



Applying Support Vector Machine in classifying satellite images for the assessment of urban sprawl

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In last decades the spreading of new buildings, road infrastructures and a scattered proliferation of houses in zones outside urban areas, produced a countryside urbanization with no rules, consuming soils and impoverishing the landscape. Such a phenomenon generated a huge environmental impact, diseconomies and a decrease in life quality. This study analyzes processes concerning land use change, paying particular attention to urban sprawl phenomenon. The application is based on the integration of Geographic Information Systems and Remote Sensing adopting open source technologies. The objective is to understand size distribution and dynamic expansion of urban areas in order to define a methodology useful to both identify and monitor the phenomenon. In order to classify "urban" pixels, over time monitoring of settlements spread, understanding trends of artificial territories, classifications of satellite images at different dates have been realized. In order to obtain these classifications, supervised classification algorithms have been adopted. More particularly, Support Vector Machine (SVM) learning algorithm has been applied to multispectral remote data. One of the more interesting features in SVM is the possibility to obtain good results also adopting few classification pixels of training areas. SVM has several interesting features, such as the capacity to obtain good results also adopting few classification pixels of training areas, a high possibility of configuration parameters and the ability to discriminate pixels with similar spectral responses. Multi-temporal ASTER satellite data at medium resolution have been adopted because are very suitable in evaluating such phenomena. The application is based on the integration of Geographic Information Systems and Remote Sensing technologies by means of open source software. Tools adopted in managing and processing data are GRASS GIS, Quantum GIS and R statistical project. The area of interest is located south of Bari, in south eastern Italy (Puglia region). Bari, one of the major cities of southern Italy, is characterized by a considerable urban sprawl. The analysis is focused on a rectangular shaped region covering the urban area of three different cities, namely Polignano a Mare and Monopoli (and Conversano minority part) which, in 2011, had a population density comprised in the range of 140-319 people per Km² (Istat). The area of interest has a surface of approximately 253 Km², is characterized by three urban areas (Polignano a Mare, Conversano and Monopoli) and has a coastline of almost 17 Km.

References

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