USING SELF-ORGANIZING MAP FOR ROAD NETWORK EXTRACTION FROM IKONOS IMAGERY

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ABSTRACT. *Automated road information extraction enables the ready creation, maintenance, and update of the transportation network databases used for traffic management and automated vehicle navigation. This paper presents a semi-automatic method for road network extraction from high-resolution satellite images. First, we focus on detecting the seed points in candidate road regions using a Kohonen-type self-organizing map (SOM). Then, an approach to road tracking is presented, searching for connected points in the direction and candidate domain of a road. A study of Geographical Information Systems (GIS) with high-resolution satellite images is presented in this paper. Experimental results verified the effectiveness and efficiency of this approach.*
Keywords: Road network extraction, Self-organizing map, High-resolution satellite imagery

1. **Introduction.** The high-resolution IKONOS satellite has provided the world with the first source of commercially available satellite images, marking the beginning of a new era in earth observation. It can provide accurate and up-to-date information for the extraction and maintenance of road databases. Automated extraction of road information provides the means for readily creating, maintaining, and updating the transportation network databases used in traffic management and automated vehicle navigation. This data is frequently used in making critical decisions in areas such as emergency response, evacuation, or incident management. Updating road map information is a time-consuming operation when performed manually. Due to the need for efficient acquisition and update of data used in Geographical Information Systems (GIS), the automatic extraction of road networks from high-resolution satellite images has been a major topic of interest for over twenty years. Automatic extraction methods hold potential for reducing database development time and cost. When factors such as image resolution, degradation of image quality, obstructions, and presence of linear but non-road features are taken into consideration, the task of road identification becomes overwhelmingly complex.

Until now, a large number of road extraction approaches have been proposed and published in the existing literature [15]. Road extraction methods have many different forms according to the imagery's spatial resolution. In low-resolution imagery (i.e., ground resolution of more than 2m per pixel), roads correspond to lines, whereas at a resolution of 0.2m-0.5m they can be described as elongated homogeneous areas [4]. The global