Deep Learning: Homework 1
Deadline is 24.09.2019, 23:59

September 19, 2019

1. Your task is to find a linear approximation of the function $\sqrt{1+x}$, $x \in [0,1]$. Your homework should contain the following steps:

   a) Generate $N = 10000$ random numbers from $[0,1]$:

   $$x_1, x_2, \ldots, x_N \in [0,1]\,,$$

   and then obtain their labels: $y_i = \sqrt{1+x_i}$, $i = 1, 2, \ldots, N$.

   b) Do linear regression on your generated data using the closed form solution.

   c) Do linear regression on your generated data using the library *sklearn*.

   d) Do linear regression on your generated data implementing the gradient descent algorithm by yourself.

   e*) Do linear regression on your generated data using tensorflow.

   f) Sketch the graphs of all approximations on one graph.

   g) Compare all solutions with the first degree Taylor approximation of the function $\sqrt{1+x}$.

2*. a) How will you define polynomial regression inspired from linear regression?

   b) Can you implement the polynomial regression using linear regression?

Remarks:

1. Exercises with asterisks are supplementary and will not be graded.
2. Don't forget about train, validation and test sets.
3. Use jupyter notebook for writing your code.
4. You can use google for any question, but don't do copies of others' codes.
5. You can ask me whatever you want and whenever you want.