ROAD EXTRACTION FROM HIGH-RESOLUTION REMOTELY SENSED PANCHROMATIC IMAGE IN DIFFERENT RESEARCH SCALES

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1. INTRODUCTION

As a main factor of evaluating city development speed, road is one of the fast information-updating elements during city development, and its development determines directly the layout of city land use and cover change. For high-resolution remotely sensed images, the phenomena that the same thing has different spectrums and the same spectrum belongs to different things are very obvious, and the road information such as lightness, shape, trend and texture differs with the environment and image type, which all increase the difficulties of road information automatic extraction from high-resolution remotely sensed image by computer.

This paper takes panchromatic remotely sensed image as the main data source, after analyzing the characteristic of the image and key techniques of road extraction, this paper gives the Multi-scale Road Information Automatic Extraction Model (MRIAEM) based on per-parcels and develops the road extraction methods, and at last gives the experiment and analysis.

2. ROAD EXTRACTION AND RECOGNITION METHOD FOR HIGH-RESOLUTION IMAGE

2.1. Research hotspots and tendency of road extraction

According to the research references of road extraction, the main channels for road extraction may include (and these will be the research hotspots in future):

1) Scale selection and change;
2) Per-parcels segmentation and feature computing based on different scales;
3) Per-parcels analysis and classification assisted by prior knowledge.

2.2. Road extraction method based on different scales

According to the characteristic of high-resolution remotely sensed image and the need of road information extraction, we give the method implementation and work flow of MRIAEM according to Figure 1, and by this procedure we can implement road network extraction in different scales according to different situations.

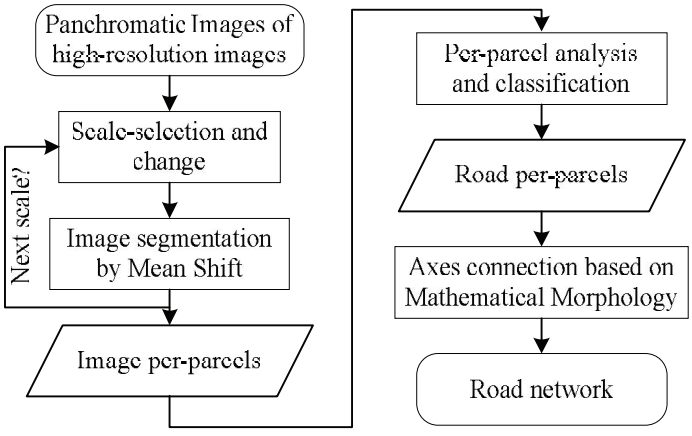
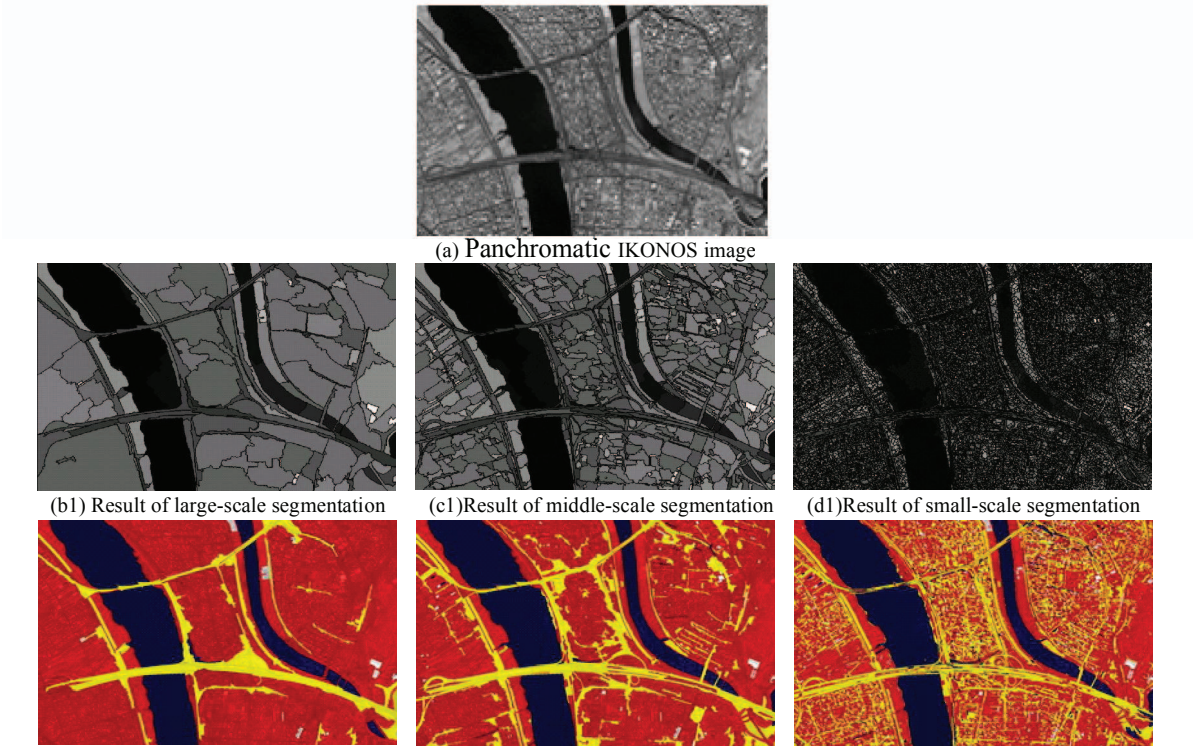


Fig.1 the work flow of MRIAEM

After scale selection, we can implement image segmentation by Mean Shift algorithms and gain per-parcels from the image, then after computing the features of these objects, including spectrum, shape, and texture and so on, we do per-parcel classification and gain road per-parcels, and at last by mathematical morphology we connect the road per-parcels into road networks.

3. ROAD EXTRACTION EXPERIMENTS

Here we select an IKONOS as the experiment images, see Figure 2(a). According to the road extraction method showed in Figure 1, we select three scales to do image segmentation by Mean Shift method and the results are listed in 2(b1), 2(c1) and 2(d1). We do these per-parcels classification by Support Vector Machine (SVM) and we select different samples including water, road and building and so on, and 2(b2) to 2(d2) are the extraction results of road networks for different scales.



(a) Panchromatic IKONOS image

(b1) Result of large-scale segmentation (c1)Result of middle-scale segmentation (d1)Result of small-scale segmentation

(b2)Road network of large-scale recognition(c2)Road network of middle-scale recognition(d2)Road network of small-scale recognition

Fig. 2 Result of per-parcel segmentation and road extraction

According to Figure 2, we can select large scale for those applications that concern the backbone road networks, or small scale for those applications that need precise road extraction results.

4. CONCLUSIONS

This paper presents the new idea of road information extraction in different scales, by image segmentation and scale selection we can get per-parcels in different scales, and we can finish road recognition by per-parcel analysis and classification. This idea can also be used to other different objects recognition such as building, grass, water body, tree and so on in the city.

5. REFERENCES

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