EPL442

Assignment 3

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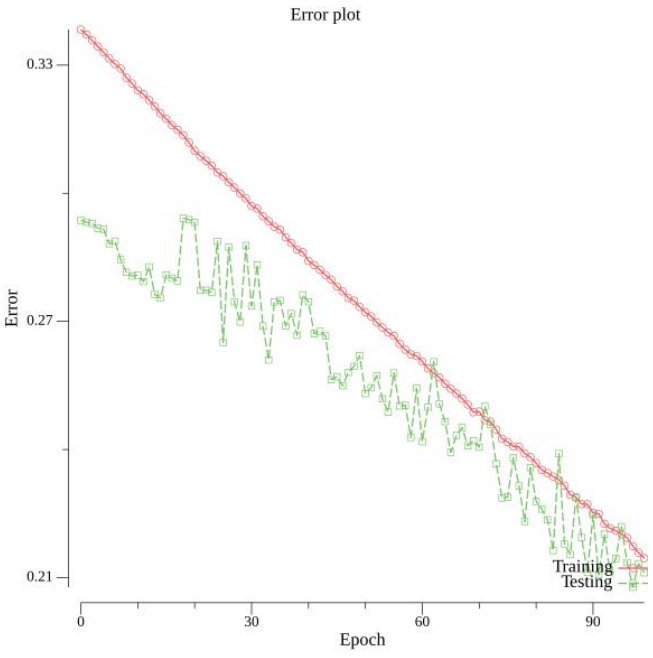
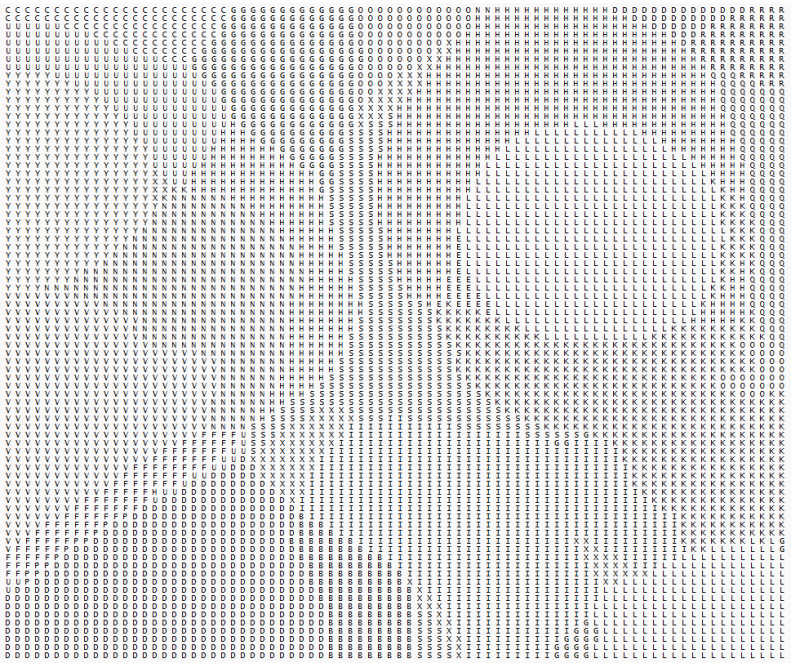
1. **Design choices**
   - For this project I used the GO programming language for its simple syntax and high performance, since the Kohonen-SOM algorithm is quite slow.
   - I used GO's map data structure for the weights and mapped the (i,j,k) triplet to a float64 value, that being the weight. The letters j and i represent the x,y values and k the corresponding input neuron.
   - The errors were calculated by squaring and then adding each neuron's distance from the winner. To find the epoch error, I just divided it by the number of records.
   - Labeling was done by going through the testing data once for every neuron and finding the minimum distance from each record. That record's letter was used to label said node.

2. Control run (Dimensions=80x80, Learning rate=0.9, epochs=100)

This is a run with parameters I found could somewhat solve the problem in a reasonable amount of time. As mentioned in class, this problem will constantly improve if you let it train (no problems such as local minima).





As we can see, the error began at around 0.35 and went down to 0.21. I would say this is a small change, however we cannot really quantify what that means since we do not have a desired output to be able to definitively say this is good or bad. What matters is that the error is going down steadily. It is also noteworthy that the training error seems to be going down very smoothly, whereas the testing error is more volatile. Something we expected. We can also see in the next image the clustering. Although the letters are not that distinguishable, the clusters are easily visible.