Implementation of a Self-Organizing Map

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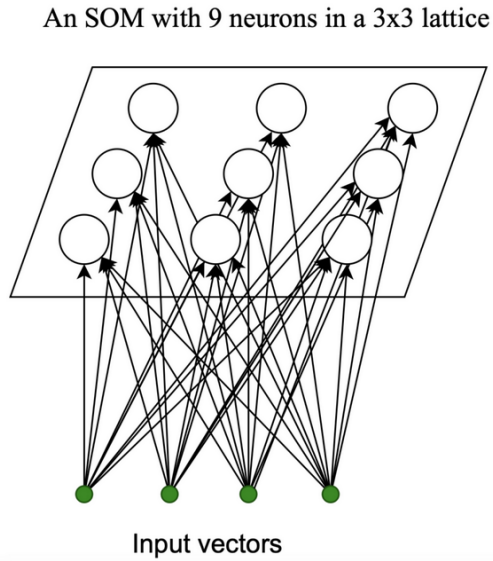
OVERWIEW

What is a SOM ?

Definition

It is a neural network of just one layer : the output layer.



Wikipedia

A self-organizing map (SOM) is used to produce a low-dimensional (typically two-dimensional) representation of a higher dimensional data set, while preserving the topological structure of the data.

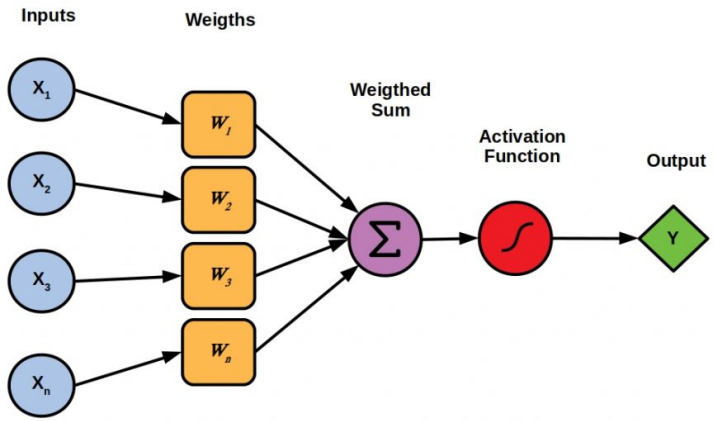
Motivation

The Self-Organizing Maps permit to :

- Analyse and visualise the data. It represents complex data on a map of only two or three dimensions (see Convergence slide).
- Detect patterns from the data. Clustering (see K-means slide).
- Improve a deep neuronal network by sorting the data at the beginning.

Similarities with the Perceptron

Perceptron



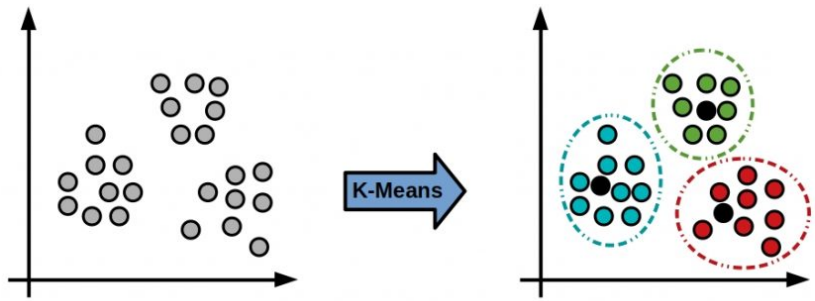
It is also a one-layer neuronal network. However, this one is used to separate two different classes. The output is actually a binary one. This is a supervised learning algorithm.

SOM

The SOM can gather vectors due to their similarities.
The SOM is an **unsupervised learning algorithm**.

Similarities with K-means algorithm

K-means algorithm is an unsupervised learning technique that can automatically gather data by creating**clusters**, which are subsets of data elements that share common characteristics.



The user must define the number of clusters **K**. However, The SOM does not require this, it guesses the right amount of clusters.

Convergence

ALGORITHM

BIBLIOGRAPHY

https://www.baeldung.com/cs/som-algorithm