

A Review of Research on Remote Sensing Information Extraction of Crop Planting Area

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Abstract

In recent years, due to the high amount of data and easy accessibility of remote sensing, it has become the focus of research in the cross-field of satellite remote sensing and agriculture in the distribution of crop planting areas. This study first summarizes the projects that have been carried out at home and abroad, and learns from it. Its research methods provide basic theories and methods for the realization of research goals.

Keywords

Crops; Remote sensing; Information extraction.

1. Introduction

Multi-temporal remote sensing image acquisition of crop planting area is to obtain the information on the earth's surface through satellite sensors. Based on the laws and principles of agriculture, remote sensing technology, geographic information system and global positioning system are used to carry out the physical information on the earth's surface obtained by satellite sensors Data correction and classification are used to classify and extract crop planting areas. In recent years, due to the high amount of data and easy accessibility of remote sensing, it has become the focus of research in the cross-field of satellite remote sensing and agriculture in the distribution of crop planting areas. This study first summarizes the projects that have been carried out at home and abroad, and learns from it. Its research methods provide basic theories and methods for the realization of research goals.

2. Overview at Home and Abroad

The National Aeronautics and Space Administration (NOAA), the Department of Commerce, the Department of Agriculture (USDA), and the National Oceanic and Atmospheric Administration (NOAA) jointly carried out remote sensing extraction experiments based on large-area crop yield estimation (LACIE) between 1974 and 1977. plan. The main purpose of the LACIE project is to analyze and study the technical methods required by the United States that can be used for rapid and long-term detection of world food production, so as to facilitate the United States to carry out more convenient and rapid resource management, and to have a more comprehensive grasp of global crop production. Information about the situation, etc. Its main research content includes: using satellite sensors to send back to the ground data, on this basis, to carry out growth status and crop planting area detection, and use meteorological data obtained by

meteorological satellites as the main variables of the yield estimation model. The results show that the use of satellite remote sensing technology can help improve crop yield estimation and prediction, thereby increasing the accuracy of wheat yield prediction on a large area (MacDonald, 1980; Baker D N, 1981). From 1980 to 1986, the above-mentioned departments cooperated to carry out the "Agricultural and Resource Space Remote Sensing Survey Program". The starting point was to study and analyze the technical methods required by the United States to detect global food production. Analyze the yield model and planting area, estimate the crop condition, estimate the sown area, and predict the yield, so as to meet the requirements of the United States for resource management and global crop yield information. After that, the European Community began to implement the MARS program in 1987. The program uses remote sensing technology to monitor the cultivated land, crop planting area and output of various countries in the European Community, and develops a new method of the European Community's internal agricultural statistical system, which has become practically applicable. Run the system (Liu Haiqi, 1999).

Different crop types are distinguished mainly based on two points: First, the minimum value of the fourth band (0.76-0.90 μ m) of the crop in the near-infrared band, which is the landsat5 TM image, is above 0.75 μ m. The fourth wave band can reflect the vegetation biomass of the underlying surface very well. It is of great help in identifying crops. The reflection of the near-infrared wave band is mainly affected by the internal structure of plant leaves, and the internal structure of leaves of different types of crops is also. There are certain differences, so the reflected pops also have certain differences; the second is the difference in phenology between different types of crops and different regions, and the temporal change law of remote sensing image information can be used to identify different types of crops (Wang Naibin, 1996). In 1992, NAQUARMBY et al. used the mixed pixel linear analysis method and applied NOAA/AVHRR meteorological satellite observation data to estimate the crop planting area, which has reached an accuracy of 89%. In 2001, Murakmai et al. used 9-scene HRVS/POT images to extract the changes in NDVI feature values of six different crop planting patterns based on the different phenological characteristics of crops, and accurately extracted the planting area of different crops (Murakmai, 2001). In 2003, BAN Yifang used the method of combining multi-spectral remote sensing images and microwave remote sensing images to significantly improve the accuracy of remote sensing information extraction of crop planting area (BAN Yifang, 2003). In 2008, S. Fritz, M. Massart, etc. used MODIS-13 image data to synthesize 16D NDVI feature values to estimate the planting area of five crops, and used 4 ETM images with different time series for testing. The results showed that MODIS The 16-day NDVI feature value of -13 image is suitable for large-scale selection of crop species. Through continuous visual interpretation, Landsat ETM image can quickly and effectively eliminate plots other than agricultural land, and distinguish that it may be affected by others at a certain point in time. The target crop covered by the crop to improve the accuracy of crop identification (S. Fritz, 2008). In March 2014, Christopher Conrad and Stefan Dech used the 2009 RapidEye imagery to extract information on the planting area of winter wheat in West Uzbekistan. They used five time images based on the distinctive NDVI characteristics of winter wheat before harvest and the NDVI characteristics of early summer growth. The overall accuracy of winter wheat planting area extraction is 85.7%. The results show that detailed NDVI time distribution can effectively distinguish crop types in agricultural production areas (Christopher Conrad, 2014).

3. Conclusion

In 1979, my country started to advocate remote sensing yield estimation by the statement Mr. Peng. Regarding the selection of the best time phase for vegetation remote sensing, Li Zewen and Wang Fengxi and others extracted different crop spectral curves during the growth period

of various varieties of cotton, and selected remote sensing identification of cotton in northern and central Henan Province. The results show that the use of Landsat TM data from the end of June or the beginning of July can detect cotton (Li Zewen, 1991; Wang Fengxi, 1991). In 2003, Pan Zhiqiang and others selected 3 TM images with different time images, calculated the NDVI characteristic values of different time images, and extracted the planting distribution areas of crops in the Yellow River Delta according to the changes in NDVI of different crops at different time images (Pan Zhiqiang, 2003). In 2004, Yang Xiaohuan and others carried out dynamic detection of crops based on MODIS data in infrared and near-infrared bands. According to the different growth periods of different crops and the time series of NDVI feature values, they extracted winter wheat, spring corn, summer corn, soybeans and other crops. The overall accuracy of the planting area is more than 95% (Yang Xiaohuan, 2004). In 2008, Ma Li, Xu Xingang and others used TM images of 3 scenes with different temporal images to extract NDVI as a new spectral feature band, designed a decision tree classification algorithm, combined with auxiliary background data and expert knowledge, and successfully extracted soybeans from Heilongjiang Junchuan Farm, Corn and rice planting information, the overall classification accuracy reached 85.87% (Ma Li, 2008). In 2012, Zhang Jiankang, Cheng Yanpei, etc., based on TM/ETM+ remote sensing image data and 13 time series MODISEVI remote sensing image data, adopted the human-computer interaction interpretation method combining the supervision classification of ecological classification and the classification of decision trees, and carried out cotton, Extraction of planting areas of corn, wheat, and vegetables (Zhang Jiankang, 2012).

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