A Theoretical Review of Vegetation Extraction Methods Based on UAV

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Abstract: At present, with the development of remote sensing technology and UAV technology, high-resolution remote sensing image has become one of the main data sources for vegetation extraction due to its rich texture features and geometric features. How to accurately and quickly extract ground object information from high-resolution images has become a hot topic in computer vision, photogrammetry and GIS research in recent years. At present, it is extremely convenient to acquire high-resolution remote sensing image data, while the extraction of ground object information, especially the vegetation classification and the research on information extraction methods, is relatively backward, which largely depends on the traditional classification methods. This paper summarizes the research progress of remote sensing classification of UAV vegetation at home and abroad.

1. Research status of UAV remote sensing application in vegetation extraction
The application of UAV remote sensing in vegetation extraction is a technology that has emerged in recent years. As an important acquisition method of high-resolution remote sensing image, UAV is characterized by low cost, high efficiency and strong timeliness, and has gradually become a new approach for forest resource investigation, vegetation extraction and monitoring. The UAV image using low-altitude close-up shooting technology can achieve a high resolution of 0.05m, and the image also has rich texture information, which can provide important data support for the extraction of ground object information. At present, UAV remote sensing is mainly used in remote sensing image processing, precision agriculture, crop monitoring and forest resource survey. Like Torres - Sanchez, etc.

Remote sensing image of UAV as data source for precision agriculture research; Based on the color and texture features of vegetation, Mitch Bryson et al. used UAV images as the data source for vegetation classification. Francisco et al. used UAV images to monitor vegetation huanglong disease, etc. Fan Jiangchuan uses the combination of multi-rotor UAV and 3D digital camera to conduct object-oriented classification based on the spectrum, texture, shape and other features of ground objects, and measures the single wood canopy width accurately to reach 94.31%. Wang Jia used the processed UAV images to analyze the stand causes by spatial analysis.
The precision of the experiment was obtained by extracting the sub-element. At present, according to the research status of uav remote sensing technology in various fields, its UAV will become one of the indispensable technical tools of remote sensing platform in the future.

In high-resolution UAV images, the difference of spectral features between similar ground objects increases, while the difference between different ground objects decreases, making the phenomenon of "foreign body in the same spectrum" and "same object and different spectrum" more common. Traditional pixel-based processing methods cannot take full advantage of its high resolution and rich geometric texture information.

2. Status of vegetation rule extraction

Due to the rich texture information and high resolution of UAV images, a large number of features with clear details and complexity appear in remote sensing images, and the classification accuracy based on traditional classification methods (such as mean clustering method, maximum likelihood method, minimum distance method, etc.) is reduced. Based on this, the researchers applied the object-oriented rule analysis method to improve the classification accuracy by combining the spectral, texture and geometric structure features of the image. In the processing and analysis of high-resolution remote sensing images, regular classification has attracted more and more attention from domestic researchers. By qualitative analysis of the extracted characteristic attributes, Weixue established the classification rule set and realized the extraction of the crown width of the single wood classification. The estimation accuracy of the crown width of the single wood classification was 72%. Wang Wei selected the optimal segmentation scale and classification index to conduct image classification and extraction experiment. The overall classification accuracy reached 93.7% and the Kappa coefficient was 85.8%. With the combination of aerial image texture and spectral features, the amplitude of single wood canopy was extracted by regular classification with an accuracy of 90.05%. Zhao Fang extracted the tree information by combining the texture feature of the canopy in the image with the spectral reflection of the canopy. The estimated precision was 86.93%. Although the literature is based on the rules of classification, the result has achieved a better classification accuracy, but the most is directly by means of qualitative...
analysis based classification rule set, knowledge base or not used in quantitative analysis of a large number of features selection, feature there is redundancy, resulting in category fault points and operation time longer.

3. Forest classification based on UAV remote sensing
The emergence of UNMANNED aerial vehicle (UAV) provides a feasible platform to replace the traditional remote sensor, which can acquire high-resolution remote sensing data at a lower cost, increasing the operational flexibility and greater versatility. The application field of uav remote sensing technology is gradually expanding, and the domestic and foreign application research has also made certain progress. Xian has applied drone remote sensing to vegetation identification in arid and semi-arid areas. Themistocles uses uav remote sensing technology to generate 3D orthophoto images through cultural relics and monuments, and to monitor cultural relics and so on. Uav remote sensing image is also widely used in ecological monitoring.
Albert remote sensing technique was used to monitor Cladophora, a branch alga in the river. For uav remote sensing image most is the application of classification. Yiannis used unmanned aerial vehicle (UAV) remote sensing multi-spectral imaging to collect data, and used deep learning convolutional neural network to classify the data according to the canopy size. Malek et al. used uav remote sensing to obtain palm tree image information. Palm trees were detected by extreme learning machine classifier. Calvin and Mitchell use drone remote sensing to capture images of grass and identify specific types. Nevalainen uses uav remote sensing technology for boreal forest individual detection and tree species classification, which proves the power and feasibility of UAV remote sensing technology. Yang Hongyan classified grassland species based on remote sensing image of UAV by means of convolutional neural network. Xiao Wuji used object-oriented classification method to classify wetland vegetation in uav remote sensing image. Niu Yaxiao extracted the coverage of winter wheat by using supervised classification and vegetation index statistical histogram based on UAV images. At present, unmanned aerial vehicle (UAV) driving platform is equipped with remote sensing device to collect remote sensing images. Due to its incomparable advantages in traditional satellite remote sensing technology, it has been widely applied in various fields of military and civil, becoming a new trend of remote sensing application and research.

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