



Modified ALV for selecting the optimal spatial resolution and its scale effect on image classification accuracy

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ABSTRACT

Faced with the prevalence of multi-spatial resolution satellite data sets, selecting data with an appropriate resolution has become a new problem. This paper analyses the significance of scale selection of remote sensing images and discusses a geo-statistics based method for selecting the optimal spatial resolution of a remote sensing image. Breaking through the limitation of traditional average local variance (ALV), the modified ALV method based on variable window size and variable resolution is proposed to quantitatively select the optimal spatial resolution of a remote sensing image. In order to verify the validity of this method and interpret the relationship among spatial resolution, local variance and classification accuracy, this paper gives further image classification experiments with different spatial resolution. The experimental results show that the trend of classification accuracy along spatial resolution is basically accordant with that of modified ALV, which means that the image classification accuracy of the optimal resolution image is basically higher than those of others. Therefore, the modified ALV method for quantitatively selecting the optimal spatial resolution of remote sensing image has theoretical and instructional meaning to a certain extent.

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1. Introduction

The issue of scale is paid much attention to in geographic information systems (GIS) and remote sensing and is regarded as one of the main challenges of Earth observation. At present, a major concern in scale-and-resolution-related issues is to develop methods for determining the most appropriate scale and resolution of research and assessing the effects of scale and resolution [1]. Selecting data in previous studies was generally limited by the availability of existing data of specific scales and resolutions. However, with the development and prevalence of multi-spectral and multi-spatial resolution data sets (such as remote sensing images), selecting data with an appropriate scale has become a new problem.

Davis et al. [2] give a qualitative analysis about this, but it is realistic to seek the quantitative relation between certain spatial patterns and spatial resolutions of remote sensing images to consequently select the optimal spatial resolution of a remote sensing image according to the scale of geo-phenomena. The solution of this problem will be contributing towards remote sensing and GIS and their geo-applications. Several methods have been suggested to study the effects of scale and resolution, such as the methods based on ALV, semivariograms, and fractal theory, etc. However some unexpected results often conflict with the ideal theory when using them. This paper discusses the methods for selecting the remote sensing

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