Applying Semi-Automatic Digital Aerial Survey Technology and Canopy Characters Classification for Surface Vegetation Interpretation of Archaeological Sites

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Abstract : The cultural layers of archaeological sites are mainly affected by surface land use, land cover, and root system of surface vegetation. For this reason, continuous monitoring of land use and land cover change is important for archaeological sites protection and management. However, in actual operation, on-site investigation and orthogonal photograph interpretation require a lot of time and manpower. For this reason, it is necessary to perform a good alternative for surface vegetation survey in an automated or semi-automated manner. In this study, we applied semi-automatic digital aerial survey technology and canopy characters classification with very high-resolution aerial photographs for surface vegetation interpretation of archaeological sites. The main idea is based on different landscape or forest type can easily be distinguished with canopy characters (e.g., specific texture distribution, shadow effects and gap characters) extracted by semi-automatic image classification. A novel methodology to classify the shape of canopy characters using landscape indices and multivariate statistics was also proposed. Non-hierarchical cluster analysis was used to assess the optimal number of canopy character clusters and canonical discriminant analysis was used to generate the discriminant functions for canopy character classification (seven categories). Therefore, people could easily predict the forest type and vegetation land cover by corresponding to the specific canopy character category. The results showed that the semi-automatic classification could effectively extract the canopy characters of forest and vegetation land cover. As for forest type and vegetation type prediction, the average prediction accuracy reached 80.3%~91.7% with different sizes of test frame. It represented this technology is useful for archaeological site survey, and can improve the classification efficiency and data update rate.

Keywords : digital aerial survey, canopy characters classification, archaeological sites, multivariate statistics
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