A Continuous Learning Strategy for Self-Organizing Maps Based on Convergence Windows

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Recommended Citation

Poster Supplement: A Continuous Learning Strategy for Self-Organizing Maps Based on Convergence Windows, Simplified

A self-organizing map (SOM) is an artificial neural network that is used for producing low dimensional representations of high dimensional data. For example, if you are working with a data set that has 30 attributes, it is impossible to visualize that data since humans cannot see beyond three dimensions. However, the two dimensional representation of a SOM, its unified distance matrix (see figures 2 - 5), enables such visualization. The map is created by starting with a grid of nodes, and over time moving those nodes closer to the data points until the data set is sufficiently modeled (see figure 1). In the existing algorithm, the amount of time to run is arbitrary and must be specified before starting. My approach combines the construction and evaluation of the map into a single process. That is, run the algorithm for some time and then see how 'good' the map is (by good here, I mean how converged the map is. See Map Evaluation). If it is good enough, stop. Otherwise, run for some more time and evaluate again. This has the benefit of being more efficient and removing the guess work from SOM construction. Since SOMs have many applications (i.e. visualization, cluster analysis, etc.) throughout the fields of science and beyond, it is my hope that improving this algorithm will benefit the advancement of knowledge.