



DEEP LEARNING BASED DEFORESTATION DETECTION BY USING RCNN

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Abstract: Deforestation detection by using RCNN is a new approach to monitoring the emergence of deforested areas. In recent decades, illegal logging has intensified, threatening the environment and contributing to climate change. Deforestation is increasing day by day as no adequate protection is provided. They eventually found one of the most endangered trees in our country. Therefore, in order to protect the trees, the project proposed a way to detect deforestation and fire burning near trees using in-depth learning strategies. The main goal is to see if there is a suspicious person in the forest who could cut down and chop wood and see a fire in the forest that will avoid dangerous damage such as burning trees. A major role is to make a divider that gets a man-made saw. This project is based on the RCNN (Recurrent convolutional Neural Network). After the fire is detected, the system will generate a voice alert and send an email alert to the forest department. To detect the theft of a tree, the system will generate an email alert and send it to the relevant forest department via IMAP protocol and a voice alert is also activated. So we can avoid losing fire by extinguishing a fire if it is a fire alarm or by catching a wood thief trying to steal firewood in case of a theft alarm.

I. INTRODUCTION

Deforestation is that the permanent destruction of forests. The most important impact is that the loss of home ground for several species. Eighty % of the world's life lives within the wild, and lots of square measure unable to survive deforestation. The tropical rain forest is one in every of Indonesia's most significant natural resources. The problem of global climate change has become quite commonplace, given its potential impact on human health and different life on earth thanks to the buildup of greenhouse gases within the atmosphere. Forest property becomes crucial to maintaining international climate, carbon conservation, hydrological processes and diverseness. Deforestation, as a part of land use amendment at regional level, has become a worldwide environmental issue, additionally to problems with land degradation, diverseness, food security and environmental property. Various studies have shown that deforestation in tropical forests occurred in 1990 has light-emitting diode to terrorist organization of greenhouse emission emissions. Inflated emissions of greenhouse gases were believed to extend warming. Forest protection is a crucial a part of the REDD program. Caution plays a job in warning of deforestation. The international organization Framework Convention on global climate change (UNFCCC) has emphasized the importance of getting correct and consistent forest cowl knowledge to watch deforestation. It's vital to calculate the number of greenhouse emission emissions. One in every of the technical issues highlighted by the UNFCCC within the REDD approach is that everyone measurements ought to be as clear, consistent and correct as potential, and receptive self-assessment. Watching of forest / land cowl on a regional scale employing a field activity system may be time overwhelming and pricy.

OBJECTIVE

- To detect fire in the forest at right time without any delay to avoid losses.
- To detect deforestation by developing an efficient algorithm to avoid stealing of wood.
- This method is accuracy which far better than many other existing methods.
- With this model it is possible to reduce the deforestation.

II. LITERATURE SURVEY

Looking at the situation Maharashtra has lost approximately 6,346 hectares i.e. 63 sq.km. Forest cover for various other urban migration purposes during the years from 2014 to 2017, has revealed data from senior local union authorities.[1] Regular monitoring of deforestation is an urgent task in many countries Access to relevant and reliable information ensures effective monitoring of compliance with laws that provide for the sustainable protection and use of forests, wildlife and existing forest regulations.[2]

The binarization threshold for NDVI index images is within 0.2, 0.4 and depends on the season. Using NDVI instead of classified supervised segments ensures complete automation of image processing. Moreover, compared to aggregation (e.g., SODATA), NDVI requires much less calculation time and provides a more stable result. When analyzing satellite imagery, the following metrics are used to measure the accuracy of automatic detection and object layout.[3]



In this project, have proposed a system that uses a UAV (Unmanned Aerial Vehicles) a no-man's aircraft carrier, the wind power used to produce a car. Lift, fly independently or remotely tested, stretch or reverse, and may carry a deadly or non-lethal payload. The method used for control by on-board computers or on a ground machine. [4]

Based on wireless communication technology, this paper designs a smoke detection system due to the need to monitor forest fires. First, this paper designs a computer program for key operating modules, and utilizes the integration of the entire system, as well as correcting a functional error in the platform. Based on the design of the computer hardware, the entire software system is configured, which effectively intervenes to fix the error of the test. For communication, the data obtained from the sensor nodes is collected by the router at the link, and sent to the GPRS module via a serial port. Finally, the information is displayed on the PC via the Internet. The program as a whole satisfies the particular need to monitor the forest environment and offers good hope for application and promotion. [5]

This paper aims to build a simulation model of the network of user relationships in SMS. The Forest Model has been put at the forefront of achieving the best results in simulating user-friendliness networks despite some shortcomings, through analysis of other existing network simulation models, as well as researching common user behavior patterns in the SMS. Then, the feature number called Reciprocity of the forest model was developed, and other parameters of the improved model were also developed. The development results are compared to the actual user relationship data of the four common social networks. Test results show that the enhanced model is very similar to real user relationships networks, and proves that the advanced forest fire model works best in simulating a SNS user relationship network. [6]

Use the YUV color space for video data representation, in which the candidate fire pixels are detected by the output of the Y light source and the candidate fire pixels are verified using information from the chrominance components U and V. [7]

III. EXISTING METHOD & PROPOSED METHOD

EXISTING METHOD:

- The current system uses machine learning algorithms to detect deforestation in endangered areas.
- Deforestation in these areas will be identified and interpreted using advanced techniques.
- Our model obtains satellite imagery and classifies them based on different climatic conditions and earth conditions.
- This model is pre-trained in the Resnet model and has the advantage of strong representation which helps us to identify with accuracy and precision.
- We use algorithms such as detection and division to identify the cut areas. If the amount of deforestation falls within a certain limit we will let you know.

DISADVANTAGES

- In the present system only determine the deforested area by comparing the existing forested area.
- No system can detect fires near trees or deforestation at the same time.

PROPOSED SYSTEM

- The proposed system for detecting both fire and sawmill by a man near a tree in the forest using the RCNN convolutional neural network RCNN algorithm is used using in-depth learning.
- It can also be planted as a stand-alone system to detect fire and sawdust for cutting tree wood using video frames captured with a camera.
- The proposed model is tested in a variety of video sequences that include different types of fire and sawmill models to test the correct detection.
- Test results are highly encouraging in terms of properly classifying images extracted using a pre-stored data set.
- The Voice alert generated after a fire is detected loud enough to reach a person and also send a notice sent to the forest department to take the necessary action to prevent deforestation.
- If a person with a saw machine is found suspiciously, an email alert will be issued and sent to the relevant forest department for further action such as chasing a thief and a voice warning may also apply.

ADVANTAGE

- Since the system is based on the RCNN algorithm, it is very effective in detecting suspicious activities such as felling trees and having weapons in the forest and detecting wildfires.

IV. SYSTEM FUNCTION

ARCHITECTURE DESIGN:

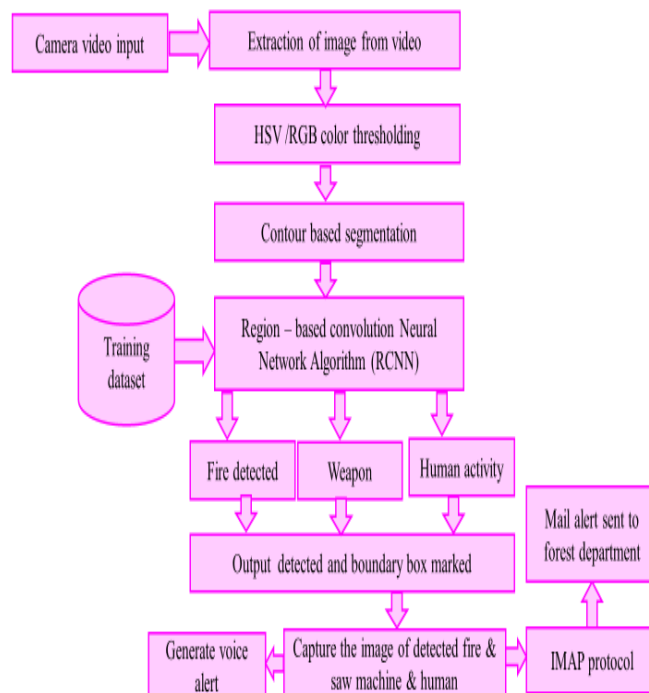


Fig.no:1 Architecture Design

MODULES

- Input camera module
- Database module
- Voice alert module
- Object detection module
- Mail alert module

STANDARD DESCRIPTION

- **Input camera module:** In this module the camera will capture video. Then in the video pictures of fire, weapons and human activity can be released.
- **Database module:** In the data center module a trained fire model and images of weapons can be stored in advance on the website.
- **Voice alert module:** In this module, when a fire is detected in a forest, a voice notification will be activated. If a person with a weapon near tress to cut tress and found and a voice warning will be made to avoid deforestation.
- **Object detection module:** In this module a person uses a weapon and fire is detected using the RCNN algorithm. This algorithm will compare input images with web-based images.
- **Mail alert module:** Here a person using a weapon or ax is a mail alert sent to the forest department. if a fire has been detected in a forest and a voice warning is generated and an email notification is sent to the concerned department using the IMAP protocol

V. SYSTEM SOFTWARE

RCNN ALGORITHM

- Instead of working with large numbers of circuits, the RCNN algorithm raises a number of boxes in an image and checks if any of these boxes contain anything.
- RCNN uses selected search to extract these boxes from the image (these boxes are called regions).
- Let us first understand what a selected search is and how it identifies different regions.



- There are four regions that make up an object: a variety of scales, colors, style, and enclosure.
- Special search identifies these patterns in the image and based on that, suggests various regions.

R-CNN CHALLENGES:

- The chosen search algorithmic rule is solid and no learning is feasible. This typically ends up in the assembly of negative regional proposals for object acquisition.
- With concerning 2000 proposals. It takes a great deal of your time to coach the network. Also, we want to coach many steps severally (CNN design, SVM model, bounding box regressor). Therefore, this makes it too late to urge started.
- R-CNN cannot be utilized in real time as a result of it takes concerning fifty seconds to scan the image with the reversal connecting box.
- As we want to save lots of map options for all regional suggestions. It conjointly will increase the quantity of disk memory required throughout coaching.

RGB IMAGE

The RGB color model is an additional color model in which the main colors of light red, green, and blue are added together in a variety of ways to reproduce a wide range of colors. The name of this model comes from the three main color letters to add, red, green, and blue.

The main purpose of the RGB color model is to hear, represent, and display images on electronic devices, such as televisions and computers, although it has also been used for conventional photography. Before the electronic era, the RGB color model already had a strong vision behind it, based on human perception of colors.

IMAGE ENHANCEMENT

Image Enhancement is the process of editing a digital image so that the result is ready for further display or image analysis. For example, you can delete audio, sharpen or illuminate digital images, making it easier to identify an important feature. Ways:

- Sorting by morphological function.
- Histogram Evaluation.
- Noise removal.
- Correction of line brightness
- Medium filtering. etc.

EDGE DETECTION TECHNIQUE

- A filter is used to blur the image and remove sound.
- Used for image classification and extraction of data in areas such as image processing, computerized visualization.
- Worm is best obtained using edge detection.

GRAY SCALE

- Grayscale range of monochromatic shades from black to white. It contains only gray shades and is colorless.
- Grayscale values are represented by binary numbers such as 0 and 1.
- Gray images are made up of pixels represented by many bits of information, usually from 2 to 8 bits or more.
- Grayscale measures the intensity of light emanating from the area (dot) of the aircraft area and defines each pixel (image element) as a byte.

IMAP PROTOCOL

IMAP stands for Internet Message Access Protocol. It is an application layer protocol used to receive emails from the mail server. It is a widely used process such as POP3 for retrieving emails.

It also follows the client / server model. On the other hand, we have an IMAP client, which is a computer operating system. On the other hand, we have an IMAP server, which is a process that works on another computer. Both computers are connected via a network.

PYCHARM INTRODUCTION

PyCharm is a popular IDE used for Python writing language. This chapter will give you an introduction to PyCharm and explain its features.

PyCharm offers some of the best features to its users and developers in the following features

- Code encryption and testing
- Advanced error correction
- Support for web applications and agencies such as Django and Flask



PYCHARM FEATURES

Alternatively, the developer will find PyCharm comfortable to work with because of the features mentioned below

Code Completion

PyCharm enables smooth encoding, whether built-in or external package.

SQLAlchemy as Debugger

You can set a breakpoint, pause the debugger and see the SQL representation of the user's SQL language code expression.

Git Visualization in Editor

When coding in Python, questions are common to the developer. You can easily check the last commitment on PyCharm as it has blue sections that can explain the difference between the last bond and the present.

Encoding Editor

You can use .py files without PyCharm Editor and mark them as details for cover code elsewhere in the project tree, in the summary section etc.

Package Management

All installed packages are displayed with the appropriate visual representation. This includes a list of installed packages as well as the ability to search for and add new packages.

Location History

Local History is constantly tracking changes in a consistent way like Get. Location History in PyCharm provides complete details of what you need to get back and what to add.

Redo

Redesign is the process of renaming one or more files at a time and PyCharm includes various shortcuts for a smooth re-processor process.

PyCharm Editor User Interface

A visual user of the PyCharm editor is displayed in the screenshot provided below. Note that the editor combines various features to create a new project or import from an existing project.



PYTHON PROGRAM

Python is a dynamic, interpretive language (integrated with byte code). There is no type of declarations, restrictions, functions, or source code modes. This makes the code shorter and more flexible, and you lose the timing of the source code time. Python tracks all types of values during operation and flags a code that does not make sense as it works.

The best way to see how Python code works is to use a Python translator and type in it. If you have questions like, "What if I add an it to the list?" Just typing in a Python translator is a quick and possibly the best way to see what happens.

Python written material language options

1. Readable: Python is that the most legible language.
2. straightforward to Learn: Python learning is simple as this can be a transparent and advanced designing language, which suggests it's straightforward to grasp the language and therefore straightforward to browse.
3. Cross platform: Python is out there and may work on numerous operative systems like mackintosh, Windows, Linux, Unix etc. This makes it a platform that's contrary to the spoken communication.
4. Open Source: Python is associate open linguistic communication editor.
5. Normal main library: Python comes with an oversized general library with helpful codes and functions that we are able to use once decryption Python.
6. Free: Python is unengaged to transfer and use. This implies you'll transfer it without charge and use it in your application. See: Open supply Python license. Python is associate example of FLOSS (Free / Free Open supply Software), which suggests you'll freely distribute copies of this software system, browse its ASCII text file and modify it.



7. Automatic memory management: Python supports automatic memory management which suggests memory is mechanically erased and discharged. You are doing not got to worry regarding erasing memory.

VI. HARDWARE REQUIERMENTS & SPECIFICATIONS

I5 PROCESSOR

The Intel core is a family of I5 processors famous for its innovative design and integrated architecture that also offers the benefit of the same computer. It is also good for providing users with excellent photo links.

Basic Features of I5

The basic features of the I5 features are significantly improved compared to the previous Intel version. Some of the most popular and advanced features of I5 processors are listed below.

- I5 processors offer complete accuracy and high performance and responsiveness that result in giving users higher output levels, as well as reduced processing time with the processor.
- Intel I5 processor is fully loaded with the latest HD graphics with a powerful and advanced video engine that provides a smooth high-quality display and 3d graphics capability. All I5 processors can be considered as high-end image processors and everyday computer multimedia.
- Intel I5 processors also provide hyper threading technology to its users that allows for multiple capabilities for both the user and the system. Systems with I5 processors can perform and integrate two tasks simultaneously without causing performance delays and bug fixes. They are so responsive that the exit of the systems can be done at the same time as well. we can easily say that the Intel I5 is the best choice for homes and offices. More than seven applications can run simultaneously on the system with an I5 processor built into the motherboards.
- I5 processors are smart, fast and flexible for all types of network scheme. Can be used with any hard disk configuration.
- They are also popular in the market with the name desktop processor because of the good resolution they have. Integrated components on motherboards also make I5 processors different in their design and circuit installation.

RANDOM ACCESS MEMEORY

RAM (also called ram) is a summary of random access memory, a type of computer memory that can be accessed randomly; that is, and any memory byte can be accessed without touching previous bytes. RAM is available on servers, PCs, tablets, smart phones and other devices, such as printers.

Commonly used, the word RAM is similar to the main memory. This is where the computer system stores data that it uses continuously. Storage systems, such as hard drives, network storage devices or cloud storage, are where the system stores the data it will need to access later.

Computer systems can retrieve data from RAM very quickly, but when the device runs out, all the data that was once in memory goes away. Many people have experienced the loss of a document they were working on after an unexpected power outage or a system crash. In these cases, the data is lost because it is stored in the system memory, which is dynamic.

Conversely, storage is slow, but it can store data when the device is slowed down. So, for example, if a document is stored on a hard drive before a power outage or system crash, the user will still be able to recover it when the system backs up and works.

Storage is usually less expensive than RAM on a gigabyte basis. As a result, most PCs and Smartphone's have twice as many graffiti as RAM grains.

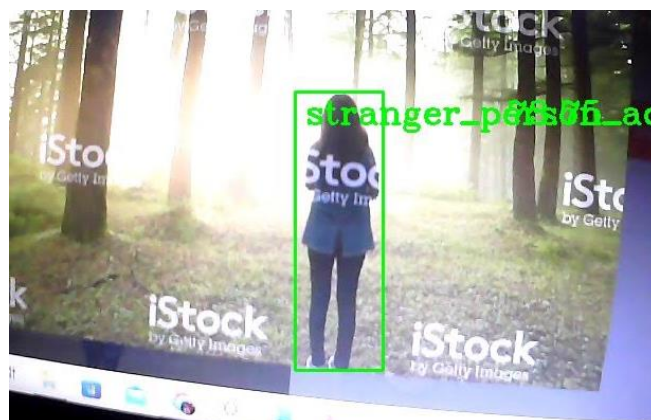
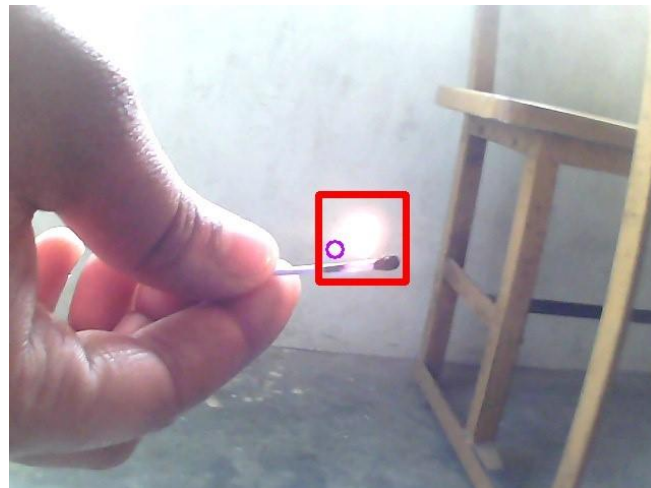


Block Diagram Representing 128 x 8 RAM
(Random Access Memory)

The increasing use of solid-state drives has blurred the line between memory and storage, in this process greatly improving the performance of storage devices.



VII RESULTS



VIII CONCLUSION

This project proposes a deforestation model which is more efficient and easier to implement. The RCNN Algorithm model gives very high accuracy of 99% because this model is a pretrained. For classification whether there is deforested the tree or not the system accuracy should be high and the mistake in classification leads to huge loss to the next generation. This proposed model can similarly helpful in many other fields where the classification takes place. By using this project, we can avoid the deforestation.



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