

An Improved Approach to Automatic Recognition of Civil Infrastructure Objects

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Abstract

Civil infrastructure objects are important elements in GIS applications. Due to the wide variety of object types, automatic recognition of infrastructure objects from imagery has been a challenging issue for the last two decades. Different approaches have been developed for recognition of buildings, one kind of infrastructure object most frequently dealt with in GIS, by defining and employing individual criteria. A Hopfield neural network can effectively combine different criteria in an overall network structure for a global optimization in finding object. In this paper we develop a holistic feature extraction approach including edge extraction, noise edge elimination by Gabor filters, contour extraction based on morphological operations, polygon simplification by local Hough transform, and building roof candidate selection using central contour sequence moment. In addition, shadows associated with buildings are extracted. This improved feature extraction approach greatly enhances the quality of recognition of objects, such as peaked-roofed and flat-roofed buildings, by a Hopfield neural network that accommodates similarity measures using the extracted features in a structured way. The achieved results demonstrate a promising approach for building recognition and can be extended to other infrastructure objects.
