DEEP LEARNING: EXERCISE SHEET 2 (SOSE2018)

18TH OF APRIL (DUE 25TH OF APRIL AT NOON)

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QUESTION 3: FORWARD PROPAGA-TION - 10 POINTS

Given is a neural network with one hidden layer. The network takes as input a 2-dimensional vector $x = (x_1, x_2) \in \mathbb{R}^2$ and outputs a single value $\hat{y} \in \mathcal{Y}$. The number of neurons in the hidden layer is set to be two.

a) Make a sectch of the whole network architecture. Do not forget the biases in the input and the hidden layer. To make your life a little bit easier, use different variables for the network inputs and weights by using x and W for the input layer; h and v for the hidden layer and \hat{y} for the final prediction.

b) Write down the formulas how to compute h and y[^] when using ReLU as activation function for both a regression output and a binary classification output.

c) Predict the network output for $x = (-1 \quad 1)$ for parameters: $W = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$, $v = (1 \quad -1 \quad 2)$

QUESTION 4: LOG-LIKELIHOOD LOSS GRADIENT - 10 POINTS

RESEARCH TIME: Take a look at slide 18 of the second lecture. Research and explain how to derive the gradients for the log-likelihood loss.

WARNING!

If we detect **Plagiarism** on your solution, you will receive no points for it. If a second plagiarism

attempt is detected, you might fail the class or be expelled from your program.

You are allowed to discuss solutions, but if you work on a group, you must indicate on your sheet with whom are you working with.

Group submissions earn 0 points, but counts as participation.

How to submit?

The new submission method is via LearnWeb.

Link to the tutorial (ld 3108) is here: https:// lsf.uni-hildesheim.de/qisserver/rds? state=verpublish&status=init&vmfile= no&publishid=70814&moduleCall= webInfo&publishConfFile=webInfo& publishSubDir=veranstaltung

And enroll also on the LearnWeb course: So that we can post your grades, news and receive your excercises: https://www.uni-hildesheim. de/learnweb2018/course/view.php?id= 906

1