AC-ViSOM: Hybridising the Modified Adaptive Coordinate (AC) and ViSOM for Data Visualization

Md. Sarwar Zahan Tapan  
Faculty of Cognitive Sciences and Human Development  
Universiti Malaysia Sarawak (UNIMAS)  
94300, Kota Samarahan, Sarawak, Malaysia  
E-mail: sarwar740@yahoo.com

Teh Chee Siong  
Faculty of Cognitive Sciences and Human Development  
Universiti Malaysia Sarawak (UNIMAS)  
94300, Kota Samarahan, Sarawak, Malaysia  
E-mail: csteh@fcs.unimas.my

Abstract

ViSOM’s (Visualization induced SOM) final map can be seen as a smooth net embedded in the input space, where the distances among neurons are controlled by a regularization control parameter which is usually heuristically chosen on a trial and error basis. Empirical studies shown that ViSOM suffers from dead neuron problem, since a big number of neurons fall outside of the data region due to the regularization effect, even though the regularization control parameter is properly chosen. In this paper, a modified Adaptive Coordinate (AC) approach that is able to preserve data structure is hybridised with ViSOM is proposed. Experimental studies on benchmark datasets shown that the proposed method was able to eliminate the selection of regularization control parameter and minimizing the dead neuron for better data representation.

1. Introduction

Self-Organizing Map (SOM) [1] is able to preserve data topology in its visualization from N-dimensional space to the low dimensional display space. However, SOM’s visualization is not directly able to represent the data structure and inter-neuron distance in its topology preserved mapping [2]. Visualization induced SOM (ViSOM) [3] is then proposed to enhance SOM’s visualization to preserve data structure and inter-neuron distances. Empirical studies in [3] have proven ViSOM’s superiority among several other visualization methods such as Principal Component Analysis (PCA) [4], Multidimensional Scaling (MDS) [5] and Sammon’s Mapping [6] in terms of data structure, data topology and inter-neuron distance preservation. Proposed in [9][10] to produce data structure and inter-neuron preserved topology mapping.