Neural Network

Assignment 4

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Part I: Self-organizing maps

A self-organizing map is a type of artificial neural network (ANN) that is trained using unsupervised learning to produce a low-dimensional, discretized representation of the input space of the training samples, called a map. Self-organizing maps are different from other artificial neural networks in the sense that they use a neighborhood function to preserve the topological properties of the input space.

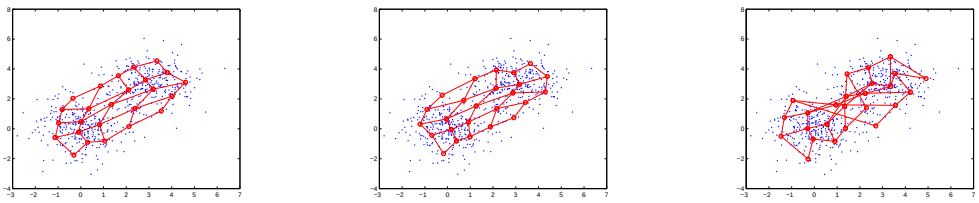
In this homework, we are mapping two gaussian distributions to $5 * 5$ neural network.

Part II: Matlab implementation

According to the algorithm, we can easily implement it in Matlab. But there are some parameters to tweak such as the learning rate and the gaussian neighborhood function.

Part III: Test results

I run this implementation with different parameters, and the results is shown in the following figures. With larger learning rate the results will converge slower, but smaller learning rate and σ will produce incorrect results.



(a) learning rate 1000, $\sigma = 4$ (b) learning rate 500, $\sigma = 4$ (c) learning rate 500, $\sigma = 1$

Figure 1: Comparison of different parameters