

عنوان مقاله:

A Growing Hierarchical Approach to Batch Linear Manifold Topographic Map Formation

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خلاصه مقاله:

The linear manifold topographic map (LMTM) is a model for unsupervised learning of multiple low-dimensional linear manifolds from a set of data samples in a topology-preserving map. Several limitations exist in LMTM and many other topographic maps that relate to their fixed topology and fixed number of representation elements or neurons. In this paper, a growing hierarchical structure is proposed for LMTM, to remove these limitations, and to be able to take advantage of the possible hierarchical nature of the datasets. The attempt is made to avoid several existing problems in the similar hierarchical and growing structures, through this proposed algorithm. Experimental results indicate the proper performance of the model on a synthesized and two real-world problems. In the first experiment, a complex manifold constituted of a circle, a line, and a sinusoidal part is properly represented by the proposed model. In the second and third sets of the experiments, the superiority of the proposed model is shown in comparison with the other related methods on an image compression problem and a handwritten digit recognition application.

کلمات کلیدی:

Unsupervised Learning, Linear Manifold Topographic Map, Growing, Hierarchical

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