BME595 Deep Learning Project

Ninety days of drinking coffee(blue) or no drinking coffee(orange)

* blue is for drinking coffee days, orange is for not drinking coffee days. The different length of blue/orange color bars were represented different consecutive drinking coffee/not drinking coffee days.



**Title**

* Using "Neural Network" Prediction of bodily metabolism with MyConnectome dataset.

**Team members**

* Weicheng Wang (togetyy), Ho-Ching Yang (photoacoustic),

**Goals**

* Our project primarily focuses on applying convolutional neural network (CNN) to the problem of cross-scan (one subject, 90 scans) bodily metabolism prediction derived from human brain fMRI data.

**Challenges**

* Myconnectome dataset had recorded brain function and metabolism fluctuate in a single individual, Dr. Poldrack over the course of an entire year.
* There are 90 scans in this dataset. Each scan has 294 timepoint which means we'll have 90\*294 3D fMRI image as input of Neural Network.
* The input will be 3D fMRI images (don't know if we need to count time into another dimension), in terms of the output will be bodily metabolism (ex. this is the functional MRI image scanned after this subject drinking coffee, eating breakfast...)
* "What" should we let neural network to "See" will be a big chanllenges. We should use processed dataset, which is convolved with hemodynamic response.
* In order to compare the package efficiency, we might learn new packages from [Theano](http://deeplearning.net/software/theano/)

**Restrictions**

* I will be very happy if I knew a simplest way to train 4D fMRI dataset without GPU...

**Division**

* Weicheng Wang (togetyy): Construct the CNN and Train the CNN with resting-state brain image. Will try to use [Theano](http://deeplearning.net/software/theano/) to compare the efficiency between packages.
* Ho-Ching Yang (photoacoustic): Validate the CNN with bodily metabolism. Will try to construct another neural network which is different from CNN.

**Reference**

1. Myconnectome http://myconnectome.org/wp/

2. Nathawani, D., Sharma, T. and Yang, Y., 2016. Neuroscience meets deep learning.

3. Bastien, F., Lamblin, P., Pascanu, R., Bergstra, J., Goodfellow, I., Bergeron, A., Bouchard, N., Warde-Farley, D. and Bengio, Y., 2012. Theano: new features and speed improvements. arXiv preprint arXiv:1211.5590.

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