Itamar Trainin 315425967

Ex. 2 part 3 description file

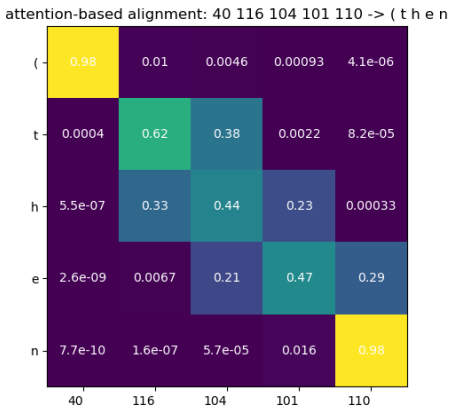
In this part I have generated heatmaps showing the weights applied to each encoder's output inorder to compose the context vector concantenated to each ecoder input.

The images below show the heatmap in an increasing order according to the epoch number.

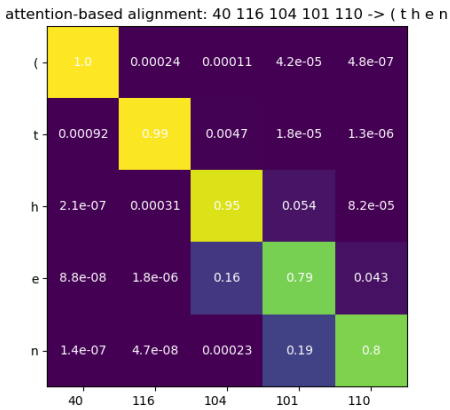
One can easily see that at first the weights are not initialized and therefore different wieghts are generated for the different encoder outputs. Once the weights matrix converges, we can see that the the most influencial character in the input on the current output character is the charater in the corresponding position i.e. one to one mapping between the characters. In previous architecture, we used the encoded representation of the last charcter to determine the output. This forced the network to encode information about the whole word into that vector. We know from the problem setup that this architecture is not optimal since there is a clear one-to-one correspondence between the input and output characters.

In the heatmaps, we see this coorrespondence. High weights were given to the input representaion corresponding to the character in the same position in the input.

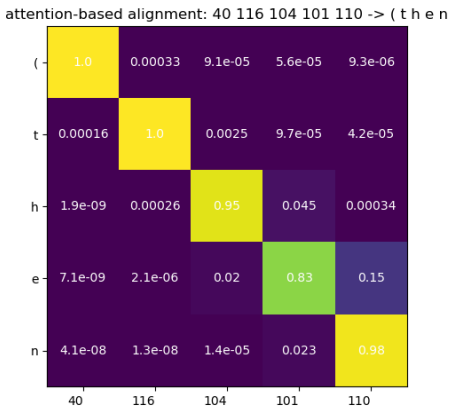
Note that the wiegts are also saved in '.npy' pickle format in 'attention_weights' folder.

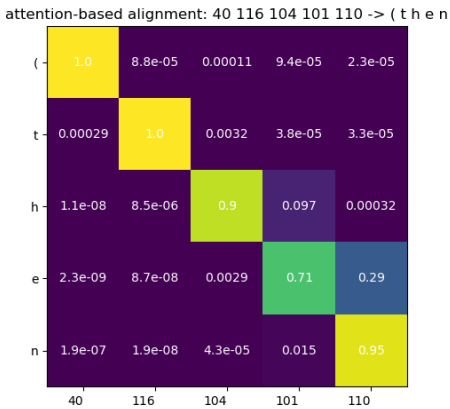


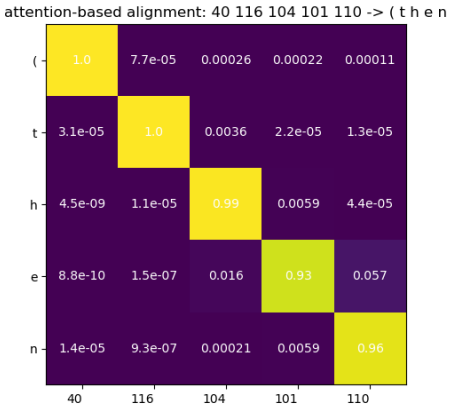
Epoch 1

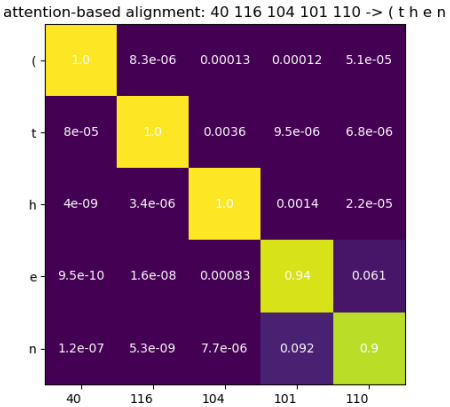


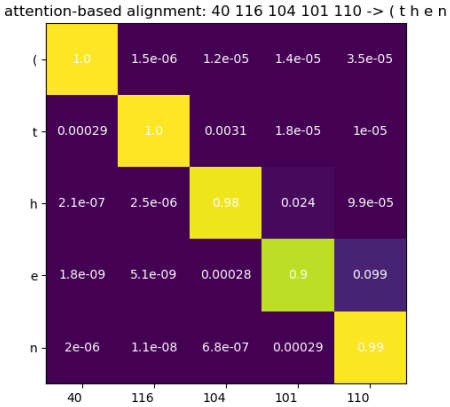
Epoch 2

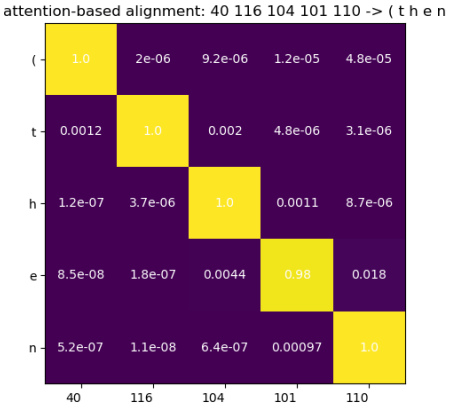


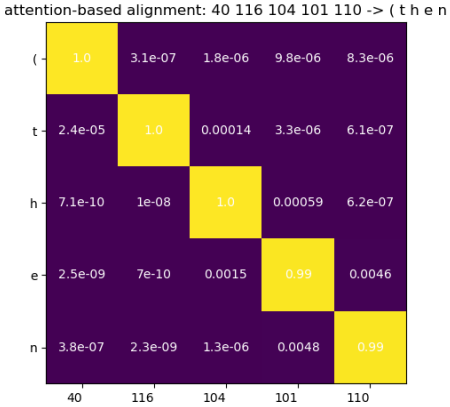


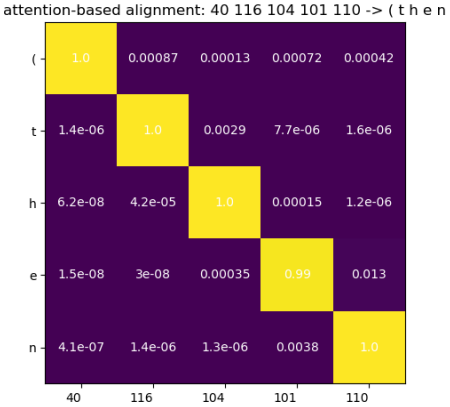

attention-based alignment: 40 116 104 101 110 -> (t h e n
(1.0 7.7e-05 0.00026 0.00022 0.00011
t 3.1e-05 1.0 0.0036 2.2e-05 1.3e-05
h 4.5e-09 1.1e-05 0.99 0.0059 4.4e-05
e 8.8e-10 1.5e-07 0.016 0.93 0.057
n 1.4e-05 9.3e-07 0.00021 0.0059 0.96
40 116 104 101 110


attention-based alignment: 40 116 104 101 110 -> (t h e n
(1.0 8.3e-06 0.00013 0.00012 5.1e-05
t 8e-05 1.0 0.0036 9.5e-06 6.8e-06
h 4e-09 3.4e-06 1.0 0.0014 2.2e-05
e 9.5e-10 1.6e-08 0.00083 0.94 0.061
n 1.2e-07 5.3e-09 7.7e-06 0.092 0.9
40 116 104 101 110


attention-based alignment: 40 116 104 101 110 -> (t h e n
(1.0 1.5e-06 1.2e-05 1.4e-05 3.5e-05
t 0.00029 1.0 0.0031 1.8e-05 1e-05
h 2.1e-07 2.5e-06 0.98 0.024 9.9e-05
e 1.8e-09 5.1e-09 0.00028 0.9 0.099
n 2e-06 1.1e-08 6.8e-07 0.00029 0.99
40 116 104 101 110


attention-based alignment: 40 116 104 101 110 -> (t h e n
(1.0 2e-06 9.2e-06 1.2e-05 4.8e-05
t 0.0012 1.0 0.002 4.8e-06 3.1e-06
h 1.2e-07 3.7e-06 1.0 0.0011 8.7e-06
e 8.5e-08 1.8e-07 0.0044 0.98 0.018
n 5.2e-07 1.1e-08 6.4e-07 0.00097 1.0
40 116 104 101 110


attention-based alignment: 40 116 104 101 110 -> (t h e n
(1.0 3.1e-07 1.8e-06 9.8e-06 8.3e-06
t 2.4e-05 1.0 0.00014 3.3e-06 6.1e-07
h 7.1e-10 1e-08 1.0 0.00059 6.2e-07
e 2.5e-09 7e-10 0.0015 0.99 0.0046
n 3.8e-07 2.3e-09 1.3e-06 0.0048 0.99
40 116 104 101 110


attention-based alignment: 40 116 104 101 110 -> (t h e n
(1.0 0.00087 0.00013 0.00072 0.00042
t 1.4e-06 1.0 0.0029 7.7e-06 1.6e-06
h 6.2e-08 4.2e-05 1.0 0.00015 1.2e-06
e 1.5e-08 3e-08 0.00035 0.99 0.013
n 4.1e-07 1.4e-06 1.3e-06 0.0038 1.0
40 116 104 101 110