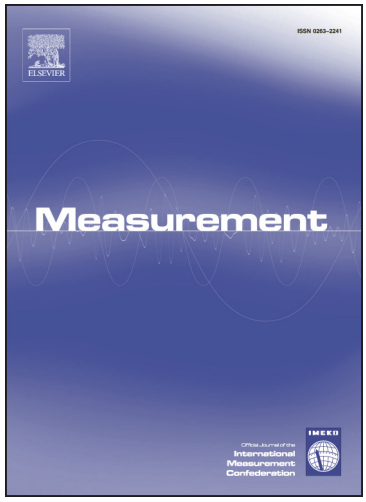

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Design and Implementation of an Expert Interpreter System for Intelligent Acquisition of Spatial Data from Aerial or Remotely Sensed Images

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Abstract

The significance of the imaging as a source for extracting spatial data is an important issue in today's world such that a huge part of the data required by spatial data management organizations is provided through imaging. Because of the increasing number of aerial and satellite sensors and the need for data processing in different applications, the necessity of having automated tools for the interpretation and analysis of digital images is clearly obvious. Due to the need for a human operator, the manual interpretation is a time consuming and expensive task. Use of computer tools and an intelligent system for the automation of the image interpretation process saves time and project cost, and also reduces human errors. In this paper, image interpretation is described, and a review is given on different interpretation systems. The capabilities of the expert systems are investigated considering the requirements of the interpretation systems. Finally, an initial interpretation system based on expert systems is implemented and tested.

Keywords: Aerial/satellite images, Intelligent Spatial Data Acquisition, expert system, image interpretation.

1. Introduction

Upon observing the objects by the human eye, the mind recognizes different features with the experience and knowledge gained by the observation of different features during the lifetime; in other words, the human eye divides the infinite number of features in the real world into some classes. When facing with a scene, the mind first recognizes each feature as belonging to one of the classes, and performs a large-scale recognition so that it can receive a general conception of the surrounding environment by reducing the information volume. This recognition process is, however, merely based on some physical properties and pattern matching, and does not consider the conceptual and practical relations between the features. This is while there are some logical and practical relations between the features in the real world, which can be expressed as some logical constraints. If the mind decides to recognize and interpret a specific feature, it can use these constraints for more accurate recognition of the object, and it can obtain true understanding of the feature. In other words, if the mind relates the feature to a particular class in the initial recognition, it validates this claim by further investigations. Also, if the feature does not match the class conceptually and logically, the mind tries to match it with another class; if the mind validates the initial recognition, it