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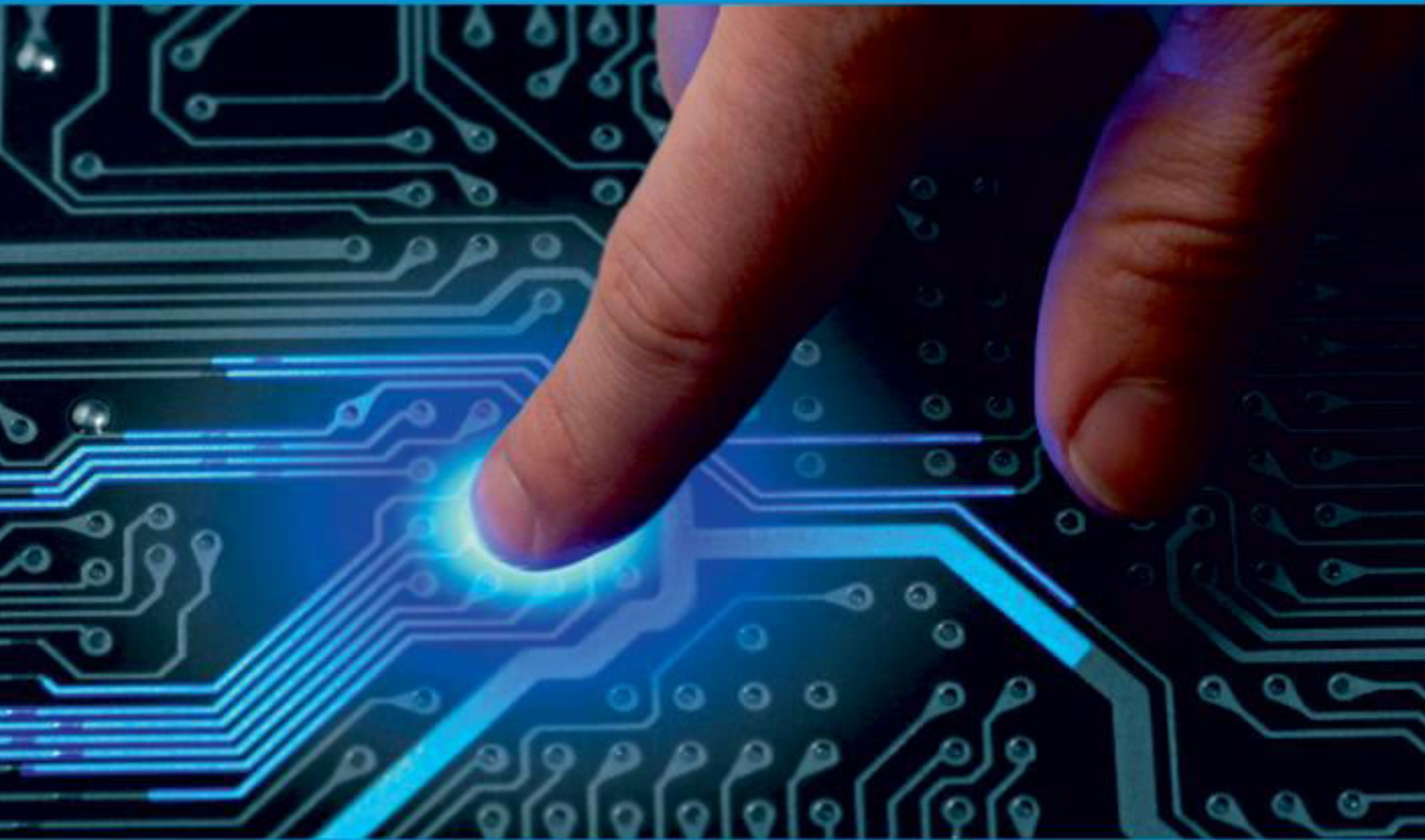

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A Review of Remote Sensing Vegetation Cover and Disaster Analysis

Ankit Ambekar, Gagan Munda, Subhendu Shekhar Nayak, Sagar Thapa, Prof. Swapnil Shinde

Dept. of Computer, KJCOEMR, Pune, India

ABSTRACT: With growing population density, and rising urban cities, land and water resources are being consumed at an unforeseeable rate. To restrain overconsumption and conserve natural resources and assess the environmental disasters in order to safeguard human lives we need to monitor land, water resources etc. using satellites images and remote sensing techniques. Satellite provides us with accurate and real-time data which can be processed to find NDVI (Normalized Difference Vegetation Index), which in turn tells us the health of forest, vegetation cover, farming areas as well as gives us data on water bodies, ground health etc. With this information relayed to us, we can use it for conservation projects, disaster analysis and resource management.

KEYWORDS: Remote sensing; NDVI; Disaster analysis; Satellite images; Vegetation cover

I. INTRODUCTION

Satellite image analysis has many applications in the real world, the images acquired from satellites come with noise and data that is not relevant to research analysis hence it has to be cleaned. Once cleaned this data can be further used by researchers and data analysts for further application. One such application of satellite image analysis is in the field of Vegetation analysis using a vegetative index. Vegetative index by definition is a single value that gives us a detailed summary of the health and vigor of plant biomass around an affected area, this value is calculated after analyzing pixels from the images provided directly through remote sensing. on the basis of which vegetation, biomass, and plant health are analyzed from each pixel provided from the image. Vegetative index in simple mathematics is basically a combination or transformation of spectral band that accentuates the spectral properties of green vegetation so that they appear visibly different from other qualities of the image being processed. A vegetative index provides the information which further indicates the amount of vegetation in this case percentage of vegetation cover, leaf area index in short LAI which in simple terms is defined as half the developed area of photo synthetically active elements of vegetation per unit horizontal ground area. It tells researchers the volume of exchange in energy and mass between the canopy and atmosphere. It also has to distinguish between soil and vegetation using spectral data as well as reduce noise by cleaning or erasing atmospheric and topographic effects to get clearer data to interpret. It gives all-out info by interpreting individual wavelength regions, the shape of spectral curves created by more than one wavelength region, and changes in spectral curves with the amount of vegetation. There are four types of vegetation indices, this paper studies the application of the normalized difference vegetation index in satellite image analysis as well as studies the impact of satellite analysis in disaster management to predict or analyze the time frame when and where the impact will occur, so as to give us proper and adequate estimate upon which we can work and provide aid in relief work and prevent such calamity.

II. RELATED WORK

In this study [1] the authors have tried to investigate and have come up with a model and approach for flood evaluation which is built on multi-sensor satellite images analysis utilising swarm intelligence techniques. In this paper, they have utilised LISS-III images before the flood and SAR images during the flood both obtained from satellite sensors used in surveying, Scale-invariant Feature Transform(SIFT) is employed alongside a multi-Objective Genetic Algorithm(GA). SIFT-GA results are compared and evaluated and analysed using cluster splitting and merging techniques.

In this study [2] the authors have used Remote sensing and GIS to research land use and vegetation index over 24 years. supervised and unsupervised classification approach alongside RS and GIS was put to use. NDVI index was used to study and come to the conclusion about the change in land use at the site of Neka River in Iran.

In this study [3] the authors have conducted a study that proposes a correlation between growing urban population density and decreased forest cover. The authors have studied the change in the decreased mangrove cover around the coastal region of Klang, Malaysia. The authors have studied the region using satellite, which they have processed using

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Erdas imagine software 9.2, This software helped calculate the NDVI index and evaluate the change in land use, and forest deforestation over a period of 10 years between 1996, 2002 and 2006.

In this study [4] the authors have studied the vegetation index of the Dhaka region in Bangladesh over 15 years from 2000 to 2015, they have developed a web-based vegetation analysis tool using remote sensing of moderate resolution imaging spectroradiometer (MODIS). This tool allows them to analyse the 13 districts of the Dhaka division based on time period, like time series analysis, monthly single district greenness comparison, yearly district-based comparison and comparison of vegetation amongst the district.

In this study [5], the authors have studied the relationship between the cereal yield gain in the European region and the NDVI index, the images were obtained using the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor of NASA's Terra satellite. With this study, they were able to predict whether a certain crop will yield high or low.

In this study [6], the authors have obtained the satellite images from the Bhuvan Indian Geo-Platform of ISRO, the data was downloaded from the LISS-III sensor of the satellite. The authors to get a more accurate result have processed the said data through PCA. PCA helps reduce noise in the obtained image and is also used for reducing dimensionality. The NDVI was calculated for the Tirupattur region and as such, they were able to study the vegetation cover in the region.

In this study [7] the authors have proposed a method that is capable of automatically drawing out disaster areas with high accuracy. Their proposed method appears to be an advanced, accurate and f-measure. The proposed method is merged with RGB channels for pre-disaster and post-disaster, of 6 channels in total which extract disaster region via CNN without losing the quality of the colour information.

In this study [8] the authors have proposed a solution to work with satellite images that tend to take up huge space. storing and studying satellite images for vegetation coverage around a large area using the Normalised Difference Vegetation Index (NDVI) is a cumbersome process that needs huge data to process. They came up with Hadoop map-reduce solution to create a raster image for efficient study of vegetation.

In this study [9] the authors have come up with a solution for analyzing large size and number of satellite images with the help of deep learning to process and classify the images taken. In this study, the authors have designed a system where the framework comprises the gathering of CNN's data with post-handling neural networks that consolidate the forecasts from CNNs with satellite metadata.

In this study [10] the authors arbitrarily test Haar-like elements inside a window, which act as contributions to an expanded random vegetation classifier. Relevant class-explicit prompts are advanced iteratively in view of class yields.

In this study [11] the authors proposed a way of feature learning strategy which is based on sparse coding. The methodology gains highlights in notable datasets from the paper and it uses for the detection of buildings in large image sets.

In this study [12] the authors have trained CNNs (Convolutional Neural networks) to segment images and extract building footprints from them.

In this study [13] the authors make use of CNNs to analyze satellite images for land use around an area, they have adopted two newly proposed architectures named CaffeNet and GoogLeNet.

In this study [14] the authors have studied several satellites image processing and analysis techniques that can be successfully applied individually or in a joint manner to accomplish rapid-mapping tasks in the field of disaster and crisis-management support. This study comes to an end that no single commercial or research-oriented satellite system can provide and guarantee fast and reliable image access alone. Thus, there is a need for effective and balanced coordination between the various monitoring systems to best serve the civil defence and humanitarian relief community.

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III. CONCLUSION AND FUTURE WORK

In this review paper we studied various algorithms and methods to analyze the satellite images taken. The images were studied for various applications ranging from crops and cereal growth predictions to studying reports on vegetation, land degradation, and disaster and crisis management. using the Normalized Difference Vegetation Index (NDVI).

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