Programming with neural networks: Exercise sheet 9 SS 2020

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Exercise sheet: 9

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Task 1: CTC algorithm

There are pictures of car signs showing a different number of 29 large letters, 10 digits and spaces (OCR task).

(a) Design a neural network for OCR in pseudo-language that consists of conv- and pooling layers and a bi-directional LSTM („BiLSTM n -nodes ") owns. Reshape channels and height to a dimension to input of the BiLSTM. As an activation function of the output by means of a FC layers (applied per horizontal position) are used to convert a Softmax layer Generate probabilities. For each layer, enter the output dimensions.

(b) What form of GT data does the CTC loss function expect?

(c) Given the label sequence „NEW AR 565 "and the following probabilities time table (output of the Softmax):

Calculate the forward and backward variables, as well as the gradient Updates for the given dates. Which dimensions do α and β have?

When calculating on Paper, make sure that a number of variables are zero! Agenatively they can use the Excel sheet (see Wue campus) to find the solutions Determine algorithm.

Which sequence does the greedy decoder output?

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$P(L, T)$	1	2	3	4th	5	6th	7th	8th	9	10	11	12th	13	14th	15th	16	17th	18th
-	0.9	0.8	0.3	0.6	0.8	0.9	0.1	0.1	0.99	0.1	0.1	0.8	0.4	0.1	0.3	0.9	0.4	0.9
A.	0	0	0	0	0	0	0	0	0	0	0.9	0.2		0	0	0	0	0
B.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E.	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0
F.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0
I.	0.1	0	0	0	0	0.1	0	0	0	0	0	0	0.3	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0
L.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N	0	0.2	0.7	0.4		0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R.	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0
S.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0
W.	0	0	0	0	0	0	0.4	0.9		0	0	0	0	0	0	0	0	0
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Y	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.6	0.1
6th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.1	0	0
7th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0