



# READING BRAIN: DEEP LEARNING

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# PROJECT SUMMARY

Deep learning is “machine learning of complex representations in a deep neural network, typically using stochastic gradient descent by error backpropagation” (Kreigeskorte, 2015).

Deep neural networks are networks with more than one hidden layer between the input and output layers.

This project uses deep neural networks to model the fMRI data obtained during the reading of 5 texts on different STEM topics (part of the Reading Brain project). The goal is to be able to predict which text was being read or information about the reader (e.g. major, reading level) based on the fMRI input data.

## Completed

Neuroimaging data preprocessing (CT)

Prepared data for Matlab

### Planned analyses

- Participant subset, n=18
- Voxel selection (32,906)
- Deep Belief Network structure (500 x 500 x 1000)

Coding for continuous data (Gaussian RBM)

## In progress

Running analyses, testing different parameters

Try leave-one-subject-out cross-validation

Other classification tasks

## Not yet started

Coding for methods to probe internal representation

Find new neuroimaging data to try classifying

# DATA ANALYSIS PROGRESS

# RESOURCES

- “Neural Networks for Machine Learning” online course by Hinton
  - <https://www.coursera.org/learn/neural-networks>
- TensorFlow (open-source software library for machine intelligence)
  - <https://www.tensorflow.org/>
- Microsoft Cognitive Toolkit (open-source toolkit for deep learning)
  - <https://www.microsoft.com/en-us/cognitive-toolkit/>