

Assignment 1

Wendy Nieuwkamer

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1 Question 1

Suppose that we have historical data of result of soccer matches of teams playing against Ajax. We want to use this information to learn to predict at a certain moment whether a team will win, lose or draw against Ajax. Our approach will be based on Machine Learning.

1.1 Define the given and the goal of the prediction task. Classify the learning task.

Given are the results of soccer matches, the goal is to decide whether a team will win, lose or draw when playing. The learning task is supervised, as we are given inputs with their wanted result. It is a classification problem as every input should be classified as one of three possibilities.

1.2 What would be the form of training data for the learning task? Give a small training set.

An example of a training set could be the following table:

team	results
1	win
2	draw
3	lose
1	lose
3	draw
4	win

Table 1: training examples

2 Question 2

Given the following data:

x	y
3	6
5	7
6	10

2.1 Manually calculate two iterations of the gradient descent algorithm for univariate linear regression function.

Initialize the parameters such that the regression function passes through the origin $(0, 0)$ and has an angle of 45 degrees. Use a learning rate of 0.1. Give the intermediate results of your calculations and also compute the mean-squared error of the function after 2 iterations.

Gradient descent Algorithm

Repeat until convergence {

$$\begin{aligned}\theta_0 &:= \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)}) \\ \theta_1 &:= \theta_1 - \alpha \frac{1}{m} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)}) x^{(i)}\end{aligned}$$

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