Machine Learning Algorithms: From Math to Code
Assignment for Self-Organizing Map

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1 Problem Set 1

1.1 Ch19_1.m

Implement SOM to the data generated by the helper function `ColorData` reads in the data. The code segment in subsection 19.2 in the textbook will help you. Finally, you will get something similar to Fig 19.14 in the textbook. For more information, refer to Example 19.6 in the textbook.

Complete the missing code and add appropriate comments (to key variables, steps, helper functions, and formulas of the algorithm) for Ch19_1.m, and submit it with a report describing your results in a compressed .zip file on Canvas.

In the report, you should

1. Include generated plots.
2. Observe, analyze, and report your results.

Note

It may take a long time to run the code. Be patient, please.

1.2 Ch19_2.m

SOM can also act as a dimensionality reduction method. Implement SOM to the data generated by the Lorenz model (see Figure 1). The helper function `LorenzData` reads in the data. This example will also help you understand how the SOM algorithm got its name.

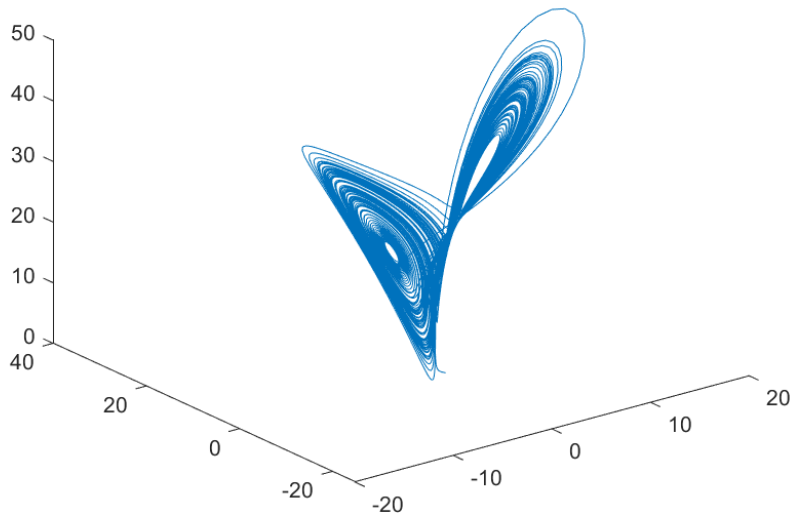

Figure 1: Lorenz

Complete the missing code and add appropriate comments (to key variables, steps, helper functions, and formulas of the algorithm) for Ch19_2.m, and submit it with a report describing your results in a compressed .zip file on Canvas.

In the report, you should

1. Include generated plots.
2. Observe, analyze, and report your results.

1.3 Ch19_3.m

Choose a dataset that interests you (not limited to those from the course). Apply 1-D array SOM or 2-D array SOM to it.

Write the code Ch19_3.m by yourself, and submit it with a report describing your results in a compressed .zip file on Canvas.

In the report, you should

1. Visualize the results in a proper way.
2. Observe, analyze, and report your results.

Notes

- These problems should be included in a single report with headings.
- Source codes and report should be compressed into a single .zip file named **Group_xx.zip** and handed on Canvas before **next Monday midnight, July 24 23:59**.