# Memory protocol of Deep Learning for Speech and Language Processing

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## 1 Supervised Learning

### SVM

Define kernel, support vector and maximal margin

### Logistic Regression

Calculate $C_{MSE}$ for a logistic regression dataset

### Explain in 1-2 Sentences

Overfitting, Regularization, When does k-means stop, Decision trees are more transparent than NNs why?,

## 2 Neural Networks

### FFNN Calculation

Calculate result of NN with 2 x hidden layers and with ReLU activation and Softmax in the output layer

### Backward Pass / Backpropagation

Explain how the backward pass works

### Parameter

Explain how Parameter Initialization shapes the model. Explain Kaiming Method.

### Explain in 1-2 Sentences

Give examples of hyperparameters, why is training important, why not use only linear functions?, why softmax in the output

## 3 CNN

### Sentinment Analysis in CNN

Explain how this works

### CNN Calculation

4x4 Matrix, 2x2 Filter, 1x2 Stride, 1x1 Max Pooling, ReLU Activation, Calculate

### Explain in 1-2 Sentences

hyperparameters of cnn, parameters of cnn, difference to FFNN

## 4 RNN

### Calculate RNN

Calculate RNN

### LSTM

Describes how a LSTM works

### Problems of RNNs

Explain problems of RNN (vanishing gradients, ...)

### Explain in 1-2 Sentences

Elman vs. Jordan, Why does LSTM have 4x values of RNN, What does time mean in the backpropagation through time algorithm

## 5 Tricks

### Learning Curves

Draw learning curves for training and development. Explain methods how to change learning rate

### AdaGrad

Explain how AdaGrad works

### Explain in 1-2 Sentences

Gradient Clipping, Dropout in testing, Residual Activation, Data Augment,

## 6 Q Learning

### Calculate agent action

Calculate Agent action in state $s_i$

### Markov property

Explain markov property

### Exploration-Exploitation dilemma

Explain Exploration-Exploitation dilemma

### Agent-Environment Interaction

Draw Agent-Environment Interaction graphic

### Set reward

Set reward to states $s_1$,$s_2$,...,$s_n$ to let the agent choose a bad path wrt greedy policy

## 7 Misc

### Self-attention

Describe self-attention

### Adversarial

Describe the goal of adversarial training

### Explainable AI Methods

Explain XAI and give links to the existing ethical guidelines