EXPLORING THE CAPABILITIES OF MULTIPLE REMOTE SENSING TECHNIQUES FOR SURFACE OBJECT EXTRACTION

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The term ‘object’ on the earth’s surface including man-made objects and landscape objects refers to a distinct entity or region which has its own boundary and is independent of background. The diversity and abundance of such objects play a crucial role in understanding earth’s resource and environment. Since different surface objects possess their own characteristics such as texture, shape, scale, colour and geometry, and their spatial distribution are widespread, the approach for accessing and distinguishing surface objects is a challenging issue. Over the past few decades, the rapid development of remote sensing techniques and the large collection of satellite imagery have enhanced the feasibility of large-scale object extraction. Although many methodologies have been studied for object extraction in the remote sensing community, developing an optimal methodology for effectively distinguishing objects remains a challenge due to the complex characteristics of different surface objects.

Several approaches have been commonly adopted to extract objects such as image segmentation, line-segments detection and deep-learning based models. Image segmentation approach divides imagery into homogeneous and meaningful segments based on the similarity of spatial and spectral information such as geometry, texture, colour and shapes. Since line-segments can be considered as low-level features of object, they served as the basic unit to delineate object with image gradients typically used to extract line-segments. In recent years, deep learning has emerged rapidly as driven by hardware advancements leading to major breakthroughs in computer vision with corresponding major advances appearing in remote sensing fields. Reported researches have also focused on developing object extraction applications, aimed at achieving state-of-the-art approaches based on the complex neural network architecture and extensive model training.

Considering the widespread adoption of common image segmentation and line-segments detection methods, as well as the ongoing development of deep learning techniques, this work intends to demonstrate their strengths and also limitations by applying them to optical satellite imagery and evaluating the results of object extraction. Such information should provide useful references for related research in large-scale object extraction.

Keywords: Image segmentation, Object extraction, Remote Sensing