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DESERTIFICATION ASSESSMENT USING REMOTE SENSED DATA WITH CONTENT BASED IMAGE RETRIEVAL

Abstract

Land desertification is a central worldwide problem with severe impacts on the environment. It may be caused by the destruction of vegetation in arid and semi-arid region, or incorrect irrigation practices in arid areas which lead to soil salinization or the cultivation of non adapted lands. In Tunisia 1/3 of land is at risk of turning into deserts. Losses of annual land are valued at 23,000 ha, of which 13,000 ha irreversibly. Then combating desertification is the core of sustainable development for large areas of the world. Design of decision making approaches for desertification monitoring needs a deep understanding and analysis of the desertification processes and a liquidation of its consequences in order to build integrated methods enabling the follow, monitoring and prediction of the development of the desertification phenomena. Therefore regular large scale, long term and accurate data are needed. Remote sensed data could be the most suitable to deal with this problem as it provides well adapted time series observations regularly. Some of these information are essential and impossible to collect otherwise (especially in terms of homogeneity and spatial coverage and/or temporal monitoring) for early warning and forecasting. Desertification mapping have to be achieved through many decades in order to be able to monitor desertification effects. However, considering the massive source of information (from different sensors, with time series acquisition and also different field campaigns data) with different formats (vectors, bitmaps, spectral, Radar, Hyperspectral...) and different resolutions which is generated will make difficult the access and the analysis of these data accurately. To overcome these problems, this paper proposes a strategy for desertification assessment tested on a test site in the south of Tunisia (Zarzis-Ben Guerdène). The main steps of this strategy are: 1. Feature extraction from different existing data (ETM+, SAR, Hyperspectral) for the test site using fuzzy Cmeans clustering algorithm (This was done and published in our previous work). 2. Building the database (images, datasets, field campaigns data ...) by computing different attributes related to the extracted feature, 3. Using an adapted content based image retrieval (CBIR) system, based on Self Organizing Map) for detecting changes through the built database, The experimental results relative to the studied test site are encouraging. Validation was done with respect to the Globecover maps.