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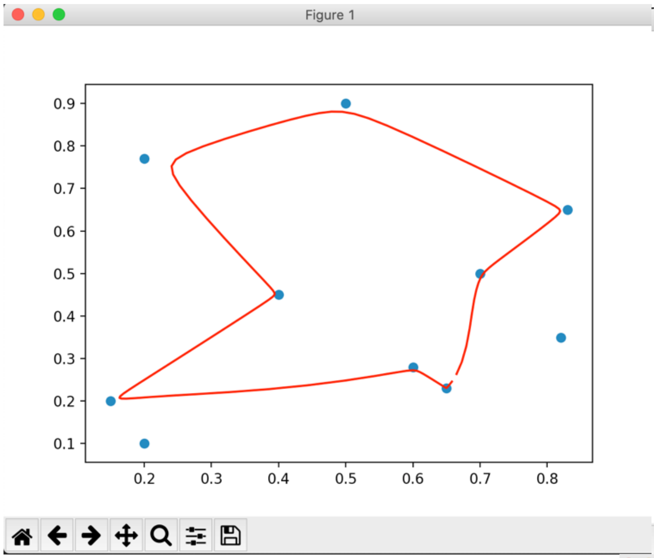
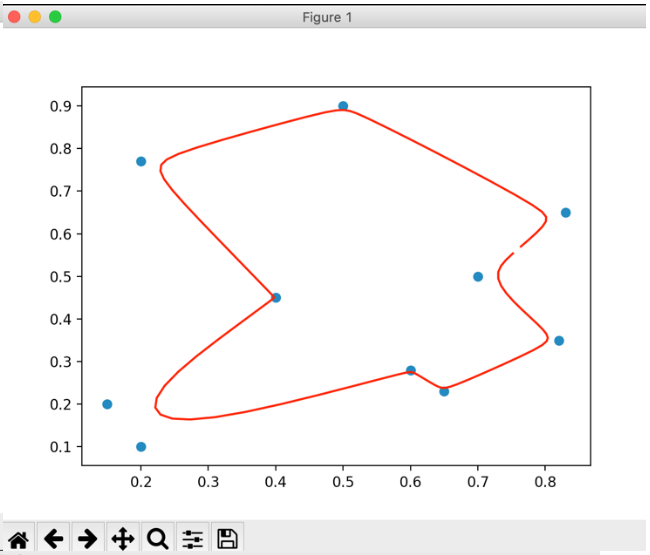
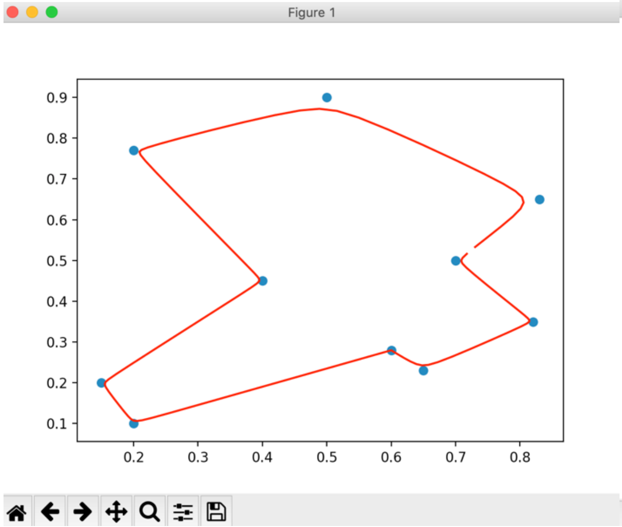
Problem 1:

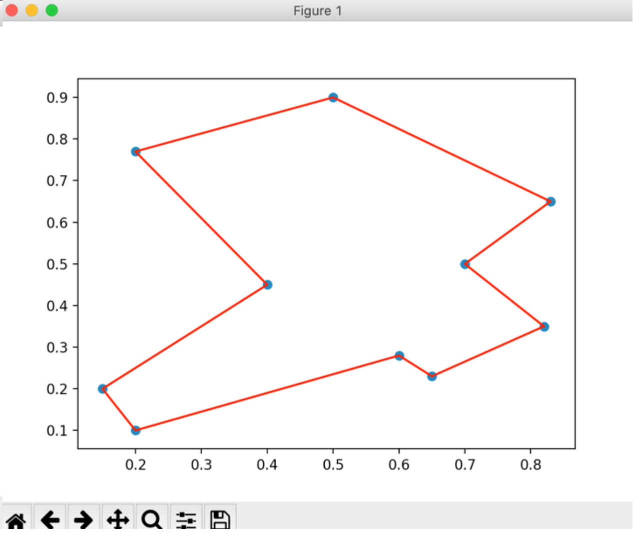
Solve a 10-city TSP problem

The below results are after using the hyperparameters learning rate = .8, pivot = 10, sigma = 6, and epochs = 1100,1200,1250,2000 (initial, fair, good, best)









The report should include details on :

- What you learned through this assignment.

  When training iterations are lower some points may be completely lost/ignored, see plot 1 (1,100 epochs)

- Implementation of your Self Organizing Map.

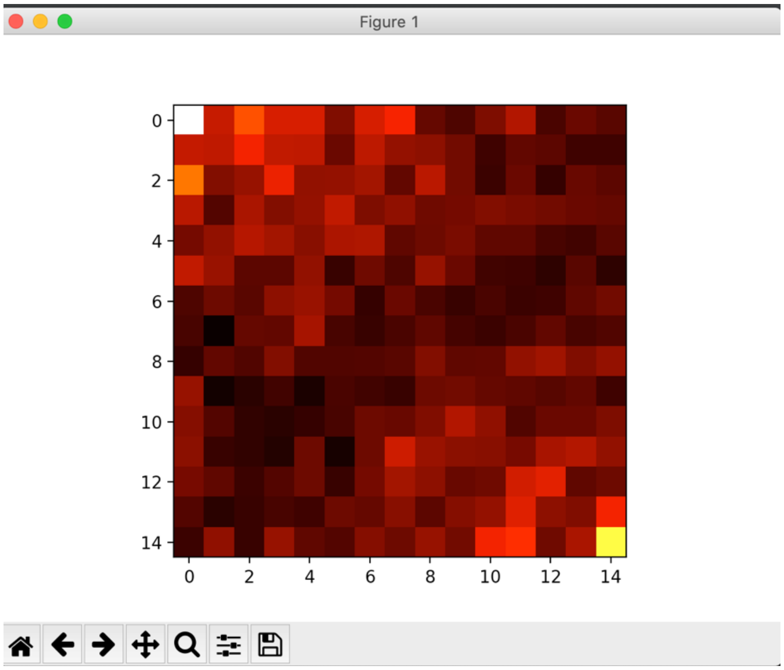
  See code

- Your results for each question and their analysis.

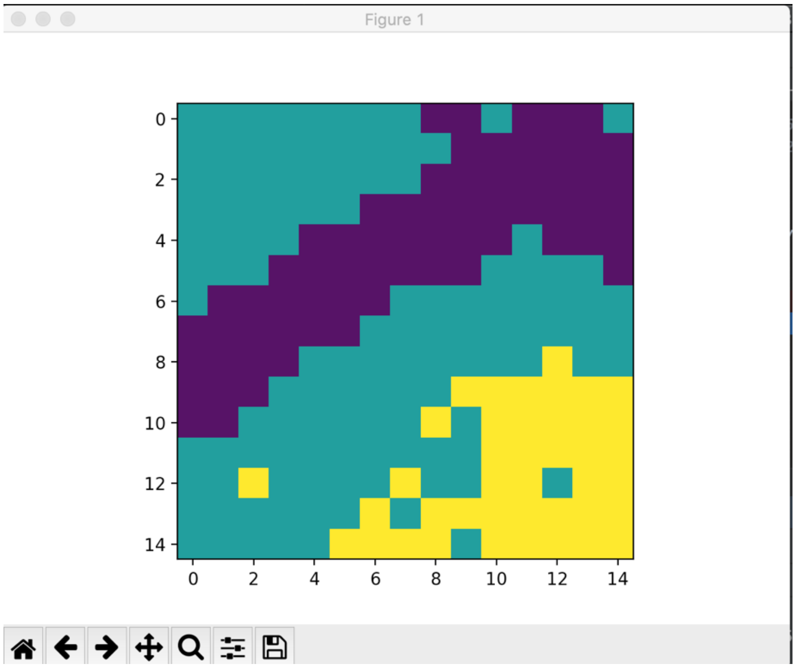
  As the training iterations increase the learned model become better and better by reaching the goal location in the straightest and closest pattern.

Problem 2:

Project the training data onto a 2D discrete space of size n x n using a Kohonen's SOM.
High density is white and low density is black



Label each cluster (Kohonen Neuron) with the wine class.



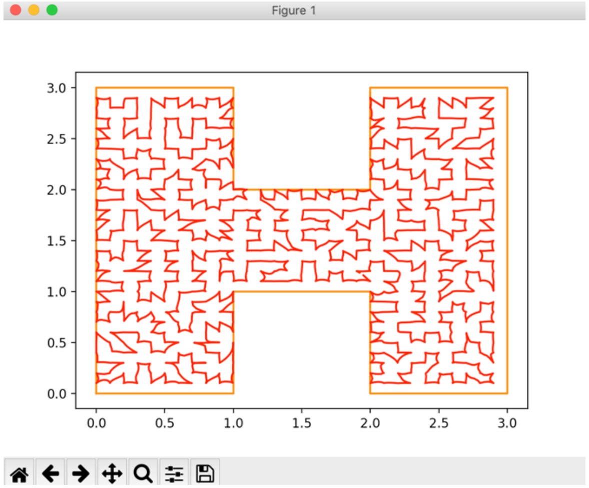
Teal = Class 2, Purple = Class 1 & Yellow = Class 3

4. Comment on how well each class is separated.
In my opinion the SOM did a great job of classifying 13 dimensional data in a 2D plane. There are a few 'misplaced' nodes however with only 10,000 epochs it seems to have done a strong job. Note: 10,000 epochs, LR = .7, pivot = 0, sigma = 5, n = 15

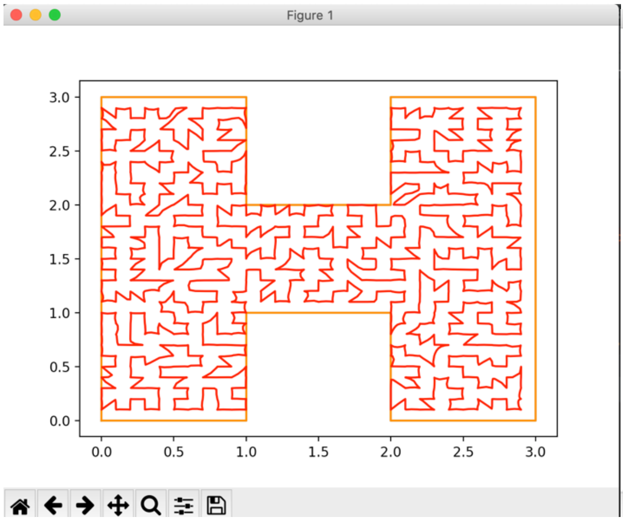
I learned that SOM simply project N-dimensional data onto a 2D plane for easy classification.

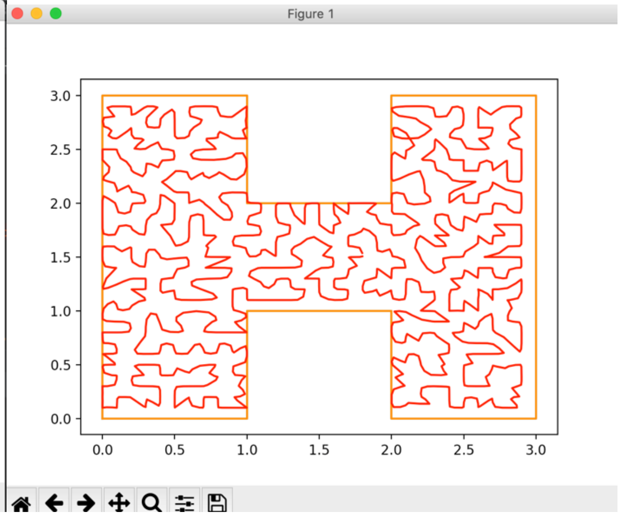
Problem 3:

Base: N = 6990 LR = .9

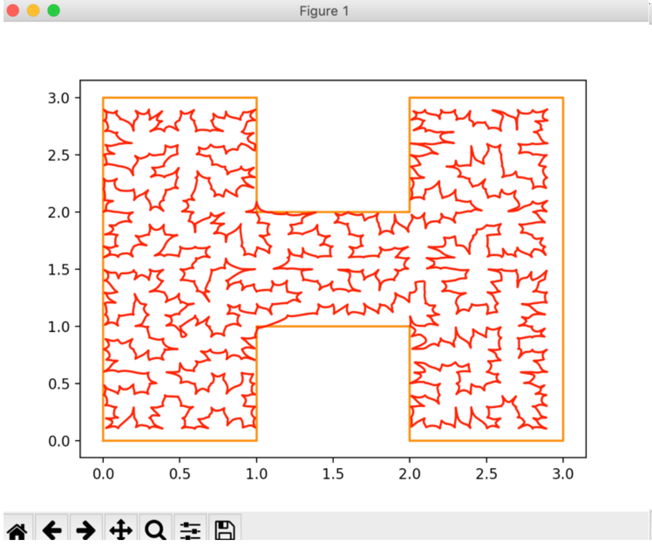


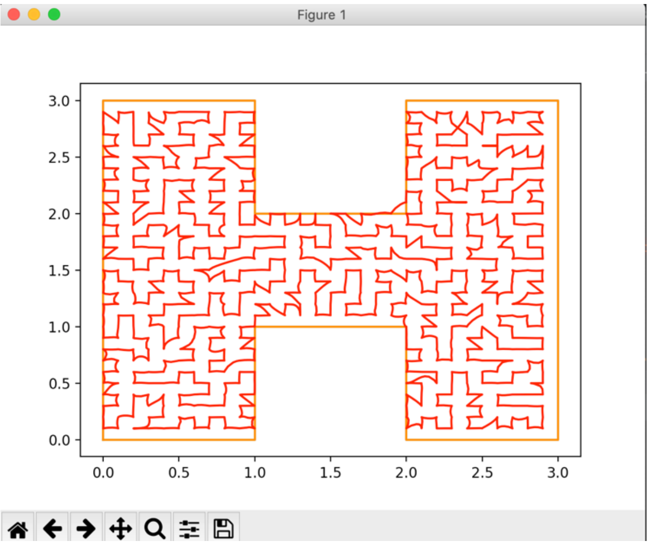
Changing N: LR = .9 N = 3495 and N = 1398





Changing LR: N = 6990 LR = .4 and LR = 1.2





Allowing N to be high initially and gradually shrink is important so that more and more nodes are included in the final map. Shrinking the N also allows for connections between nodes to be straight lines as you can see lowering N reduces the ‘sharpness’ of the plot. Increasing the LR finds a more efficient path and lowering it finds a less efficient path.