

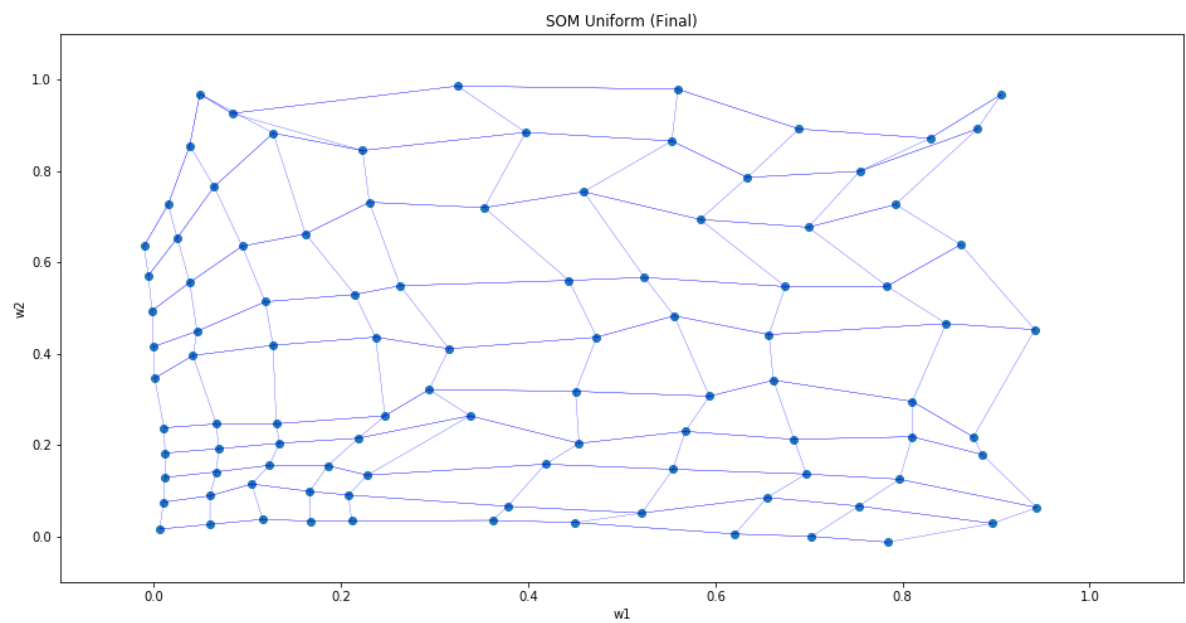
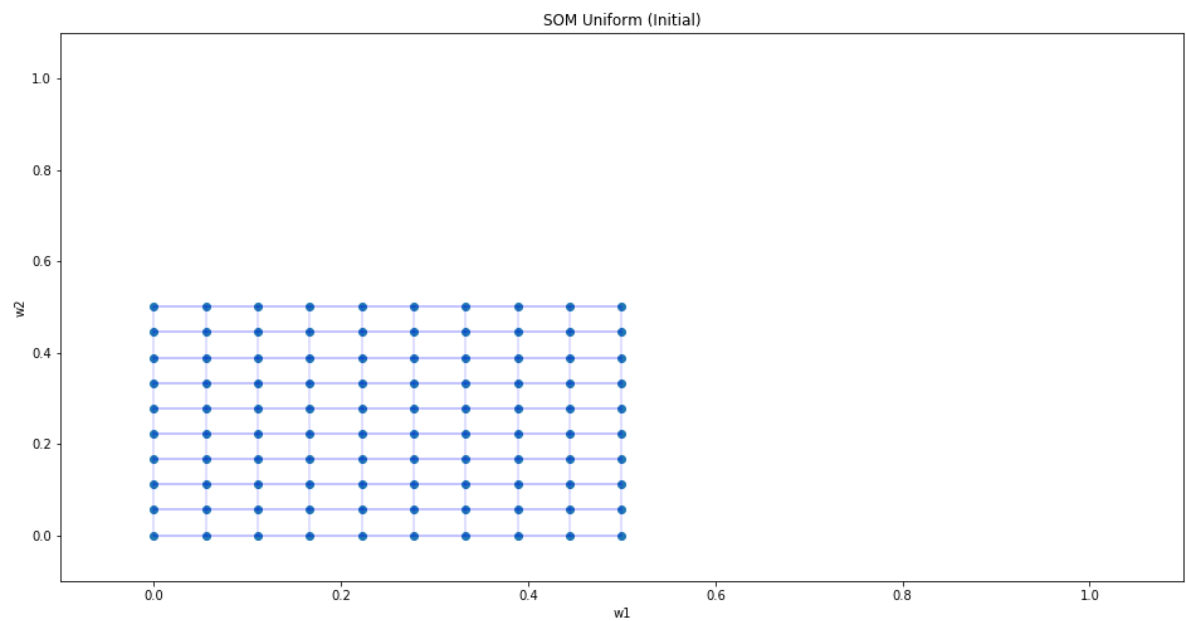
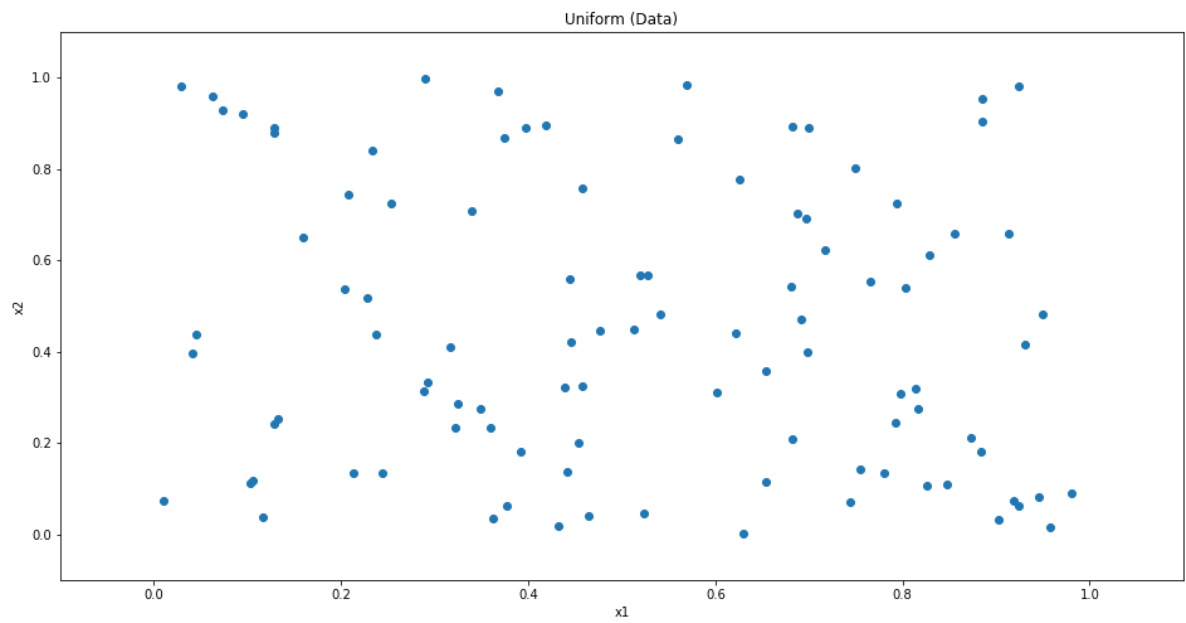
Problem 3

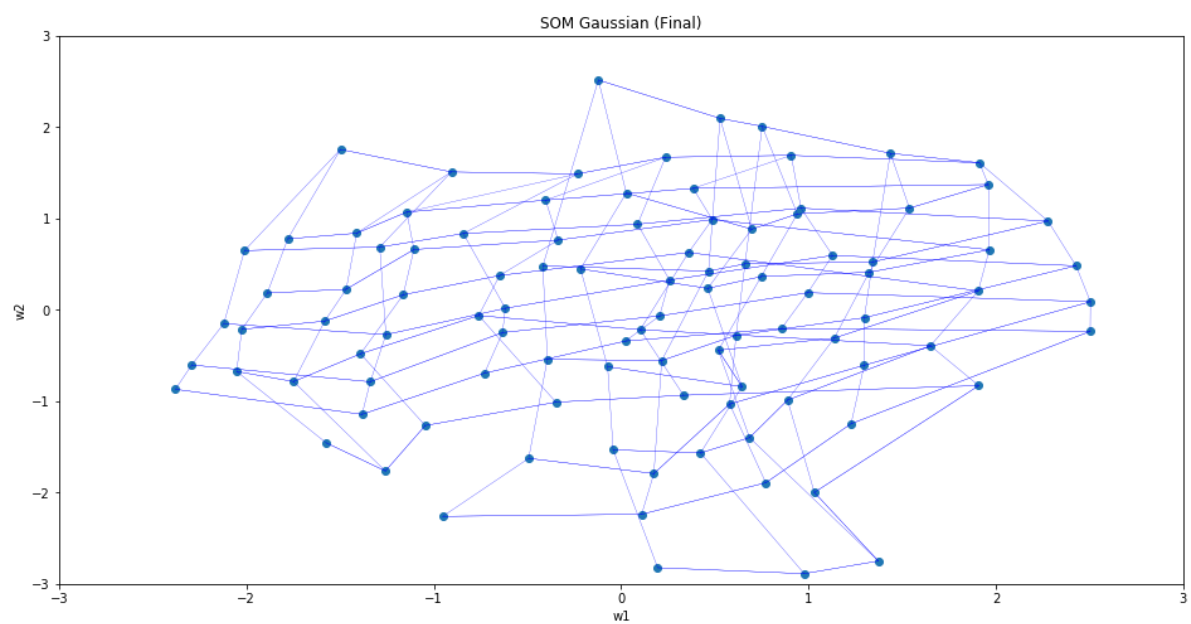
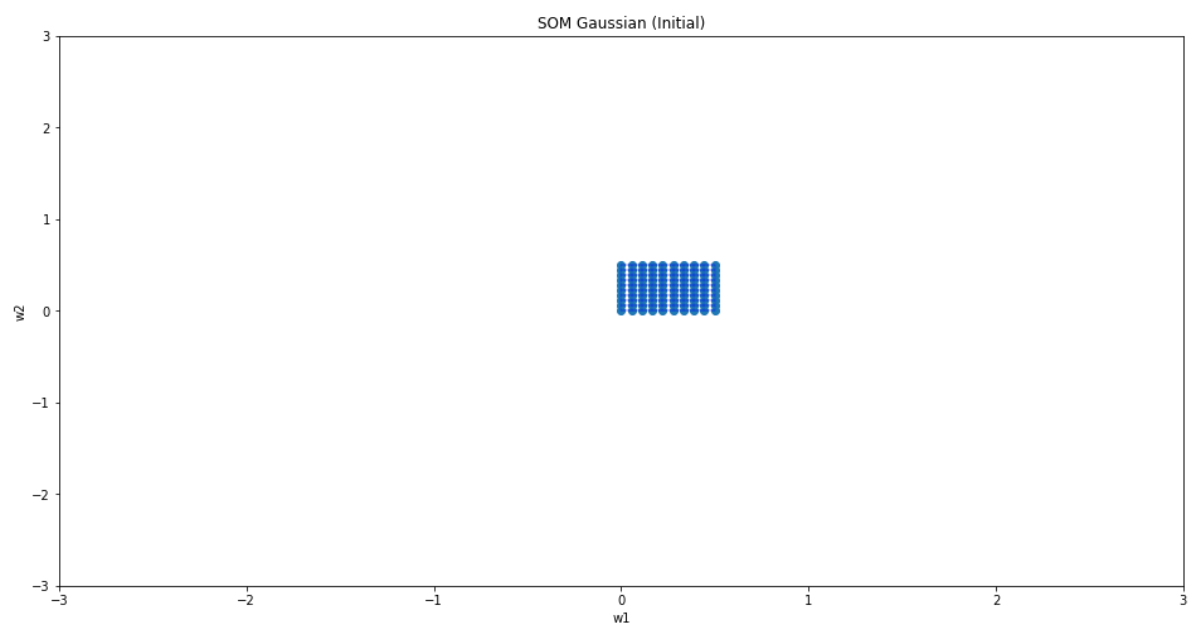
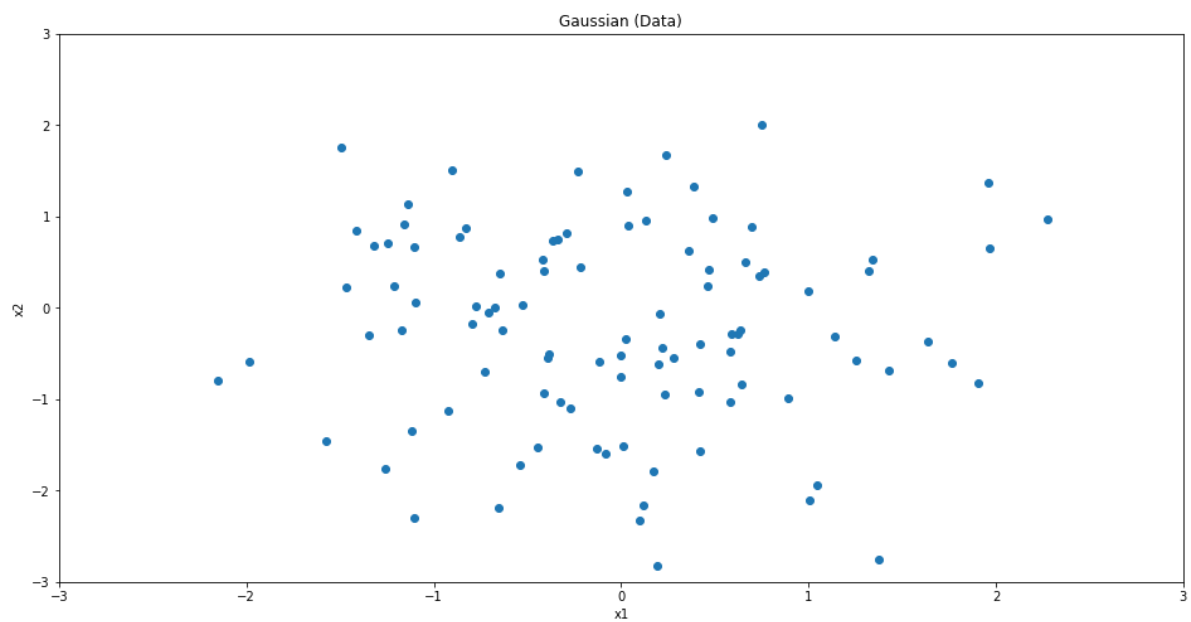
Method

We implement a Self-Organizing Map (SOM) trained on two random distributions: a standard random uniform distribution, and a standard random gaussian distribution.

The SOM model was trained on both datasets for 2000 iterations each. The neighborhood function was set to a gaussian, with initial standard deviation starting at 4 units, and decreasing exponentially with time decay of $1/300$. Similarly, the learning rate was initially set to 4, and decreases exponentially with time decay $1/300$. The original distribution, and the initial and final SOMs for plotted for both distributions.

Out[1]: [Toggle Code](#)





Discussion

For both distributions, we can see that the SOM shifts its weights in order to match each random distribution over time. What's interesting to note is that there seems to be some overfitting of the SOM with respect to the original data. This can easily be seen in the uniform distribution map, where, in theory, the weights of the SOM should be evenly distributed across the range of a true uniform distribution. However, there are distortions in the map where the network seems to coalesce around concentrated examples. This can probably be fixed by having more samples in the original data, or by tuning the SOM further.