

## ABSTRACT

In this thesis, a model of self-growing and self-organizing feature map is proposed, which has been designed to alleviate the difficulty of pre-specifying an appropriate choice of the network topology, i.e., size and shape of the feature map, suitable for a given data set in the application of the Self-Organizing Map.

The proposed model progressively builds a feature map by incremental growing of the network during the training process in a way that maintains two-dimensional regular grid structure compatible with the Kohonen network, and by gradual adaptation of the reference vectors through coordinated competitive learning dynamics of the Batch Map algorithm.

Experimental results based on iris data set and Italian olive oil data set show that the stopping criteria applied in the proposed model is effective in discovering an appropriate topology of the network suitable for the data manifold at hand while avoiding undergrowth and overgrowth, and that the proposed model is capable of growing the network dynamically during the training process to manifest a feature map of suitable size and shape for a given data set in significantly less time than the time taken by the standard SOM algorithm to produce a feature map of similar quality on a predetermined network structure.