Meeting 9

11/4/21

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Deliverables

- Augment the epochbm_dict with heart rate data
  - Incorporate Uche’s heart rate function
  - Return dictionary in format of: {1: [[start, end], eeg_bands, hr_data]}

Methodology and Learnings

- Called Uche’s heart rate function
- Added heart rate data to dictionary

Results

```
def HR_per_epoch(e_dict, eeg_data):
    # define output dictionary
    epochbm_dict = {}

    for key, value in e_dict.items():
        list_hr = [eeg_data.HR[i] for i in range(value[0], value[1])]
        epochbm_dict[key] = [e_dict[key], pd.DataFrame(data=pd.Series(list_hr).rolling(window=5000).mean(),
                                                       index=range(value[0], value[1]), columns=['HR'])]

    return epochbm_dict
```

```
def getEpochbm_dict(eeg_data, epoch_dict):

    df = eeg_data.iloc[:, 0:64]      # create dataframe for 64 signals
    fs = 500                         # Sampling rate of 500 Hz
    epochbm_dict = dict()            # final dictionary

    # Read dictionary with heart data
    hr_dict = HR_per_epoch(epoch_dict, eeg_data)
```

Results – cont.

```
    # create new dataframe for freq bands of each electrode for given epoch
    bands_df = pd.DataFrame(eeg_list, columns=['Delta', 'Theta', 'Alpha', 'Beta', 'Gamma'], index=idx_name)

    # add time index ranges and dataframe to dictionary in given epoch
    epochbm_dict[e] = [[start_idx, end_idx], bands_df, hr_dict[e][1]]

return epochbm_dict
```

Results – cont.

```
1 : [0, 42663]
              Delta         Theta         Alpha          Beta         Gamma
Fp1   4.889927e-11  8.423252e-12  2.642536e-12  4.359902e-13  1.187204e-13
Fp2   4.390949e-11  7.402872e-12  2.419045e-12  4.088885e-13  1.127960e-13
F3    4.619386e-12  1.046754e-12  1.435916e-12  3.700543e-13  6.363369e-14
F4    3.606577e-12  9.316499e-13  1.307190e-12  4.907973e-13  1.646644e-13
C3    1.533518e-12  5.165224e-13  1.116517e-12  2.897726e-13  1.058815e-13
...            ...           ...           ...           ...           ...
PO8   1.857688e-11  2.076086e-12  2.389193e-12  7.807219e-13  6.391389e-13
Fpz   3.610387e-11  6.126865e-12  2.290647e-12  3.633384e-13  9.878641e-14
CPz   4.051544e-12  1.029351e-12  1.191260e-12  2.830822e-13  6.620627e-14
POz   4.115669e-12  1.394971e-12  1.448764e-12  3.224239e-13  7.157896e-14
TP10  6.903166e-12  1.633495e-12  1.508446e-12  4.477264e-13  2.529003e-13

[64 rows x 5 columns]
             HR
0           NaN
1           NaN
2           NaN
3           NaN
4           NaN
...         ...
42658   54.0734
42659   54.0730
42660   54.0726
42661   54.0722
42662   54.0718
```

```
2 : [42663, 91494]
              Delta         Theta         Alpha          Beta         Gamma
Fp1   1.779313e-11  4.163003e-12  2.456524e-12  4.575242e-13  1.391357e-13
Fp2   1.735419e-11  3.567409e-12  2.409759e-12  4.416931e-13  1.254445e-13
F3    3.086889e-12  9.584300e-13  1.509474e-12  3.742806e-13  1.149803e-13
F4    3.546418e-12  7.884749e-13  1.662349e-12  5.552834e-13  1.764324e-13
C3    1.668989e-12  5.598393e-13  1.319197e-12  3.756272e-13  2.212387e-13
...            ...           ...           ...           ...           ...
PO8   4.876703e-12  1.508113e-12  2.394406e-12  8.061991e-13  6.947308e-13
Fpz   1.415141e-11  3.031471e-12  2.178861e-12  3.832828e-13  1.030079e-13
CPz   4.778353e-12  1.285299e-12  1.542061e-12  3.146615e-13  7.138623e-14
POz   3.436101e-12  1.285270e-12  1.679310e-12  3.305556e-13  7.514902e-14
TP10  4.792582e-12  1.307609e-12  1.566548e-12  5.535721e-13  4.254088e-13

[64 rows x 5 columns]
             HR
42663   54.4560
42664   54.4568
42665   54.4576
42666   54.4584
42667   54.4592
...         ...
91489       NaN
91490       NaN
91491       NaN
91492       NaN
91493       NaN
```

Results – cont.

```
3 : [91494, 100828]
              Delta         Theta         Alpha          Beta         Gamma
Fp1   3.686808e-11  1.342660e-11  3.258992e-12  4.835010e-13  1.180875e-13
Fp2   3.880886e-11  1.192793e-11  3.632454e-12  5.125668e-13  1.116843e-13
F3    3.823898e-12  1.288069e-12  1.772689e-12  4.379029e-13  8.694069e-14
F4    4.266782e-12  8.740953e-13  1.687049e-12  4.627807e-13  7.943096e-14
C3    1.942923e-12  7.721115e-13  1.710549e-12  4.022406e-13  2.026252e-13
...            ...           ...           ...           ...           ...
PO8   5.689757e-12  1.843980e-12  2.564200e-12  8.724193e-13  6.697649e-13
Fpz   2.894869e-11  9.988427e-12  3.003091e-12  4.496562e-13  1.039248e-13
CPz   3.819268e-12  1.218681e-12  1.507282e-12  3.157477e-13  7.078322e-14
POz   4.109213e-12  1.503513e-12  1.876078e-12  3.411803e-13  7.001991e-14
TP10  6.863945e-12  1.823335e-12  1.594468e-12  5.759919e-13  4.291954e-13

[64 rows x 5 columns]
         HR
91494   NaN
91495   NaN
91496   NaN
91497   NaN
91498   NaN
...     ..
100823  NaN
100824  NaN
100825  NaN
100826  NaN
100827  NaN
```

```
4 : [100828, 129160]
              Delta         Theta         Alpha          Beta         Gamma
Fp1   1.039539e-10  1.732446e-11  3.774389e-12  4.953543e-13  2.783105e-13
Fp2   1.363205e-10  1.867575e-11  4.003513e-12  4.997233e-13  3.152264e-13
F3    1.458678e-10  3.158588e-12  1.779845e-12  5.886986e-13  2.358607e-13
F4    7.947679e-11  2.148810e-12  1.908817e-12  4.888055e-13  1.774858e-13
C3    3.032301e-11  1.477255e-12  1.411105e-12  5.210646e-13  5.899476e-13
...            ...           ...           ...           ...           ...
PO8   3.191164e-10  1.375950e-11  4.024865e-12  1.629463e-12  1.539830e-12
Fpz   1.002873e-10  1.368166e-11  3.596202e-12  4.527091e-13  2.282671e-13
CPz   3.403485e-11  1.510730e-12  1.836625e-12  3.005631e-13  9.097610e-14
POz   1.260696e-10  1.259192e-11  3.722210e-12  8.697276e-13  2.145512e-13
TP10  1.126437e-10  4.017120e-12  2.287776e-12  1.054095e-12  1.055179e-12

[64 rows x 5 columns]
         HR
100828  NaN
100829  NaN
100830  NaN
100831  NaN
100832  NaN
...     ..
129155  NaN
129156  NaN
129157  NaN
129158  NaN
129159  NaN
```