

A MATHEMATICAL IMPROVEMENT OF THE SELF-ORGANIZING MAP ALGORITHM

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ABSTRACT

The objective of this paper is to report a mathematical improvement of the self-organizing map (SOM) algorithm implemented using real georeferenced biomedical and disease informatics data. The SOM algorithm is a very powerful unsupervised neural network with both competitive and cooperative learning abilities. It provides a foundation for knowledge discovery in large spatial databases and has successfully been applied to recognize patterns in several problem domains. Although significant progress has been achieved in using SOM to visualize multidimensional data or utilizing SOM for data mining purposes, certain limitations related to its performance still exist. In this paper, we propose a mathematical improvement as a result of discovering these limitations while using SOM-trained data for biomedical applications. The paper also introduces a new SOM-based model, mathematically improved learning- SOM (MIL-SOM*).

Keywords: SOM; MIL-SOM*; GIS; Clustering; Geography; Algorithms; Spatial Data Mining; Visualization; Biomedical Applications