International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2019 IJSRCSEIT | Volume 5 | Issue 2 | ISSN : 2456-3307
DOI : 10.32628/CSEIT1952113

# An Adroit Detection of Vegetation Index Covered in Remote Sensing Images

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## ABSTRACT

Detecting the vegetation of land covers with plants and so are determined with the help of image using image processing. Image processing is a common technique which can be used in the field of remote sensing. The presence of vegetation has been detected from an image which can be captured and recorded from the ground to detect the presence of vegetation in a particular region. In this paper, the presence of vegetation covering the land by plants and most biotic elements of biosphere have been detected from the particular region through an image. There are number of researches using the method of vegetation detection are using NIR images which can be particularly suitable for detecting vegetation. Our method uses the features of an image from the visible spectrum of color satellite images. Main intention is to identify the texture feature set for the problematic in vegetation detection. The detection of vegetation is implemented using an algorithm called Normalised Difference Vegetation Index (NDVI).

**Keywords :** Image Analysis, Remote Sensing Images, NDVI, NIR and Vegetation Detection.

## I. INTRODUCTION

Detection and analysis of vegetation from an image is considered very important in the field of remote sensing, where it has been used for detecting green regions on the earth and detecting changes caused by urbanization. It may be used to detect the changes occurring in an environment decade by decade. The suggested technique can be implemented with the multi spectral remote sensing to find the spectral marks of different object such as vegetation index, land cover classification and the spatial distribution such as road, urban area, agriculture land and water resources easily taken by computing their NDVI method. The classified object can be calculated with the help of generating different threshold value of NDVI method by detecting the false colour composite. The results show the NDVI method is significantly useful for detecting the surface of the visible area. The multispectral remote sensing images carry essential integrating spectral and spatial features of an objects. In this proposed system, the satellite image has been taken to detect the vegetation covering the land, water bodies, land cover classification and to subsequently make these extracted features for further analysis in order to avoid any sort of natural disasters like flood.

There are two types of generic sensors that are for collecting an information, named as passive and active remote sensing. The passive remote sensing is used for collecting all the satellite information and sun is only one of the sources of energy, which is used to record how much amount of electro-magnetic radiation that is reflected or emitted from the earth's surface. Where the active remote sensing, is the remote sensing system which propagates its own electro-magnetic radiation and it can measure the intensity of the signal coming back from the earth. Maximum passive remote sensing is applied in the field of image processing and remote sensing and the active remote sensing is used for the radar imaging system. The National Aeronautics and Space Administration of USA (NASA) uses 7-band data for feature extraction, and it is called as LANDSAT image. One of the regions from Bangalore city have been received as the multispectral remote sensing data image from the National Remote Sensing Agency and it is called INSAT image. It consists 3-band data and the information are accomplished by the help of these 3 bands named near infrared (NIR) band, red band and green band.

Each band contains some specific information and with the help of these three bands, the features can be extracted from an image. On the basis of wavelength, remote sensing is classified into three types as: visible and reflective infrared remote sensing, thermal infrared remote sensing, and microwave remote sensing. With the help of different algorithms and mathematical techniques are used to analyse the image in digital image processing. Features are based on the reflectance characteristics, and indices have been devised to highlight the features on the image. There are several indices for highlighting vegetation bearing the areas on a remote sensing scene from an image. NDVI is a common and widely used index. The vegetation response to environment is very sensitive and not only affects the ecological balance and climate but has also been found to be effective barrier against natural disasters. This paper shows how the differences between the visible red and near-infrared (NIR) bands of an INSAT image can be used to identify areas containing significant vegetation and other different features.

Several investigators have been reported the use of NDVI for vegetation monitoring assessing the crop cover, drought monitoring and agricultural drought assessment at national and global level. Recently, the researchers have employed remote sensing techniques for estimating the vegetation status of growing crops by determining the appropriate wavelength or combination of wavelengths to characterize crop deficiency. In addition, many researchers have widely used NDVI. While other researcher's explored remote sensing techniques for estimating the nitrogen status of the growing crops by determining the appropriate wavelength or combination of wavelengths to characterize crop N deficiency.

## II. FINDING VEGETATION USING MULTI SPECTRAL IMAGE

**Figure 1**. SATELLITE IMAGE

From fig. 1, it can be taken from the LANDSAT image for the process of detecting the vegetation of land covers. The LANSAT image with 7 band followed by the pixel of 810 by 546. The below implementations help us to find the differences between the visible red and near infra-red (NIR) bands of a LANDSAT image can be used to identify the vegetation's in a particular area.

**Figure 2.** IMAGE WITH DECORRELATION

By applying the decorrelation method, it helps to enhance more effective visual display. The colour differences in the original composite image, a decorrelation stretch is suitable. We can use the decorrelation function which enhances the colour separation across correlated channels, and also specifies an optional linear contrast stretch to saturate the brightest and darkest one percent of the pixels in each band.

By increasing the contrast of an image, it becomes more colourful because the spectral differences across the image is overstated. Due to healthy and much enough chlorophyll the vegetation has been appeared as green in colour in an image. By analysing differences between the NIR and red bands, you can measure this contrast in spectral content between vegetated areas and other surfaces such as pavement, bare soil, buildings, or water. A scatter plot is a natural place to start, when comparing the NIR band (displayed as red) with the visible red band (displayed as green). It's convenient to extract these bands from the original CIR composite into individual variables. (We return to the original bands, because the decorrelation-stretched image is appropriate for visual display but not for spectral analysis.)

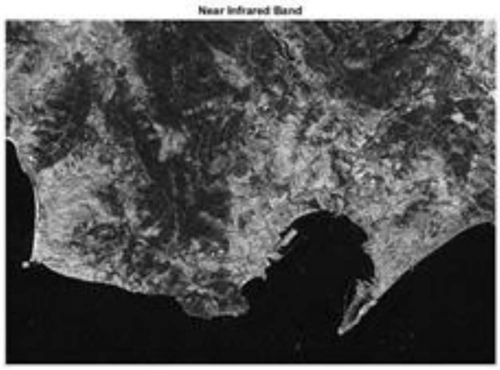


**Figure 3.** NIR BAND APPLIED

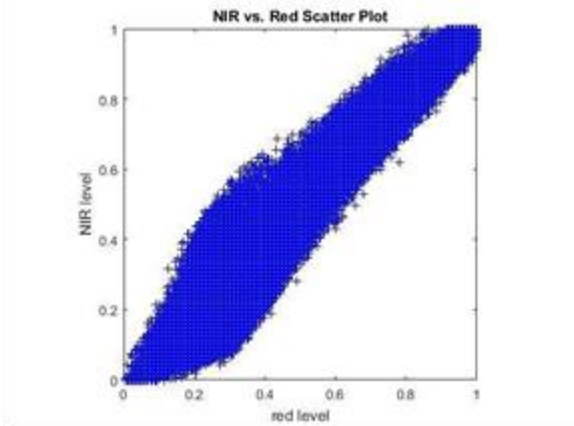


**Figure 4.** NIR LEVEL VS RED LEVEL

The appearance of the scatter plot of the city of Bangalore scene is characteristic of a temperate of urban area with trees in summer greenery. There is a set of pixels near the diagonal for which the NIR and red values are nearly equal. This "grey edge" includes features such as road surfaces and many rooftops. Above and to the left is another set of pixels for which the NIR value is often well above the red value. This zone encompasses essentially all of the green vegetation.

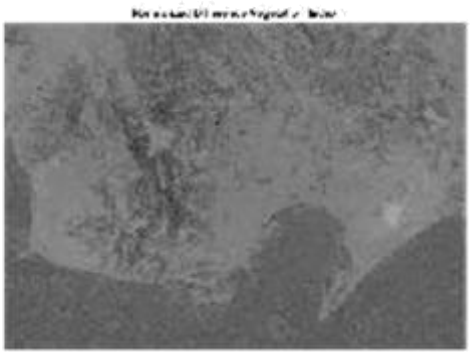

**Figure 5.** NDVI INDEX

Observe from the scatter plot that taking the ratio of the NIR level to red level would be one way to locate pixels containing dense vegetation. However, the result would be noisy for dark pixels with small values in both bands. Also notice that the difference between the NIR and red should be larger for greater chlorophyll density. The Normalized Difference Vegetation Index (NDVI) is motivated by this second observation. It takes the (NIR - red) difference and normalizes it to help balance out the effects of uneven illumination such as the shadows of clouds or hills. In other words, on a pixel-by-pixel basis subtract the value of the red band from the value of the NIR band and divide by their sum.

**NDVI = (NIR - red) ./ (NIR + red)**

Notice how the array-arithmetic operators in MATLAB make it possible to compute an entire NDVI image in one simple command. Recall that variables red and NIR have class single. This choice uses less storage than class double but unlike an integer class also allows the resulting ratio to assume the values of smooth gradation variable NDVI is 2- D array of single class with a theoretical maximum range of [-1 1]. You can specify these theoretical limits when displaying NDVI as a grayscale image.


**Figure 7.** NDVI WITH THRESHOLD

In order to identify the pixels most likely to contain the significant vegetation, you can apply a simple threshold to the NDVI image. The percentage of pixels selected by the formula mentioned below

**100*numel (NIR (q (:)))/numel (NIR)**

The park and other smaller areas of vegetation appear white by default when displaying the binary image as 0's and 1's. Finally, the output can be executed as 0.0010%

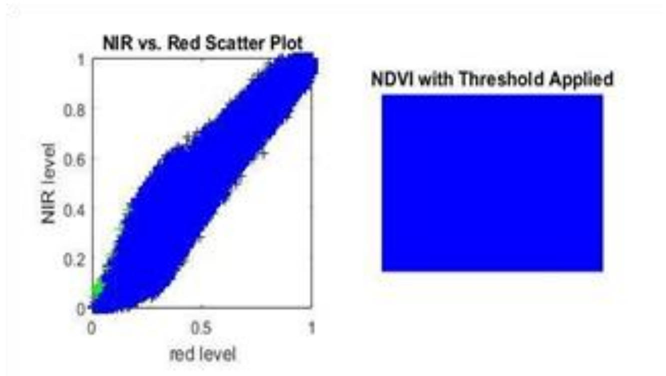


**Figure 7.** NIR VS RED SCATTERED PLOT & NDVI THRESHOLD APPLIED

To link the spectral and spatial content, you can locate above threshold pixels on the NIR red scatter plot, redrawing the scatter plot with the above threshold pixels in a contrasting colour as green and then re-displaying the threshold NDVI image using the same blue and green colour scheme. As we expected, the pixels having the NDVI value above the threshold appear to the upper left of the rest and correspond to the redder pixels in the CIR composite displays.

## III. CONCLUSION

The percentage of vegetation in the given studied LANDSAT image was found to be 0.0010 % at NDVI threshold of 0.2. The algorithm developed gives very good result for vegetation varying in densities and also for scattered vegetation from a multispectral remote sensing image. By varying the value of threshold index varying densities of vegetation coverage can be detected. Apart from studies of agricultural needs and crop patterns, the vegetation analysis can be used in the events of unfortunate natural disasters to provide humanitarian aid and damage assessment and also to device new protection strategies.

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**Cite this article as :**

Dr. D. Napoleon, M. Sivaranjani, R. Saikumar, "An Adroit Detection of Vegetation Index Covered in Remote Sensing Images", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 5 Issue 2, pp. 483-487, March-April 2019.

Journal URL : http://ijsrcseit.com/CSEIT1952113