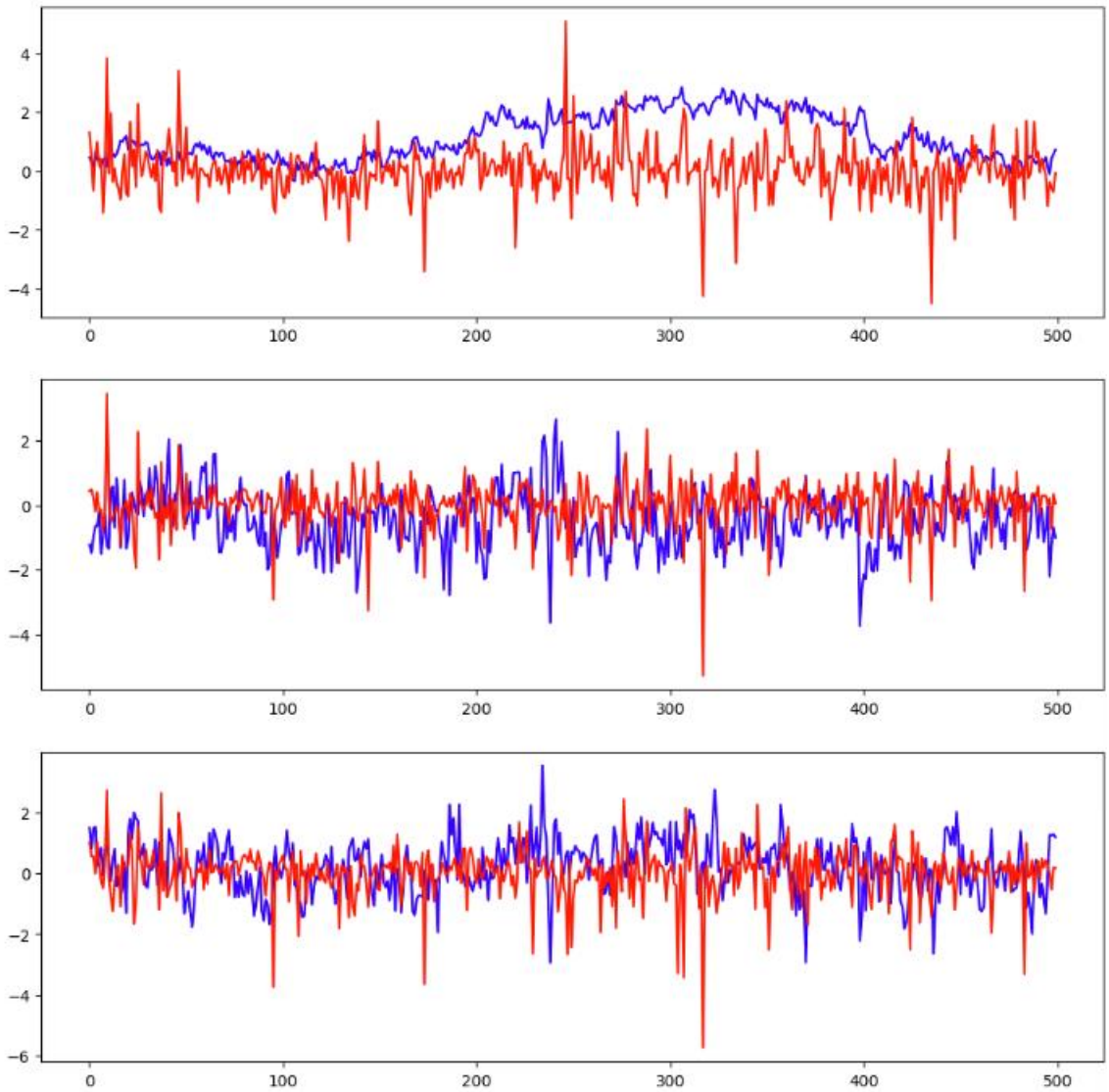
HW 8: Important Figures and Questions

The supervised learning for this scenario did not perform well. The network was unable to learn and had a constant learning rate. The outputs were constant as a result and got stuck on the initial conditions. Multiple different modifications were employed to combat this: 1) x3 was scaled with the Standard Scaler 2) “GELU” was used instead of “RELU” 3) the learning rate was reduced 4) a variety of combinations of units for the layers was utilized. None of these changes gave the network a better outcome. **Thus, the unsupervised learning methods of lecture 13 are superior to the supervised learning methods used in this assignment.**

Displayed below are the plots from lecture 13:

The blue is the original data, and the red is the predicted data. The predicted data does an okay job at following the original data.



The “r” and “p” values for the three outputs were:

Output 0 has r = 0.0055 and p = 0.0831

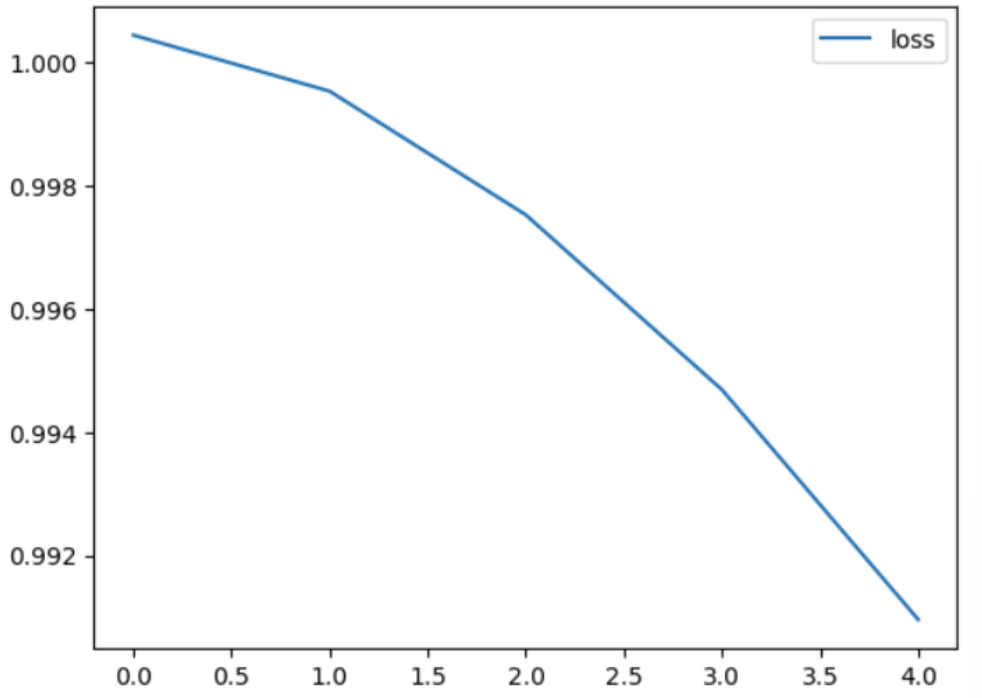
Output 1 has r = 0.0063 and p = 0.0449

Output 2 has r = -0.0023 and p = 0.4649

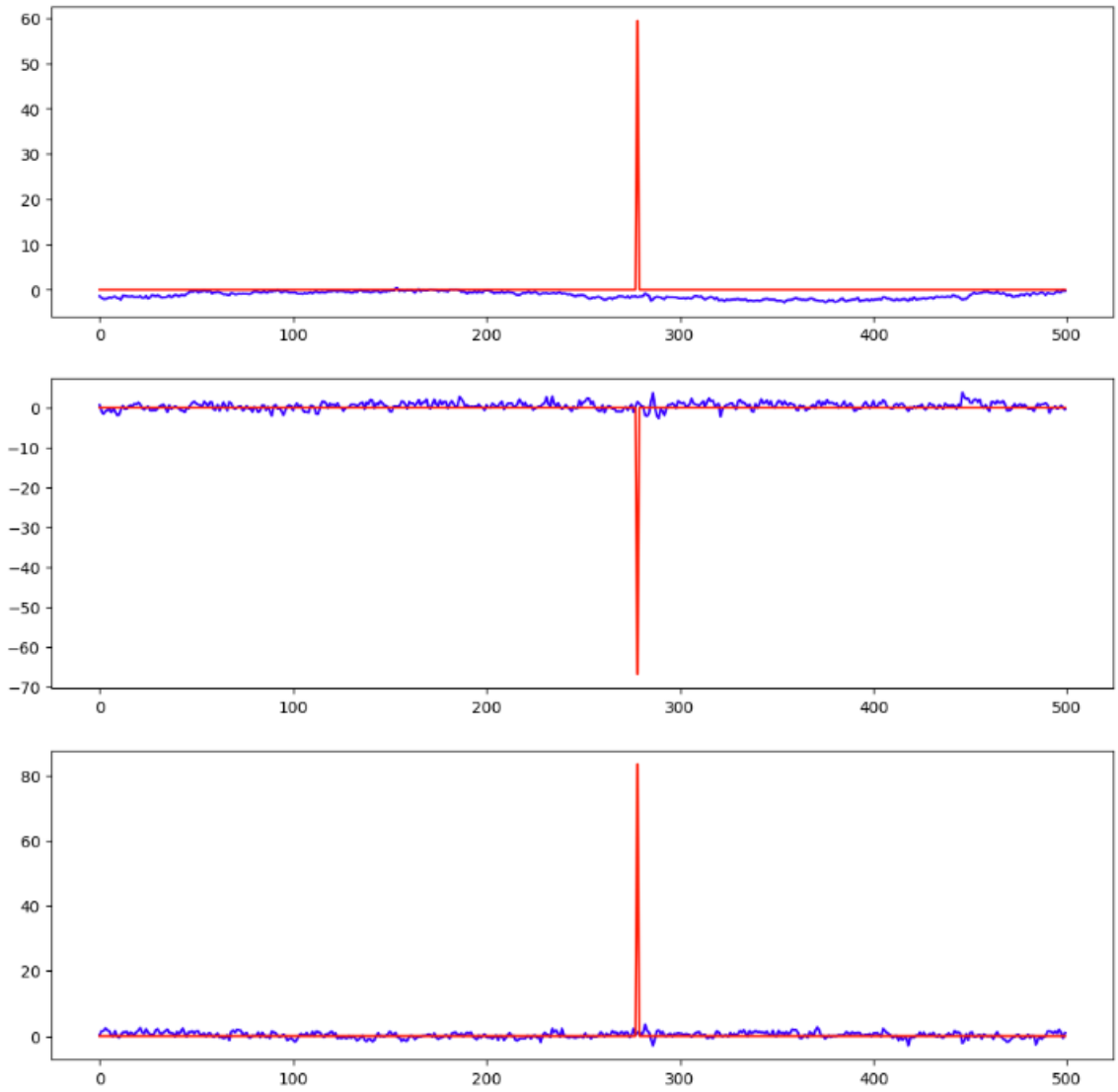
All of the r values are around zero, showing there is no correlation. Two of the p values are low, for outputs 0 and 1, whereas the p value of output 2 is high. Generally, p values below 0.05 mean there is strong evidence for a correlation, which only barely occurs for output 1. However, since the r values are low for all of them, this points to no correlation being present between the predicted outputs and the outputs.

Shown next are the results from the supervised model:

The loss curve is shown first:



The plots of the predicted outputs are as follows:



Besides a spike in one location the model stays with the initial condition. There is no learning and the loss is constant.

The p and r values are shown below:

Output 0 has r = -0.0008 and p = 0.7994

Output 1 has r = -0.0012 and p = 0.6987

Output 2 has r = -0.0020 and p = 0.5241

All of the r values are around zero, showing there is no correlation, which makes sense as the output is constant the entire time, and thus does not depend on the input. The high p values we are seeing also tell us there is no correlation, because they demonstrate that the evidence against the null hypothesis is very weak. This also shows that the two outputs are not correlated.

Thus, both models have r values around zero, demonstrating that there is no correlation between the input and the output. There should be correlation between the input and output as they are two different parts of the brain that share some common activity. The p values also point little or no correlation as well for both cases, although the unsupervised learning has better p values than the supervised learning case.