CLASSIFICATION OF VEGETATION AREA FROM SATELLITE IMAGES USING IMAGE PROCESSING TECHNIQUES

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ABSTRACT

Image processing has been proved to be efficient tools for investigation in different fields and applications. Significance of Agriculture acts as an important task in economies of countries. Remote sensing technology has an important role for applications regarding the earth examination. The estimation of vegetation is important to everyone and classifying vegetation in a gainful approach is the aim of all farmers and an agricultural organization. Vegetation area includes crop area, tree area, plant area etc. Vegetation area identification from remotely sensed images is essential due to use of remote sensing images as an input for agricultural & economic planning by government & private agencies. The methodology for this work is selection of satellite data; use of suitable method for classification and identifying vegetation area. The scope of this paper is the processing of satellite image for agricultural purpose. This paper includes methods those are involved for vegetation classifying contains image preprocessing and image classification. This paper presents a summary of how to use remote sensing images to classify vegetation area using image processing. The general process is implemented in MATLAB.

Keywords— Agriculture, Classification, Image processing, Remote sensing, Satellite images, Vegetation area.
1. INTRODUCTION

The major agricultural applications of remote sensing include vegetation and soil. Vegetation includes crop type classification, crop area classification, crop monitoring, and crop yield estimation. Farmers can receive field-based information including vegetation identification, crop region determination, and crop condition monitoring. [1] This kind of processing includes the work on different agricultural objects and products such as crop, flowers, fruits, leaves, etc. [2] In crop production estimation using remotely sensed data, it is essential to approximate the crop area and its yield. The two strategies were applied to rice crop area estimation. [3]

Crops are normally issued between the time of the plantation and the time of harvest. In research, I will use “satellite image” captured in-between the plantations or before and the time of the forecast. There are several image processing techniques available. Image processing techniques provide tentative data from satellite images. When working with images, there are many things to keep in mind such as loading an image, with the right format, saving the data as different data types, displaying images, conversion between different image formats, etc. Mainly these instructions require an Image processing techniques. Future data may be quantitative or qualitative.

In this paper, our main focus is to develop a vegetation area classification model framework that can

1. Collect forecaster satellite data from multiple sources.
2. Apply image processing techniques
3. Classify vegetation area
4. Study useful forecast policies for decision planners.

It is very important to keep track of vegetation area cover for any country. At the same time, it is a very difficult task looking at the vast area covered by it and practically highly costly. In this scenario, image processing has been a very useful tool. Images captured through satellite can further be analyzed by various methods to derive the desired information. The use of satellite images for more objective, suitable and perfect crop information in whole season. This is the one of the growing research areas for image processing in the agricultural field. This research is to define an approach to identifying vegetation area based on a satellite image.

2. PREVIOUS WORK
Accurate and timely information on the location and area of major vegetation area has significant economic, food, policy, and environmental implications. Remote sensing has been used in vegetation acreage assessment for many years. Image processing is having its valuable importance in the agricultural applications. These applications include the crop identification and classification, fruit classification, fruit and crop disease identification, land identification and classification etc. The work already done by different researchers in this area is discussed in this section.

With increasing use of satellite images and its applications on various platforms like weather prediction, LULC mapping, crop estimation, deforestation, urban growth, etc., it is extremely necessary to derive at a specific method which gives exact information required. Paper by Fonseca presented an overview of the various techniques available to solve a general problem through image processing. Common techniques like Image registration, image fusion, image segmentation and classification were compared in this case study. [4] Low resolution satellite imagery have been widely used for crop monitoring and yield forecasting. It plays a significant role in an increasing number of operational systems. Different qualitative and quantitative methods can obviously be noted for the use of low resolution satellite images as the main forecaster of simple application like final crop yield. The same can also be used for difficult crop development models where remote sensing-derived indicators act dissimilar roles, depending on the environment of the model and on the accessibility of data considered on the ground. Using new sensors, low resolution pixels are reduced by the higher while the existing systems remain essential for ensuring the accessibility of long time series as wanted by the bulk of the yield forecast methods used today [5].

Study from Ormeci in 2014 focused on yield estimates from the plant area with cotton in Turkey. A study was carried out with a combination of multi temporal satellite images, on daily basis digital photographs of cultivated parcels and meteorological data. SVI – Spectral Vegetation Index obtained from satellite images used with this information provided produced vegetation cover fraction. Adverse affecting criteria like temperature, vapor pressure deficit were also calculated and used in yield estimation. Specific regression equations derived for crop from this study enabled to obtain yield estimates. Obtained results were compared with actual statistical yield information at four districts and it could result in relative errors below 10%. This was found to be a good, reliable tool for gross primary
production approximation and yield estimates. [6] Images taken during special periods of planting, growing and harvesting can be used to distinguish the types of crop. This information of types of crop is very helpful in the studies of global food security and many other environmental problems. Using special algorithms, results of Thematic Mapper (TM) crop approximation were derived. Local knowledge of crop calendar, land registration data of government records, special check points of special crop growth types were used to derive the algorithm. Results were compared with other Land Used / Land Cover (LULC) types and results were highly matching [7].

Crops identification from remotely sensed images is important due to use of remote sensing images as an contribution for agricultural. Satellite sensors like AWIFS, LISS (IRS series), SPOT 5, LANDSAT, MODIS are good sources of multispectral data with different spatial resolutions. The method for this work is collection of satellite data, apply appropriate method for classification and checking the accurateness. Multispectral & hyperspectral images include spectral information about the crops. Different researchers have been worked with supervised & unsupervised classification [8]. The work on crop land estimation by performing the supervised knowledge approach. This analysis to identify and estimate the crop area and its classification. The maximum likelihood classification algorithm used along with parallelepiped algorithm to estimate the crop area. Author performed the accurate size and shape identification of different crop areas. [9] The work on the crop land identification and classification was performed. It defined the work on satellite captured images and performed the structural analysis. The obtained outcomes are viewing the effective classification of the land area. [10]

The information about the area of vegetation fields has huge impact on rising remote sensing applications. Remote sensing techniques permit researchers to perfectly categorize huge vegetation area at cheap cost. The Moderate Resolution Imaging Spectroradiometer (MODIS) offers a good probable for assessing vegetation area. Applying segmentation, vegetation area is classified from non vegetation area. It provides ability to get the parameters that can be used to identify vegetation area or land surface. [11]

3. PROPOSED SYSTEM

3.1 Block diagram
4. DETAILED METHODOLOGY OF PROPOSED SYSTEM

4.1 Data collection

Figure 1 shows satellite images are images taken by satellites at regular and used by meteorologists to forecast the vegetation area.

There are various types of satellite images:

- Weather zone are infrared images
- Roadmap images
- Water vapour images
- Agricultural images
4.2 Materials and methods

Methods are used in image processing for proposed system

To read an image, use the imread command. The example reads one of the sample images included with the toolbox, pout.tif, and stores it in an array. To display a binary image, using either imshhow or imtool, specify the image matrix as an argument. After this convert this RGB image into the HSV image. HSV is returned array whose three planes contain the hue, saturation, and value for the image.

Median filtering is a nonlinear function frequently used in image processing to reduce noise. A median filter is more efficient when the aim is to concurrently reduce noise and preserve edges. Then adjust image intensity values. This maps the intensity values in grayscale image to new values, such that data is saturated at low and high intensities of image.

Now apply area thresholding to reduce the intraclass variance of the black and white pixels. After this convert the gray scale image into a binary image. Sometimes i want to process pixel values in the original grayscale image, then first segment grayscale image to acquire a binary image of objects. After that examine the original grayscale pixel values corresponding to each object in the binary image. Now measure the region of image. [12]

4.3 Practical Approach
Figure 2 shows original image. [13] This is a satellite image in RGB. The color of pixel of this RGB image is defined by combination of red, green and blue. After this RGB image converts into HSV. HSV image is defined by combination of hue, saturation and value which is displayed in Figure 3.

In figure 4 the image is displayed in green band. After that apply median filtering which is used to reduce noise and preserve edges in image. Figure 5 shows differentiated vegetation area in image.

Comparing the Test Image and Final Image
In Figure 6 we observe that after applying these methods, only green vegetation was detected.

![Satellite Image as a test image and Green Vegetation detected](image)

**Figure 6 Test Image and Final Image**

5. CONCLUSIONS

Satellite images perform as good source for classify or identify area related to crops monitoring & mapping in region. Image processing is having its precious significance in the agricultural applications. These applications contain the crop identification and classification, and crop disease identification, land identification and classification etc. I could say that whole vegetation with green is detected. Only green fields were detected even if the image has fields in different colors. Better outcome are obtained if the image contains nothing in shades of green other than vegetation. Any object, which is in green color, will be detected by the proposed system. So, if the image contains things like green trees, farm etc, they will be also detected as shown in figure 5. This paper has also defined some image processing techniques. These techniques are used to perform the classification or identification of vegetation area.

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