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# The Efficiency of SRTM Data for Geomorphic Feature Analysis Using Artificial Neural Network

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The Shuttle Radar Topography Mission (SRTM) has provided detailed digital elevation models (DEM) for all land masses between 60° N and 57° S. Easy availability of SRTM 3 arc second data promoted great advances in morphometric studies and numerical description of terrain surface features as shown by many literature references.

This paper presents a robust new approach using artificial neural networks in the form of a Self Organizing Map (SOM) as a semi-automatic method for analysis and identification of morphometric features in Lut Desert, Iran.
Lut Desert or Dasht-e Lut is a large salt desert with a hyper arid region characterized by homogeneous repetition of wind-eroded landforms (Yardang), some of the world's highest mega dunes and salt flats in southeastern Iran.
The results of other parametrization method (Wood's method) which are available in the geographic information system softwares (such as GRASS) are compared with the SOM. Wood's Morphometric Parameterization provides point-based features (peaks, pits and passes), line based features (channels and ridges) and area-based features (planar). Since point based features are defined as having zero slope, selection of suitable values for slope tolerance and curvature tolerance are crucial for useful results.
The 3 arc seconds data were re-projected to a 90 m UTM grid with WGS84 datum. Bivariate quadratic surfaces with moving window size of 5×5 were fitted to this DEM. The first derivative, slope steepness and the second derivatives minimum curvature, maximum curvature and cross-sectional curvature were calculated as geo-morphometric parameters and were used as input to the two mentioned approaches. Different learning parameter setting, e.g. initial radius, final radius, number of iterations, and the effect of the random initial weights on average quantization error were investigated. A SOM with a low average quantization error was used for further analysis. Feature space analysis, morphometric signatures, three-dimensional inspection and auxiliary data facilitated the assignment of semantic meaning to the output classes in terms of geo-morphometric features. Results obtained with two methods of morphometric parameterization (Wood's method) and Self Organizing Maps (SOM) are presented in this paper.

The result showed that new elevation data (SRTM) with self-organizing map provide very efficient and speedy tool for analysis of geomorphometric features in remote region and use the full potential of morphometric characteristics. While as the result of second approach are dependant to selection of suitable values for slope tolerance and curvature tolerance.

Keyword: Self Organizing Map, Morphometric Feature, Neural Network, Lut Desert.