

Computational Processing of Medical Data [Hackathon UMBC Spring'18]

Team Name: Neural-Networking

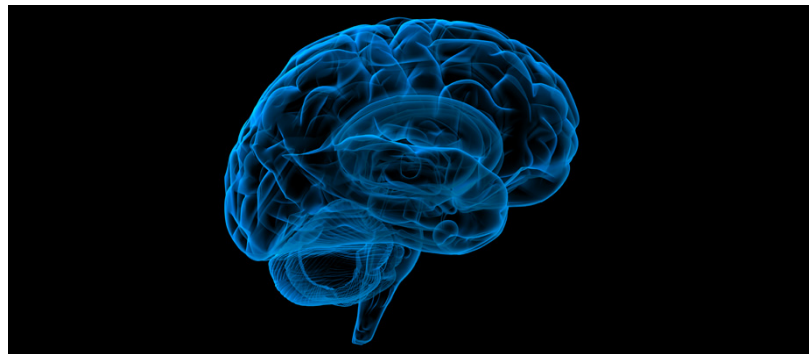
Team Members: Deepa Gupta (PhD), Jackson Reynolds (Freshman)

Computer Science and Electrical Engineering

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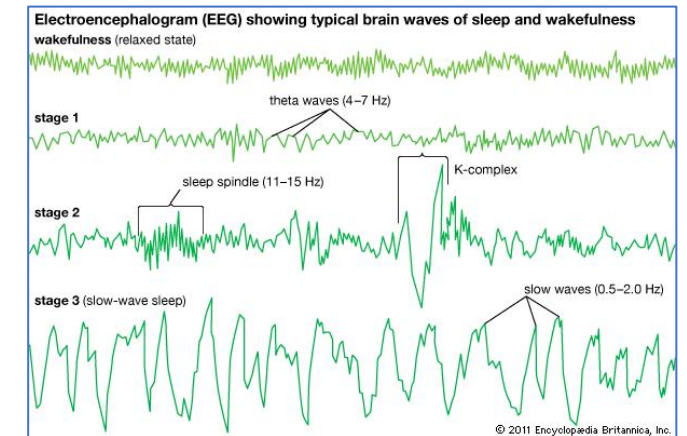
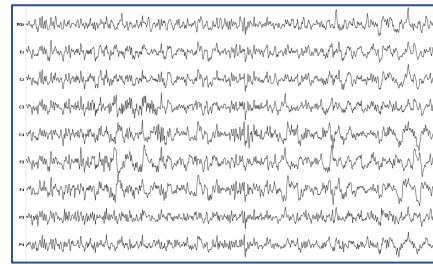
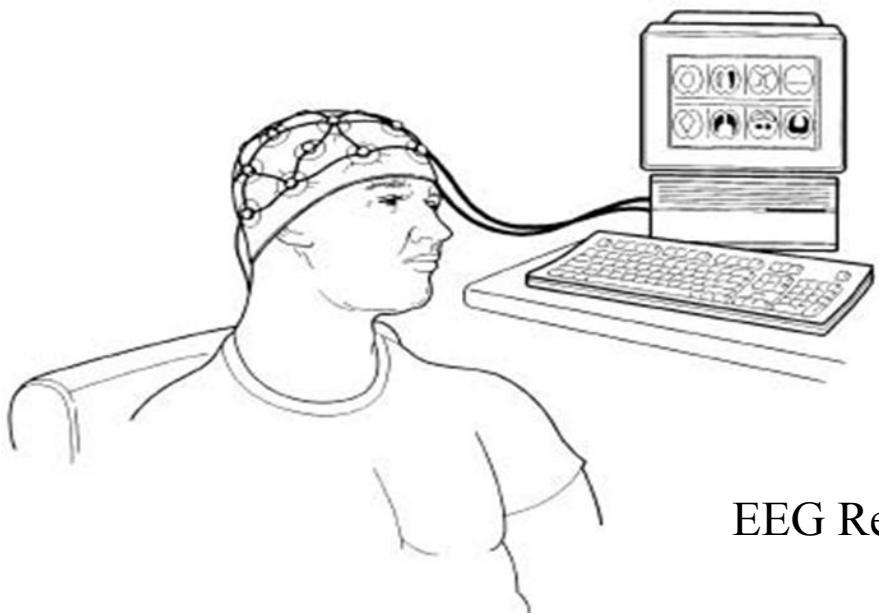
Why computationally analyze medical data?

- Trillions of dollars are spent on healthcare investigations for the better well-being of individuals.
- Health issues such as mental illnesses are difficult to diagnose and treat or cure. E.g: Alzheimer's disease, Schizophrenia, Epilepsy etc.
- A better understanding of our brain can aid clinicians for the advancement towards better health.



What is EEG?

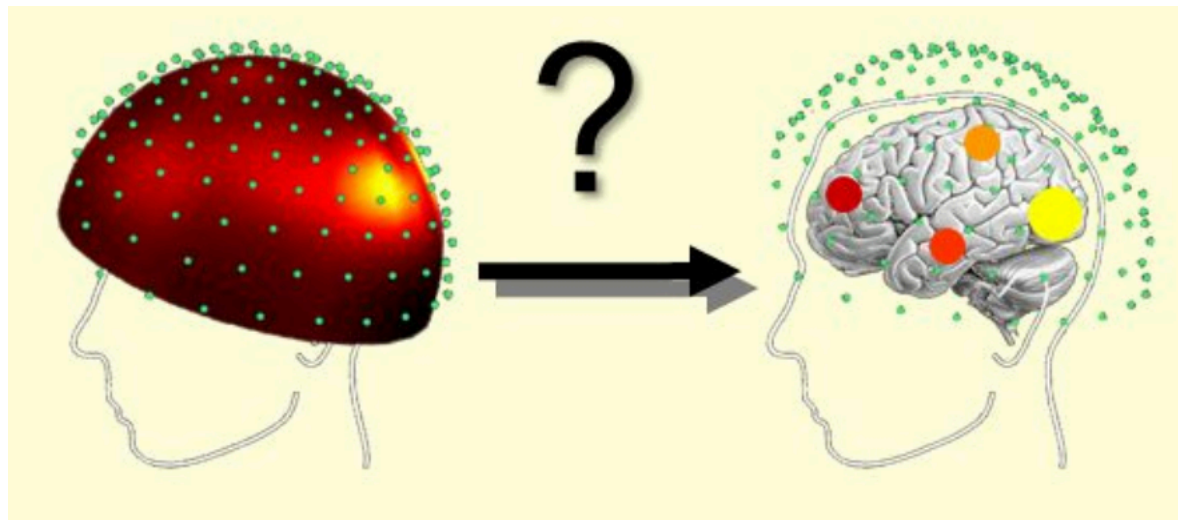
- A non-invasive technique to monitor and record brain's electrophysiological activity
- German psychiatrist Hans Berger recorded first human EEG in 1924

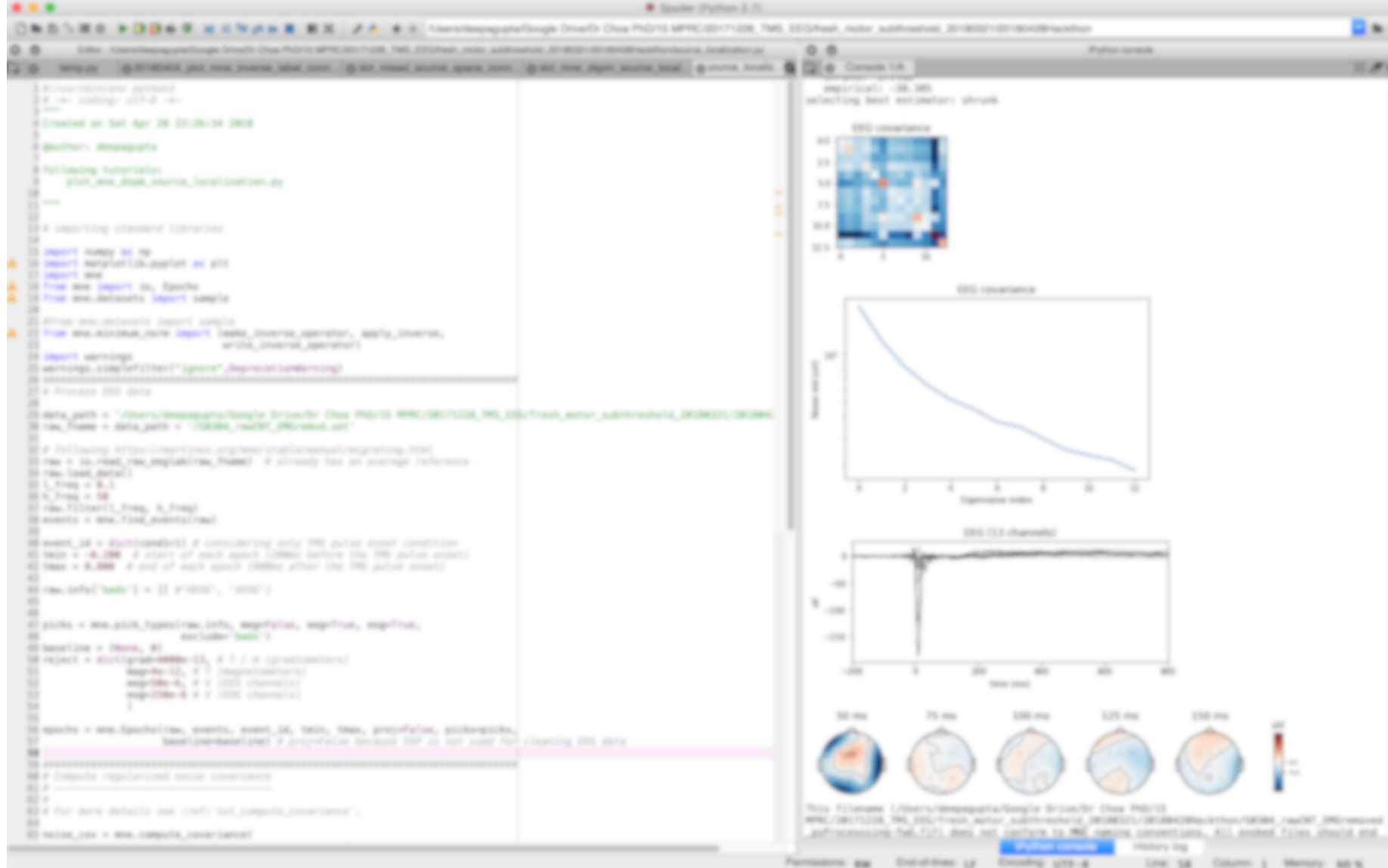


EEG Recording -> artifact removal and preprocessing -> data analysis

EEG data processing by using Python

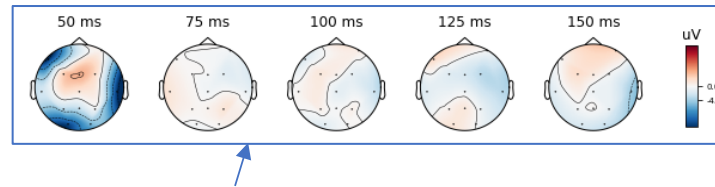
- Our objective is to do source estimation (what is the activity origin inside the Brain) for a given EEG activity measured from the scalp.
- This will aid in better EEG analysis as it characterizes potential biomarkers that can be used for treatment and cure of mental illnesses.



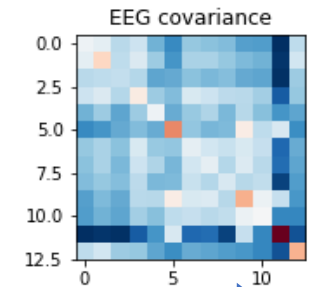
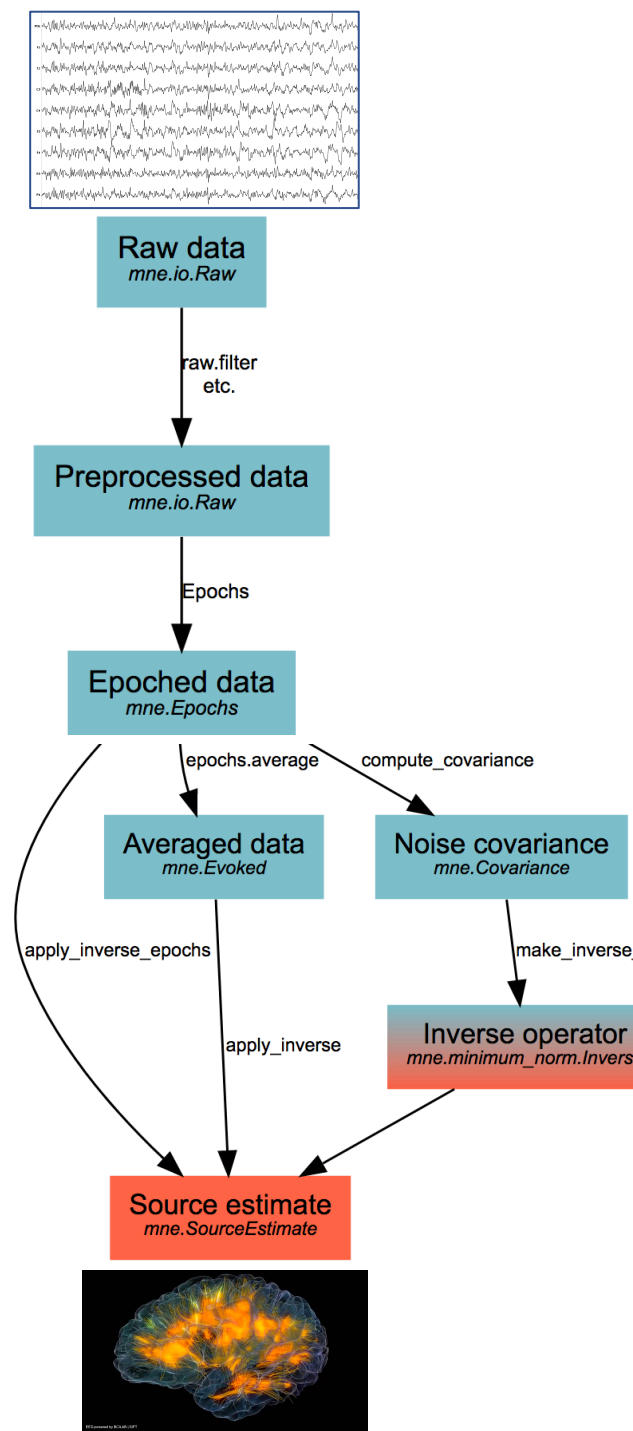


We cannot disclose a lot about our dataset and code via Github due to discrepancy between potential publication avenues and related disclosure concerns. But this figure shows the snapshot of Python code (left) with results (right). However, we do show final results and workflow in the next slide. Our sincere apologies but we thank you for your consideration.

Python library workflow:



Scalp maps generated from our sample EEG dataset



Noise Covariance computed for inverse solution

Conclusion

- We successfully preprocessed our sample EEG data to calculate parameters for source estimation within the brain with python library.
- These results contribute towards brain research and analysis for eventually improving our mental well being.
- Future scope: learn the additional new toolbox skills required for computing sources and do network analysis to extend our work further



Acknowledgment

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 - Corey Scheideman
 - Jaime
 - Stephanie
 - Hannah

