**ENPM 808Y: Neural Networks, Spring 2020**

# Assignment 3: Self Organizing Maps

The aim of this assignment is to give you a better understanding of Self Organizing Maps. There are 3 problems in the assignment that will focus on different aspects of SOM. For this assignment **do not use inbuilt functions or frameworks.** The algorithm has to be developed **from scratch** by you.

## Problem 1:

Solve a 10-city TSP problem with their (x, y) positions shown below:

(0.2, 0.1) (0.15, 0.2) (0.4, 0.45) (0.2, 0.77) (0.5, 0.9)
(0. 83, 0.65) (0.7, 0.5) (0.82, 0.35) (0.65, 0.23) (0.6, 0.28).

Apply 1D SOM and show the resulting tours – initial, fair, good, and best tours.

## Problem 2:

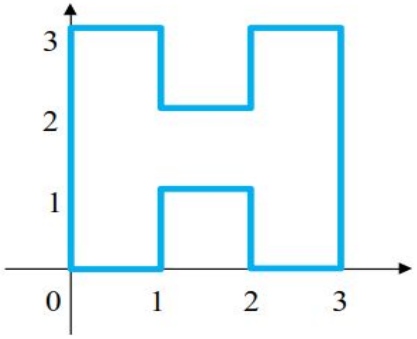
The data for Problem 2 is provided in wine data.zip.

1. Divide the 13D wine data (with 3 class outputs) into training and test data.
2. Project the training data onto a 2D discrete space of size n x n using a Kohonen's SOM.
3. Label each cluster (Kohonen Neuron) with the wine class.
4. Comment on how well each class is separated.

Note: Choose a proper value for your n.

## Problem 3:

Design a SOM that maps the inside of the following structure onto 1D Kohonen neurons. Show the effect of $\eta(t)$ and $\sigma(t)$ on the resulting input pdf approximation performance. What is the reason behind allowing the initial neighborhood to be large, then gradually contracting it over time ?




## Report

The report should include details on :

- What you learned through this assignment.
- Implementation of your Self Organizing Map.
- Your results for each question and their analysis.

## Submission Guidelines

The submission should include the following:

- Code
- Report ( in PDF format).
- Readme.txt with instructions to run your code.

The file should be named DirectoryID_HW3.zip and submitted to ELMS/Canvas.