

The Self-Organizing Map

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Overview

- Background
- Algorithm
- How it Works
- Conclusion
- Example

About SOM

- Type of Artificial Neural Network
- Uses unsupervised learning
- Produces low-dimensional map with clusters.

- First described by Finnish professor, Teuvo Kohonen at Helsinki Univ. of Tech.

About SOM (2)

- Operates in 2 modes.
 - Training
 - Mapping
- Labels.

Initial Map

- Randomly initialized.
- Each vector (p) compared to each point on the map (q) with Euclidean distance.

$$\sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2 + \dots + (p_n - q_n)^2} = \sqrt{\sum_{i=1}^n (p_i - q_i)^2}$$

Initial Map (2)

- Whichever point the specific vector is closest to.
 - That point is trained accordingly.
 - Other points around it are also trained, just not as much.

What is Needed?

- A .bat file containing the reference to the executables and the specifics of the map.
- The executables randomly initialize, run the algorithm, and calibrate the label onto the points.

```
randinit -din nh1.dat -cout nh1.cod -xdim 15 -ydim 15 -topol rect -neigh bubble -rand 0  
vsom -din nh1.dat -cin nh1.cod -cout nh1.cod -rlen 10000 -alpha 0.05 -radius 15  
vsom -din nh1.dat -cin nh1.cod -cout nh1.cod -rlen 1000000 -alpha 0.02 -radius 5  
vcal -din nh1_label.dat -cin nh1.cod -cout nh1_label.cod
```

- som_mapper.exe

SOM

- Process repeats for a set number of times.
- The labels are pasted on to each instance.
- The Map is made.

Conclusion

- Relatively simple way to attempt to cluster high dimensional data.
- Only issue – correct format.

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Sources

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