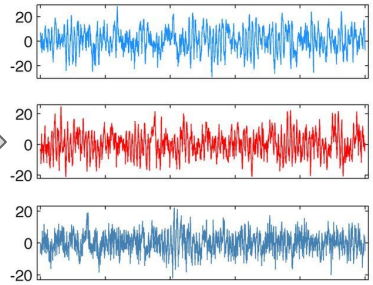
U Think V Speak

Team ID: P307
Rakathon
Let the code pitch for you!

What are we building?

NeuroSky



Raw eeg Signals

Feature Extraction

Machine Learning Model

Detect Thought (Classification)


```
> deploy
```

NeuroSky

Price:

Not so Much. Rs. 11000/-

Looks:

Looks kinda Cool, isn't it!?

Is our Feature Set good enough?

Yes!

What Features?

- 14 Features:
  - 14 Channel Values

- CNN
- RNN

Why are they Good?

- Literature Survey!
- We have Empirical Proof :)

Can we trust our Data?

Yes!

Why?

- Inter class dissimilarity
- Intra class similarity

How?

- Fitting GMM
- Cosine Similarity

Snapshot of a similarity matrix

1.0	-0.006	-0.021	-0.08	0.081	-0.006
-0.006	1.0	-0.185	0.07	0.07	0.172
-0.021	-0.185	1.0	-0.04	-0.203	-0.06
-0.08	0.07	-0.04	1.0	0.155	0.176
0.081	0.07	-0.203	0.155	1.0	-0.084
-0.006	0.172	-0.06	0.176	-0.084	1.0

Were we able to Do this?

Yes!

Reverse Engineering

Training feature vector =

[-46 -41 -32 -24 -23 -24 -15 -41 -29 -30 -19 2 -3 10] **[Book]**

Testing feature vector = (not seen by the model)

[-58 -53 -41 -28 -31 -40 -35 -37 -34 -32 -17 -7 -14 -11]

Testing feature label should ideally be **[Book]**

Demo

Results (Accuracy)

```
, The step is: 145 , The accuracy is: 0.804143 The cost is : 24.7276
, The step is: 150 , The accuracy is: 0.865857 The cost is : 22.0697
, The step is: 155 , The accuracy is: 0.803714 The cost is : 19.7181
, The step is: 160 , The accuracy is: 0.830714 The cost is : 17.6272
, The step is: 165 , The accuracy is: 0.837571 The cost is : 15.7685
, The step is: 170 , The accuracy is: 0.837857 The cost is : 14.1088
The lamda is : 0.004 , Learning rate: 0.005 , The step is: 175 , The accuracy is:  0.847143
(21000, 264)
```

- Accuracy: 84.71%
- Training Time: 259 mins (>4 hours)
- Trained on Laptop NVIDIA GTX 960M GPU

Possible Deployment Ideas

- A Brain Computer Interface (BCI) for speech-impaired people
- Neuromarketing
- For a Think-Search Application
- Rakuten Rapid API

Language will not be a barrier anymore!

Thank You!