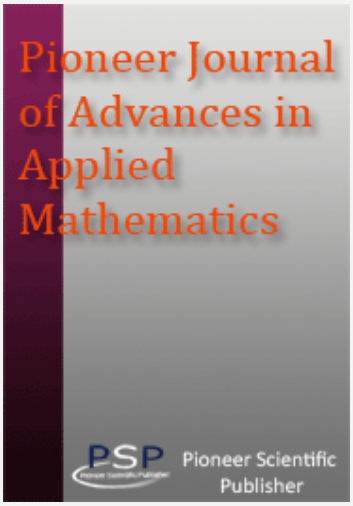
Pioneer Journal of Advances in Applied Mathematics
Volume 7, Issue 2, Pages 17-49 (April 2013)

ISSN: 2231-1858



GEOLOGICAL APPLICATIONS OF SELF-ORGANIZING MAPS TO MULTIDIMENSIONAL COMPOSITIONAL DATA

Joaquín A. Cortés and José L. Palma

Abstract

In this contribution, we analyze the performance of the Self Organizing Map with linear topology modified for a space with simplicial geometry defined by Aitchison's metric, suitable for compositional data. We also describe and discuss the transformations available. We found that in most of the cases the algorithm perform similarly when it is or not modified taking into account the simplicial geometry. Relevant differences have been found when the data have one or more parts that are equal or very close to zero, thus becoming practical outliers. While from the theoretical perspective, Aitchison's distance defines the adequate geometry for compositional data, there are some real situations which favor the use of the canonical algorithm as approximation.

Keywords and phrases: self organizing map, artificial neural networks, compositional data, simplicial geometry.