Headband Communication Aid for Alzheimer's Disease Patients

Motivation:

With an aging world population where the total amount of people over 60 years old could double from roughly 1 to 2 billion by 2050, the number of individuals diagnosed with Alzheimer's disease may also increase. In fact, right now, every 3 seconds, someone in the world is diagnosed with Alzheimer's. At this rate, the total amount of individuals with Alzheimer's is expected to triple and hit a total of about 150 million people by 2050.

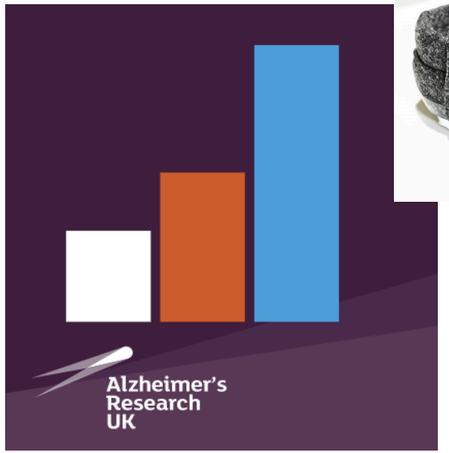
As patients with Alzheimer's oftentimes start finding it more difficult to express their thoughts or needs due to decreased cognitive abilities, it would be useful to develop something to aid their ability to still communicate effectively through other means. An idea is to develop a headband which could read an Alzheimer's patient's brainwaves and directly return (on an inbuilt monitor on the headband) using simple phrases or terms what the patient may be trying to communicate.

Impact to Society:

Alzheimer's disease causes slow destruction to an individual's memory and thinking skills. It is also the most common cause of dementia among the elderly. When it progresses into its most severe form, people may lose their ability to speak.

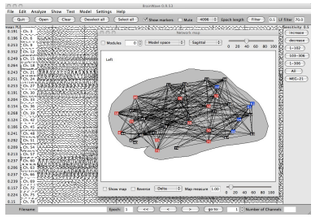
Therefore, such a headband communication aid could potentially not only help Alzheimer's patients who suffer from hindered ability to communicate but also assist mute individuals with their communication needs: in their case, this device could even replace their need for sign language.

Hopefully, we can continue to find other prospective breakthrough innovative ideas to not only help cure Alzheimer's Disease but also other health conditions that our population suffers from.

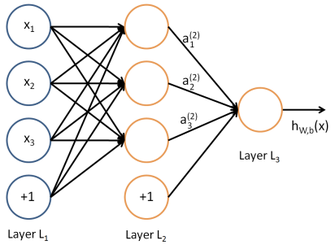


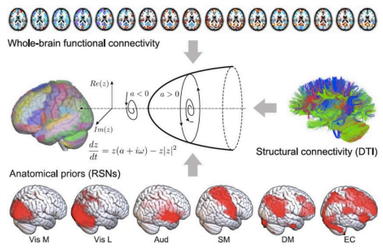
Technology & Implementation Plan:

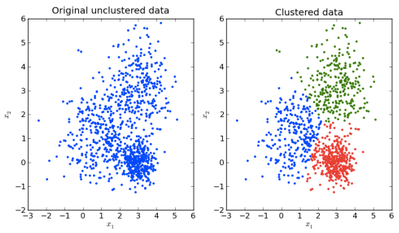
1) Creating a software that, when paired with a wireless electroencephalogram (EEG) headset/headband, can analyze brainwave recordings.



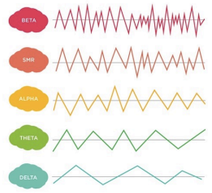
2) Design a neural network for the headband using unsupervised learning algorithms based on computational models of how our brains and brainwaves work. A k-means clustering algorithm can be adopted where the different initial brainwave pattern inputs will constantly self-classify themselves into different clusters based on certain similarities. The variances for each cluster should be ultimately minimized for optimal results.



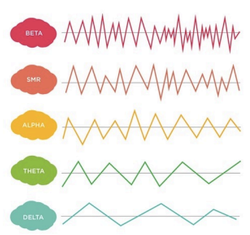




3) As the headband's usage by the patient increases over time, the algorithms in it should be able to self-learn, through experience, the optimal different brainwave classifications/clusters for that specific individual.



4) To help give identification to the different brainwave classifications/clusters, the software would have to store a unstructured database, such as NoSQL, which contains all the brainwave patterns and the respective words of phrases that it represents: database should include as many patterns as possible that have been discovered by neuroscientists so far to help make the communication aid optimally comprehensive (headband will be able to best replicate normal communication)



5) The inbuilt monitor on the headband should return the right corresponding word or phrase, associated with the brainwave pattern, that the patient/user would like to express

6) Communication can be aided for those that have troubles expressing their thoughts or needs!