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COMPARING NEURAL NETWORKS, INVARIANT MOMENTS AND MATHEMATICAL MORPHOLOGY PERFORMANCES FOR THE AUTOMATIC OBJECT RECOGNITION

Abstract

Pattern recognition is an essential part of any high-level image analysis systems. Most of these systems share a general structure of four building blocks: Image acquisition, pre-processing of the images, feature extraction, and classification (Khotanzad Lu 1990). To improve the classification results in various situations, many approaches have been studied including decision theory, feature selection, optimization, learning and so on (Kim Han 1995). An effective shape descriptor is a key component of multimedia content description, since shape is a fundamental property of an object. There are two types of shape descriptors: contour-based shape descriptors and region-based shape descriptors (Kim Sung 2000).

The CRPSM, in the framework of European Project GMOSS and G-MOSAIC, has developed some techniques able to automatically recognize and extract potential made-man structures which could be present in complex aerial and satellites images. In particular, the main goal of this research is to develop several techniques that allows the automatic detection of given objects of interest by different approaches, in order to compare all these techniques and to highlight the advantages and disadvantages of every studied technique in this paper.

The purpose described above is obtained by using of several algorithms developed by CRPSM in the last few years based on the Mathematical Morphology, Geometrical Moment Invariants and Neural Networks approaches. These algorithms have been developed exploiting the functions available in several Matlab Toolboxes and this point could brings us in the future to develop an efficient and flexible recognition system that can use in automatic way the best technique to recognize and to extract the real objects present in the images regardless of orientation, size and position of these.

A preliminary analysis of the performances of the above listed techniques has shown that, according with the particular object characteristics, each one of them can result better than the others. Therefore this study aims at developing a software package able to exploit the advantages of all these techniques in order to extract as accurately as possible the required objects.