Abstract

Automatic road network extraction based on high resolution satellite image for urban planning holds great potential for significant reduction of database development/updating cost and turnaround time. Satellite remote sensing has been recognized worldwide as an effective
technology for the monitoring and mapping the urban development. Two approaches for road network extraction for an urban region have been proposed. When an image is considered in original form it is difficult and computationally expensive to extract roads due to presence of other road-like features with straight edges. Hence roads are first extracted as elongated regions by removing bright regions (that mostly represent the buildings, parking lots and other open spaces), non-linear noise segments are removed median filtering (based upon the fact that road networks constitute large number of small linear structures). The roads are then modeled as boundaries and are extracted using Level set and Normalized cuts methods. Finally The extracted roads are overlayed on the original image. The experimental results show that these approaches are efficient in extracting road segments in urban region from high resolution satellite images. Evaluation of the results carried out by comparing the level set and normalized cuts results with manually extracted reference data. The methods were applied on the high resolution IKONOS image of urban area of Hobart, Australia.

Reference

- Asef Zare, Mostafa, Okauti Automatic road extraction based on neuro-fuzzy algorithm, Proceeding, ROCOM’10 Proceedings of the 10th WSEAS international conference on Robotics,

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Automatic Road Extraction based on Normalized Cuts and Level set Methods

control and manufacturing technologyWorld Scientific and Engineering Academy and Society (WSEAS) Stevens Point, Wisconsin, USA ©2010
- Rajeshwari, M., Senthilnath, J.; Omkar, S. N. Semi Automatic Road Extraction using high resolution satellite imagery in urban areas, Indian Engineering Congress 2007, Uadipur, Rajasthan, 14-15 December, 2007
- Trish Keaton and Jeffrey Brokish (2002). A level set method for the extraction of roads from Multispectral Imagery, Proceedings of the 31st Applied Imagery Pattern Recognition Workshop (AIPR.02) 0-7695-1863-X/02 $17.00 © 2002 IEEE
- A.Grote, M. Butenuth, C. Heipke, Road Extraction in Suburban Areas Based on Normalized Cuts PIA07 - Photogrammetric Image Analysis --- Munich, Germany, September 19-21, 2007
- Chunming Li, Chenyang Xu, Changfeng Gui, and Martin D. Fox (2005), Level Set Evolution Without Re-initialization: A New Variational Formulation Proceedings of the 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05) 2005

Index Terms

Computer Science

Pattern Recognition
Key words

Level set
median filtering
Normalized cuts
Performance Evaluation
Urban Road extraction