

Project Documentation for Mathematics of Neural Networks

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Abstract

The aim of this project is to test the learned things in the first half of the lecture series on Neural Networks on the example of the Fashion-MNIST Dataset

Things that could be done on Fashion-MNIST

- Hyperparameter search
- Activation functions
- Initialization
- Optimizers
- Regularization (Overfitting?) + Generality
- FFT/im2col/Winograd
- Attribution
- Feature Visualization
- Adversarial Attacks
- Going deep?

1 Idea collection and planning

Hyperparameters:

Idea: For every test, do several choices of hyperparameters to get a feel for the choices

Activation functions / network structure

Idea: Test small network structures (fast trainable) for effect of structural changes and different choices of activation functions using knowledge from the lecture and Exercise 4 from sheet 6 as starting point for network evaluation.

Initialization

Idea: Verify the validity of the three approaches discussed in the lecture. (Zero/Random/Known

data)

Optimizers

Idea: Use Adam for all computations to reduce complexity of project as it incorporates other approaches.

Regularization (Overfitting?) + Generality

Idea: Test for overfitting and generalization with own pictures (for fun). Maybe try regularization if poor performance is observed.

FFT/im2col/Winograd

Idea: Let tensorflow decide on the usage of different approaches as insight was achieved in the exercises and modifications are not cheap.

Progress will be documented with screenshots of the console and explanation. Graphs will be used.