

Identification of Patterns via Region-Growing Parallel SOM Neural Network

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Abstract

The Self-organizing map (SOM) is an effective method for topologically mapping datasets. By adapting the neurons to the inputs, the network can conform to the data and form clusters. However, with the Classical SOM and growing architectures such as Growing Cells and Growing Grid, the neurons are simply points in space and do not cover entire regions of the input space. Therefore, inputs that are introduced after the network is trained need to have cluster membership determined by proximity to the trained neurons.

The ParaSOM, being a different SOM architecture, where each neuron actually covers a region of the input space, opens up possibilities for different approaches to clustering and classification. By having entire areas of the input space covered by clusters of neurons, the actual regions that the clusters consist of are much better defined. The architecture of the ParaSOM is also structured so each neuron can have, at most, two neighbors. Therefore, the ParaSOM network is considered one-dimensional.

An algorithm has been proposed to take advantage of the unique characteristics of the ParaSOM. The neighbors of each neuron are evaluated by distance to determine cluster separation. Once the clusters have successfully been identified, then new inputs can be introduced to effectively determine which, if any, cluster each belongs to.