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Change Detection of Forest Areas Using Object -Based Image Analysis

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ABSTRACT: As numerous methods for mapping and tracking changes in forest cover have been actively implemented, the majority of deforestation activity still takes place. Combating deforestation is not a simple task. A novel method to knowledge service is a good technique to provide information about how deforestation activity affects our environment more intelligible in order to notice deforestation activity and its natural influence on environment.

To build a system that can present the distribution of deforestation effect on soil degradation based on human language regression, we suggest semantic spatial weighted regression. The desire detected can be displayed using our suggested system based on the user's evaluation of the site. As input data, we employ Landsat satellite photos or two different real time images in two different time stamps. In order to create a novel semantic regression model of the impact of deforestation area to capture user intention, our system calculates the band parameters value using semantic orthogonally.

KEYWORDS*:* Detection of changed areas, Image processing, Analysis of two different images, Analysis of change in two different time stamp images.

I. INTRODUCTION

The use of remote sensing is becoming increasingly frequent in environmental studies. Environmental research are using remote sensing more and more frequently. Satellite photos were primarily employed in straightforward interpretations or as map backgrounds in the 1970s and 1980s. For the past three decades, applications for weather, geography, and geology have successfully employed satellite imagery. One of the main causes of climate change and global warming is deforestation. An increase in the greenhouse gases that envelop our globe is what causes global warming. Deforestation worsens the effects of global warming because it reduces the amount of CO2-sucking vegetation by removing highly forested areas.

Deforestation indirectly throws off the delicate equilibrium between the amount of carbon dioxide produced and absorbed. A procedure called "change detection from remotely sensed images" compares two photographs taken over the same area at different periods to find potential changes that may have taken place in that time. The SAR system is better suited than other remote sensing tools used in change detection for land use and land cover because SAR sensors are insensitive to atmosphere (especially rain and clouds).

As a result, it has been successfully applied in numerous applications over the past few decades, including agricultural surveys, environmental monitoring, damage assessment, urban studies, and forest monitoring collected from various sources such as surveillance cameras, aerial imagery, and sensors. In order to improve traffic flow and lessen congestion, the processed data is then used to implement adaptive control strategies and make informed decisions.

II.RELATED WORK

DEFORESTATION MONITORING USING SENTINEL-1 SAR IMAGES IN HUMID TROPICAL AREAS (2021).

Tropical forests are vulnerable to deforestation and various monitoring techniques have been developed based on remotely sensed data to map deforestation, but are facing multiple problems in the tropical areas. For instance, the techniques based optical data, which are widely used to monitor deforestation, face severe limitations in the humid tropical forest due to high cloud cover. Sentinel-l C-SAR dense time series can be used for a temporally more accurate monitoring. In this study, a change detection algorithm commonly used in the financial domain, the Cumulative Sum (Cu Sum) algorithm, was modified to be applied on time-series of Sentinel-l images in a forest concession of Democratic Republic of Congo (DRC) near Kisangani. The validation was made through the visual interpretation of Planet Scope Ortho Scene images as in situ data were missing. The results show a precision up to 0.75, an accuracy up to 0.95 and a kappa coefficient up to 0.40 for clear cut detection. The algorithm is able to detect forest degradation activities before the clear cuts.

DEFORESTATION DETECTION USING GEOGRAPHICAL INFORMATION SYSTEM (2022).

This paper proposes an approach for deforestation detection using Geographical information system to manipulate and analyze geographical data. Here, the rate of deforestation is detected using a vegetation index measure and hence can estimate and control the extent of deforestation. An NDVI based algorithm is applied on the raster data and the final output is obtained in the form of a map in which the area of deforestation is highlighted in different colours Visualization of the data helps analysis in a much easier and efficient manner and hence NGO's can do faster and accurate analysis helping them to take preventive measures and reduce rate of deforestation.

REMOTE SENSING SATELLITE IMAGE ANALYSIS FOR DEFORESTATION IN YAVATMAL DISTRICT, MAHARASHTRA, INDIA (2021).

Forests are the most important and essential natural resources used by mankind for various usage. Loss of these forests has emerged as a major environmental concern in recent years. But for the purpose of development, many forests are being cut resulting in deforestation. Due to this cutting of forests, deforestation rate is increasing day by day and the world is facing severe disasters. Therefore, this continuous clearing of forests has a major degraded impact on the soil quality, climate change, hydrological cycle and ecosystem etc. This paper suggests suitable remote sensing techniques which can be used for the analyses of planet scope 3m resolution satellite data of Yavatmal district of Maharashtra state.

III.METHODOLOGY

- TECHNICAL DETAILS:

  Two of the most important tools when working on this project work were the Interface which was Matlab and the images we required of a particular area over a time period.

- SATELLITE IMAGES:

  Satellite images of different spatial resolutions are commercially available. Images with high resolution data with ground pixel sizes of less than 5m provide detail information about the Earth's surface and small objects, such as buildings, streets, and trees can be displayed in great details.

- There are three types of remote sensing data:
  - Optical
  - Radar
  - Aerial Photography

These are the following steps for algorithm.

1)Generation of log-ration image from the two multi-temporal images
2)Extract SIFT key points in log-ration image
3)Segmentation about SIFT key-points in both images
4)Comparison of segmented imaged
5)Generation of change detection map.

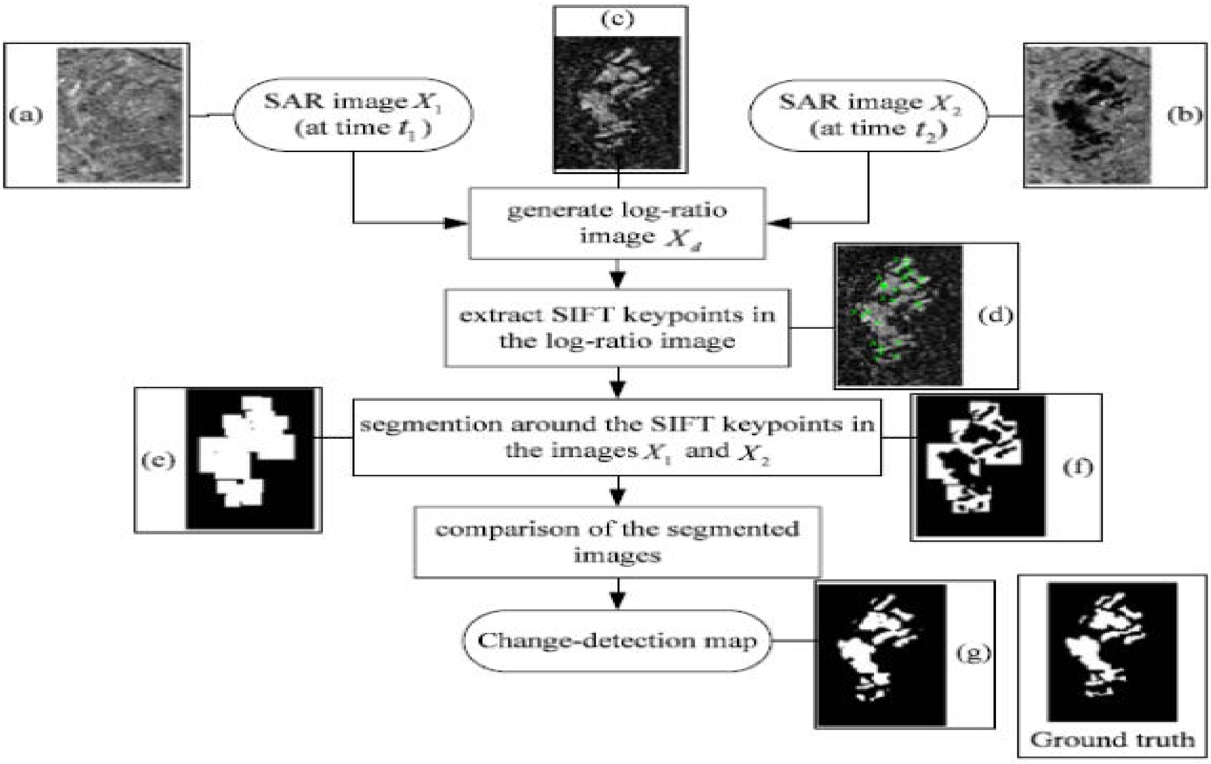


Fig. 1. Proposed Algorithm

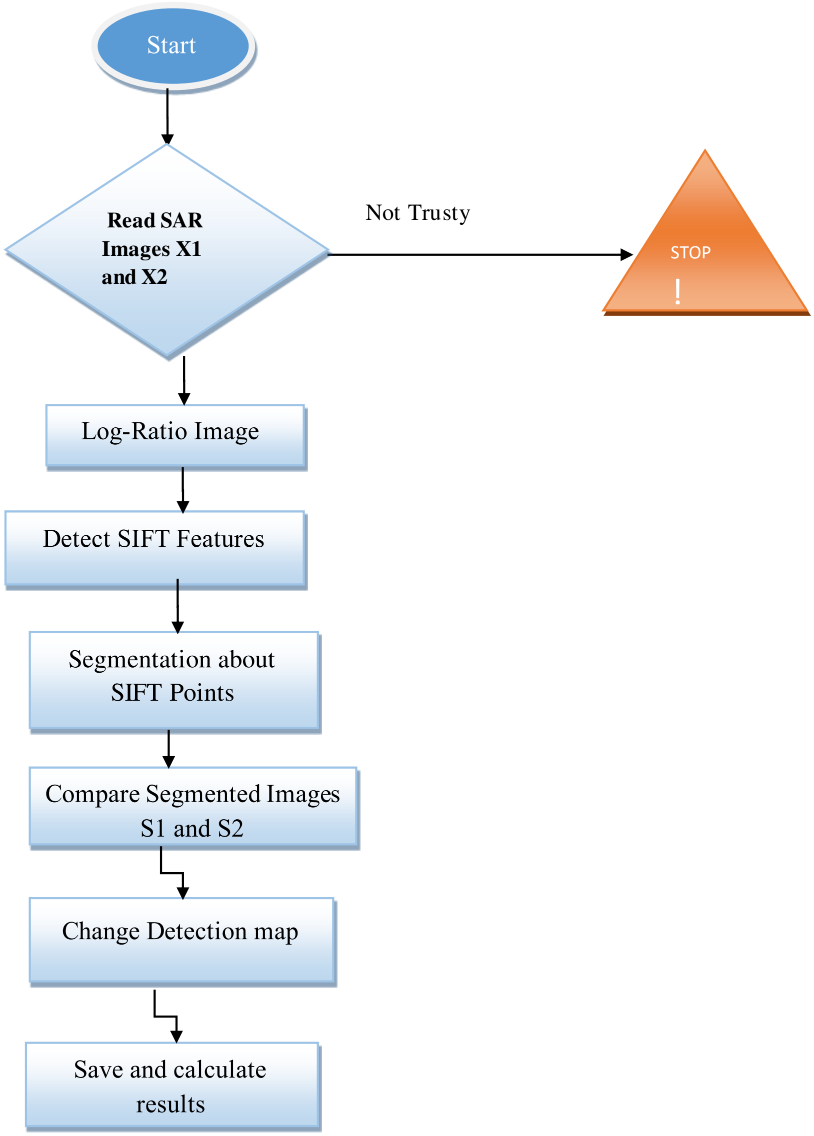
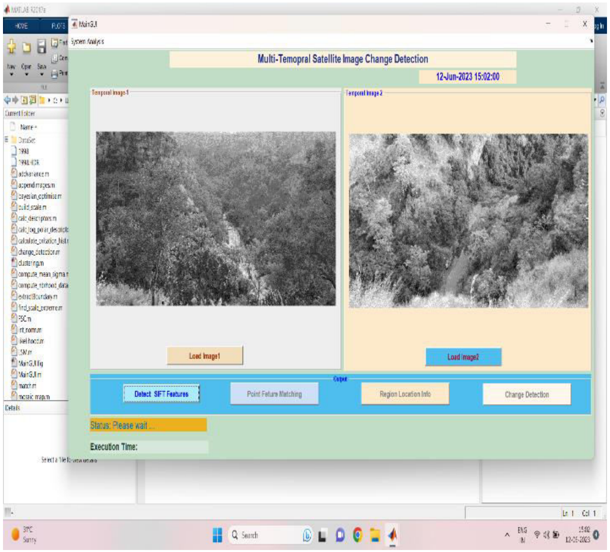


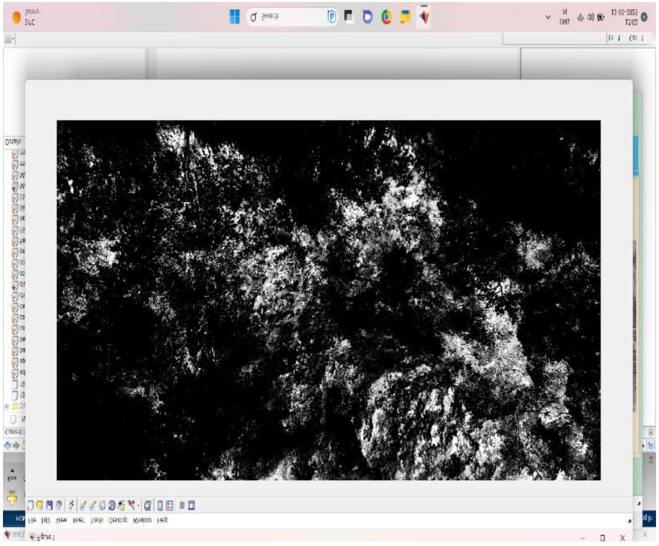
Figure 2: Flow Chart.

IV. EXPERIMENTAL RESULTS

Figures shows the results of the image processing of change detection in forest areas.



(a)



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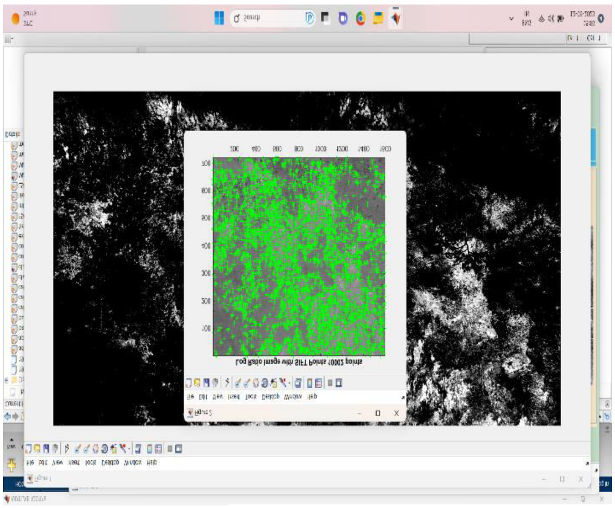

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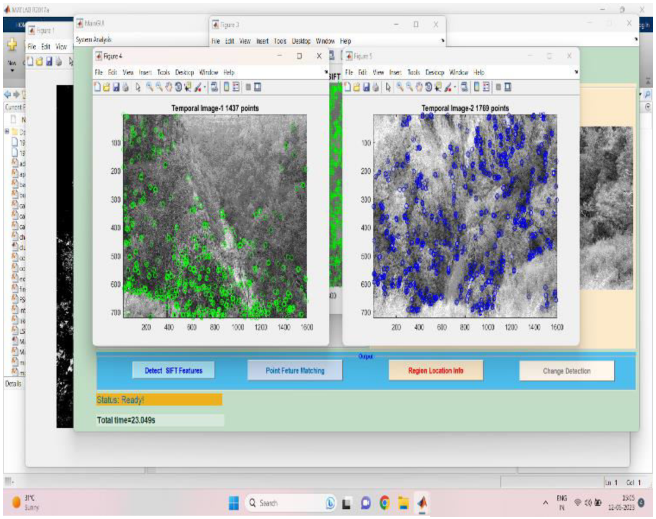

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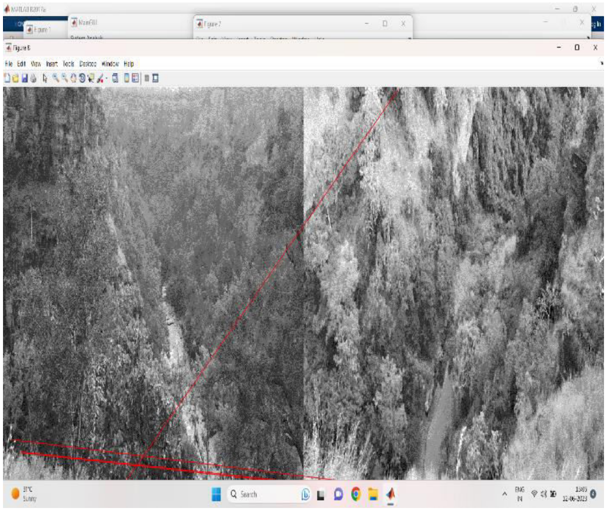

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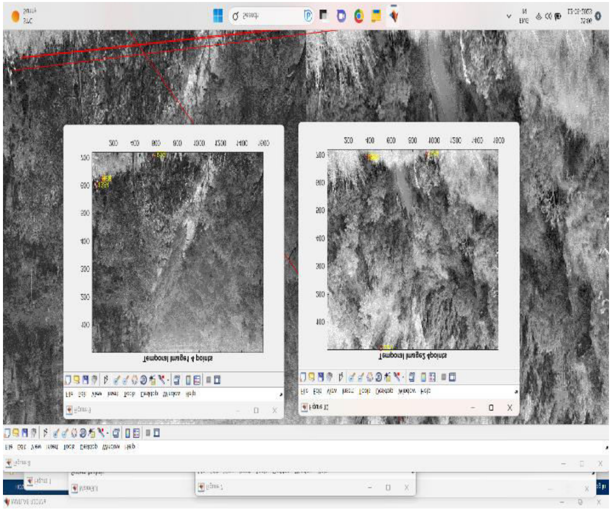

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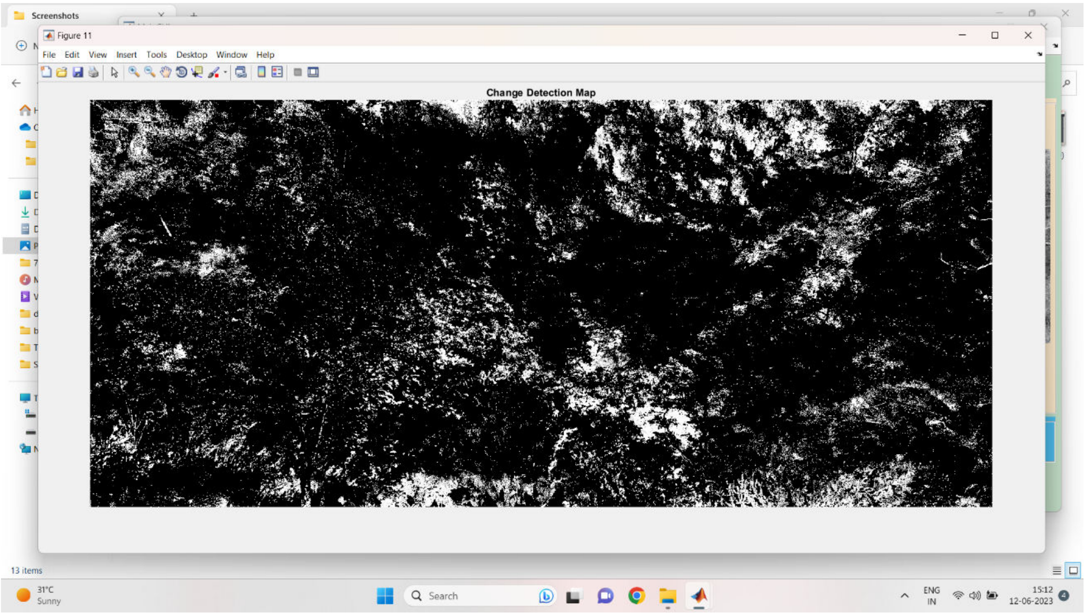

(g)

V.CONCLUSION

In summary, the software will be a fully compact tool kit to forest conservation departments of each country It will facilitates its uses to track deforestation through satellite image processing and also the software will be equipped with tools to analyze data and provide critical information needed to combat deforestation. Our software will also be capable of delivering future deforestation probabilities based on previous deforestation patterns.

Our deforestation tracking system should provide a solution to the Deforestation problem which is the seventh Millennium Development Goal of UN. Our system shall deliver essential information to people in forest conservation of each country through satellite image comparisons or two real time images in different time stamp.

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