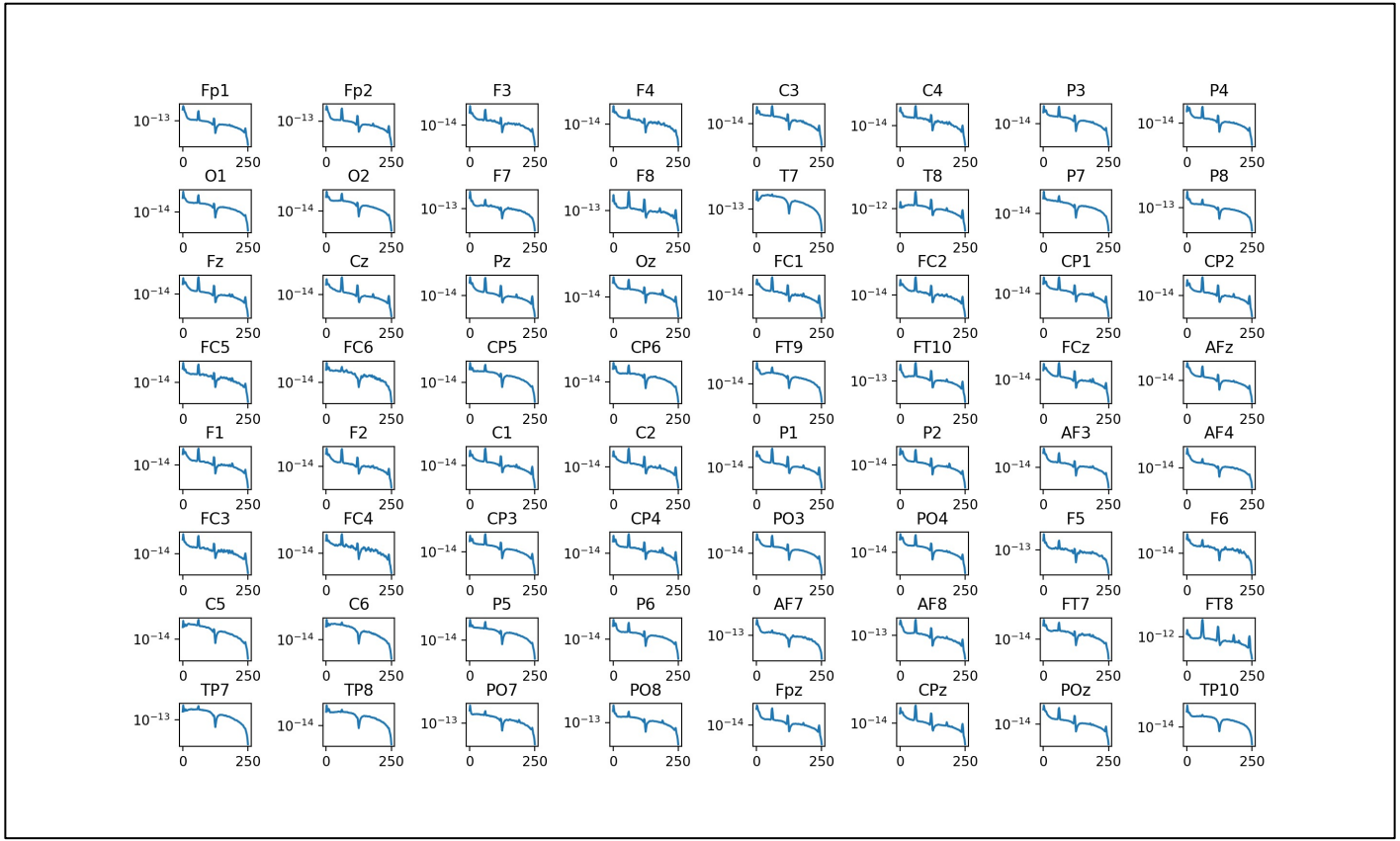
How it relates

- Interpret data easier
- Patterns become visible

Frequency band	Frequency	Brain states
Gamma (γ)	>35 Hz	Concentration
Beta (β)	12–35 Hz	Anxiety dominant, active, external attention, relaxed
Alpha (α)	8–12 Hz	Very relaxed, passive attention
Theta (θ)	4–8 Hz	Deeply relaxed, inward focused
Delta (δ)	0.5–4 Hz	Sleep



Results


Fp1
Fp2
F3
F4
C3
C4
P3
P4
O1
O2
F7
F8
T7
T8
P7
P8
Fz
Cz
Pz
Oz
FC1
FC2
CP1
CP2
FC5
FC6
CP5
CP6
FT9
FT10
FCz
AFz
F1
F2
C1
C2
P1
P2
AF3
AF4
FC3
FC4
CP3
CP4
PO3
PO4
F5
F6
C5
C6
P5
P6
AF7
AF8
FT7
FT8
TP7
TP8
PO7
PO8
Fpz
CPz
POz
TP10

Results – cont.

```
# Read data
data = read_eeg("./2020_06_04_T05_U00T_EEG01.vhdr")

# create dataframe for 64 signals
df = data.iloc[:, 0:64]

# plot data
row = 8
col = 8
count = 1

# dimensions of plot
fig = plt.figure(figsize=(8, 8))
fig.subplots_adjust(hspace=.9, wspace=.9)

# Traverse the dataframe and create a plot for each EEG signal
for i in df.columns:
    freq_array, psd = signal.welch(df[i], fs=500)   # store frequency and power spectrum of signals
    plt.subplot(row, col, count)    # create subplot
    plt.semilogy(freq_array, psd)   # plot the semilogy graph
    plt.title(i)    # title of graph
    count = count + 1   # increment plot counter
plt.show()
```