

Mind Reading: Using Deep Learning for Predicting Images Viewed by a Human

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Abstract

Beginning with the title of the research which is "Mind Reading: the use of deep learning for predicting images viewed by a human". The main objectives of our work is to infer the stimulus from brain, basing on the electrical signals coming from electrodes implanted in their brain. In this study, We used Artificial Neural Networks Where we train and test them in order to obtain the required results.

Keywords: deep learning, Neural Networks,train,Mind Reading

Introduction

Artificial intelligence very wide field,We specialized in this field by studying "Mind Reading". which is science, not a magic trick where electrical activity within the brain means that our thoughts can be read and understood using different methods and devices including Magneteto Eencephalo Graphy (MEG) Where we are allowed to decoding the brain,We used the resulting signals as datasets in our study.

The main problem for this work is to infer the stimulus from brain signals giving the limited set of possible stimuli. This classification task For each input signal is to infer the type of the stimulus. Consequently, the research dissertation is formulated as a classification problem.

Implementation

In order to implement the case study of our work we choose to use the Python language for programing including some other frameworks:

First,we had to learn the structure of the DataSet used in the Mind Reading Competition [?], the structure of the dataset is described bellow: They presented three separate sequences comprising video clips in three different categories (artificial, football, and nature). The clips were of duration 6 – 26 seconds. During each sequence,each clip was interspersed with a 5s 'rest' interval. In addition to the above categories of short clips, we also showed two long film sequences (about 20 min in duration). The first was a Mr. Bean film and the second was a sequence from a Charlie Chaplin feature film.

The data is distributed as three Matlab files. Two of the files contain the actual data, while the third includes the locations of the planar gradiometer sensors (megicann secret.mat, megicann train v2.mat, megicann test v2.mat, megicann locations.mat)

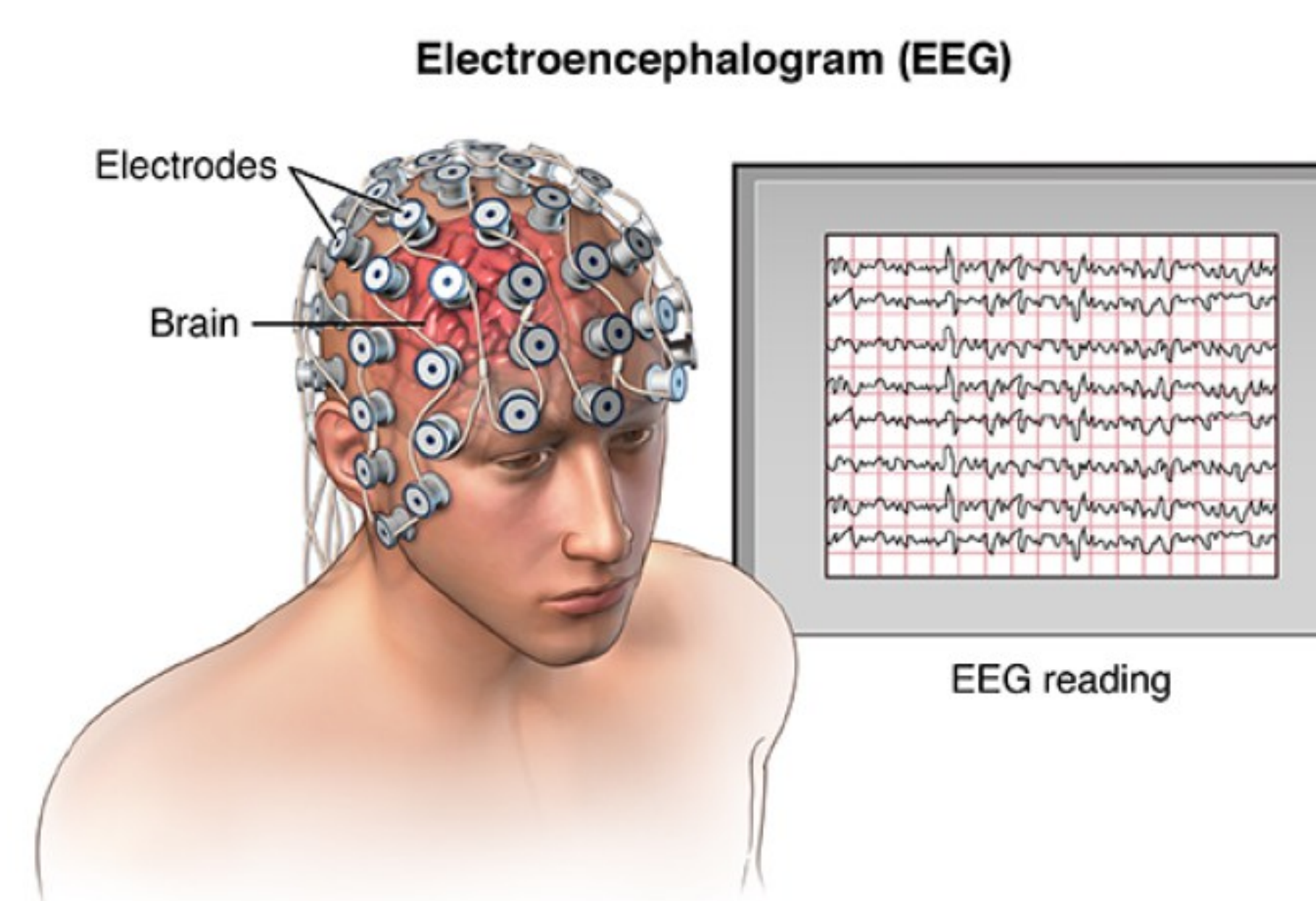
Than, we've used a Neural Network classifier implemented using the ScikitLearn framework which is a library that implements many machine learning algorithms in Python.

Through this we obtained preliminary results for the accuracy of test data and markings. These results are so weak that they are close to 25% For large data size.

Methods

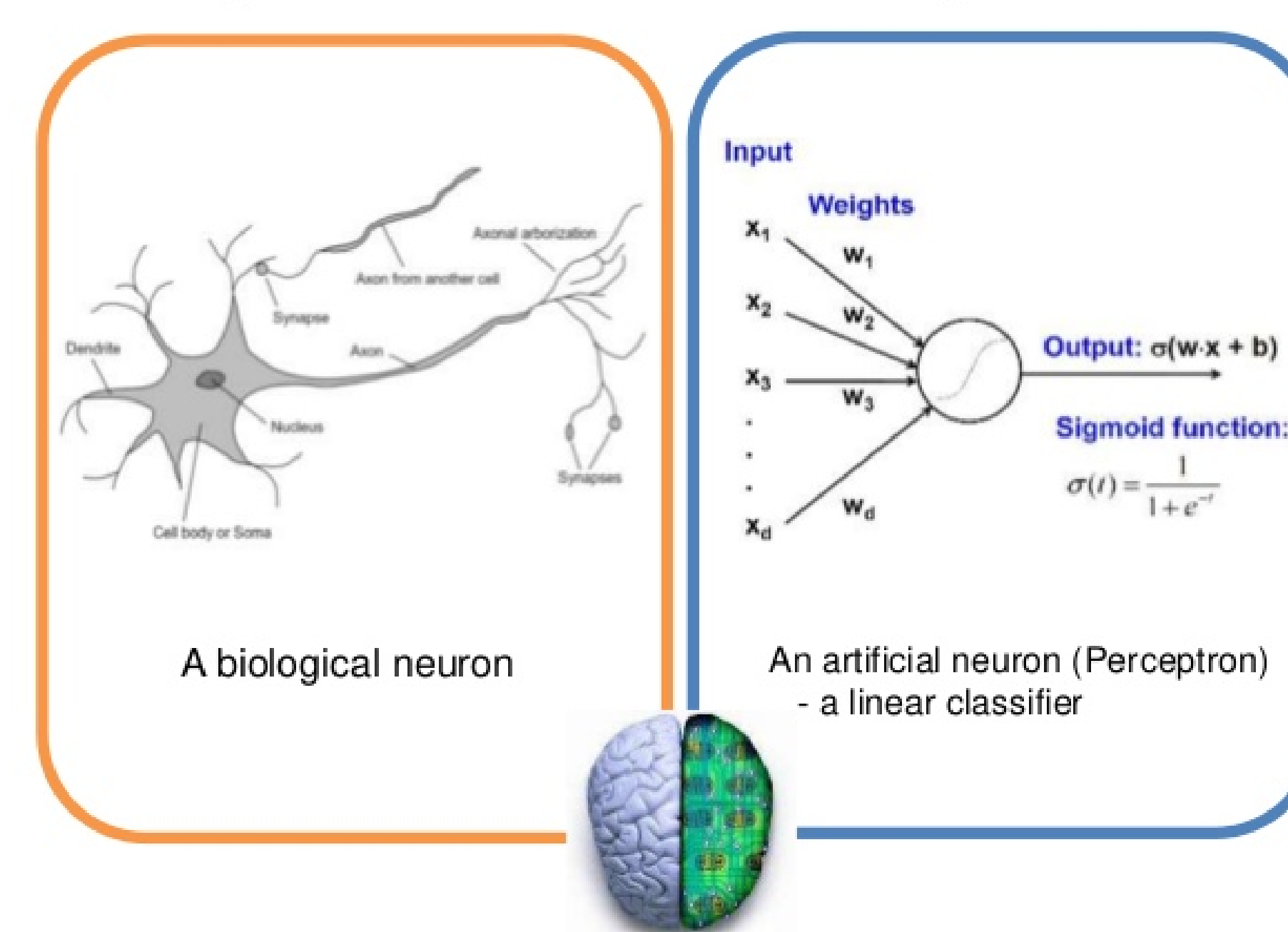
In our research, we used data sets from the ICANN conference (International Conference on Artificial Neural Networks).

The data consists of MEG recordings of a single subject, made during two separate measurement sessions (consecutive days). In each session the subject was watching visual stimuli consisting of five different movie categories. The stimuli were presented without audio.



We have relied on training and testing on neural networks and deep learning because they currently offer the best solutions for many problems in image recognition, speech recognition and natural language processing.

Biological neuron and Perceptrons



Conclusion and next work

- Deep learning is nothing but large-scale neural networks with large data
- Deep learning is scalable as opposed to the old algorithms of machine learning
- Artificial neural networks learn but do not program
- The more training samples makes accurate the test results

We plan as a next phase, the implementation of this work using the HPC High Performance Computing situated at the Research Center. To do this we will focus on using the Google framework "Tensorflow" that is mainly used in the recent work of Deep learning field in aim to get better accuracy.

Reference

References

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