Deep Autoencoder on EEG Data

Master thesis topic

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We can record data form human brain. There are many ways to do it. One of them is called Electroencephalography[1] (EEG). This data is then used for medical diagnosis, in psychological experiments, brain-computer interfaces, etc.

But before being useful, the data has to be preprocessed and meaningful *features* have to be extracted from it. There are many ways to extract such features – people came up with bunch of insightful ideas and they work fine.

With the advance of deep learning[2] the idea of automatic feature extraction becomes more and more popular. The question of this thesis will be to see how well a classifier that operates on automatically learnt features performs in comparison to human-crafted features in the context of EEG data analysis. The main way to do *feature learning* is via *deep autoencoder*[3] – an artificial neural network designed to find an effective compact data representation.

Initial plan is to take EEG data from the Kaggle[4] competition "Grasp-and-Lift EEG Detection", extract features using an autoencoder and compare the results against competition leaderboard. This will allow us to see how well can we perform if we go fully automatic with the EEG feature extraction. If we can do it well, there is an immediate application in the field of Brain-Computer Interfaces.

[1] https://en.wikipedia.org/wiki/Electroencephalography

[2] https://en.wikipedia.org/wiki/Deep_learning

[3] https://en.wikipedia.org/wiki/Autoencoder

[4] http://www.kaggle.com