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FOREST FIRE DETECTION USING DEEP LEARNING

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ABSTRACT

Early forest fire detection is of great importance to avoid the huge damage of forests caused by fires. Early fire detection focuses on smoke detection. The forest area is gradually decreased because of increasing forest fire and human activities. The satellite sensor is used to collect the forest thermal image in different places and analyze the data in these images to detect the fire region if they occur. Image processing technique can effectively predict the fire in the forest. The input image is pre-processed to enhance the image quality, because the input image has the noise, so the pre-processing technique is used to eliminate the noise in this system and enhance the image quality. The pre-processed image is taking to the segmentation process; it processes the image to adjacent the forest sub-area. In this system, the affected area is separately detected, and it gives the accurate forest fire in this system because the output image intensity is better to stabilize the average value of the image. In our proposed system we propose a deep learning method that uses a Convolutional Neural Network (CNN) to predict the forest fire detection. The convolutional layer is the main building block of the convolutional neural network. Usually, the layers of the network are fully connected in which a neuron in the next layer is connected to all the neurons in the previous layer. We are going to detect the fire in the forest result based on the accuracy which we get in train and test of the dataset based CNN algorithm using that we show the graph result.

KEYWORDS

CNN– Convolutional neural network.

I.INTRODUCTION

. Early detection of wildfires is critical to the safety and security of environmental spaces and is one of the important and most large challenges in the government sector and forest fire managers. Forest fire is the important one is decreasing the space of the forest area. This fire detection technique also reduces human protocols and helps to monitor and protect the areas that are hard to protect. The new technique is used to facilitate the implementation of systems that allow monitoring is efficient in detailed areas, regardless of the state of the atmosphere or daytime. Satellite images also gave a fire-monitoring tool, management, and finding the damaged tool for compliance with burn areas to

understand a favorable fire range. The principle of classifying this fire, such as materials from the original fire, is to check the color consistency. The parameters that were adopted in our proposed system operation to analyze the forest fire, thresholdvalue, the detection of matrix value, and the differential matrixvalue of the system. The forests as a whole have been greatly endangered by human activities. Area due to inaccessibility, lack of necessary equipment and shortage of manpower. Also, the constant monitoring of these forests is very tedious and nearly impossible. This module senses human and animal activity using infrared thermal imaging cameras. The IR sensor is used to monitor the entry and exit of humans or animals

EXISTING SYSTEM

Forest fire detection images are based on fire images and non-fire images. It detects the fire accrued area in the forest. Forest fire detection in a particular area is tough to detect. The existing system detects the low level accuracy of performance based on fire occurred in the forest. The existing system doesn't effectively classify and detect the fire in area of the forest.

DISADVANTAGES

- No comparison is made between the accuracies of several algorithm
- The overall classification accuracy was found to be the same irrespective of the kernel types.
- Occurrence of errors are more in single Feed Forward Neural Network with large no. of hidden neurons

PROPOSED SYSTEM

The proposed model is introduced to overcome all the disadvantages that arise in the existing system. This system will increase the accuracy of the deep neural network results by classifying the forest fire image dataset using Deep learning algorithm. It enhances the performance of the overall classification results. In preprocessing method we are doing segmentation process to identify the fire accrued area. Detecting the forest fire from segmented images is to find the accuracy more reliable.

ADVANTAGES

- High performance.
- Segmentation process is easy to identify fire in the forest.
- Convolutional Neural Network is used to find the accuracy more reliable.

III.MODULES DESCRIPTION

DATA SELECTION AND LOADING

- The data selection is the process of selecting the data detect the fire
- In this project, the fire dataset is used for predicting forest fire.
- The dataset which contains the information about the forest fire with corresponding location.

DATA PREPROCESSING

- Image Data pre-processing is the process of getting rescale data from the dataset.
- Resize image dataset: Rescale the fire image size into 200.
- **HSV** segmentation is implemented and separates color information (chroma) from intensity or lighting (luma). Because value is separated, you can construct a histogram or thresholding rules using only saturation and hue. This in theory will work regardless of lighting changes in the value channel.

SPLITTING DATASET INTO TRAIN AND TEST DATA

- Data splitting is the act of partitioning available data into. Two portions, usually for cross-validators purposes.
- One portion of the data is used to develop a predictive model and the other to evaluate the model's performance.
- Separating data into training and testing sets is an important part of evaluating data mining models.

CLASSIFICATION

CNN In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of deep neural networks, most commonly applied to analyzing visual imagery. They have applications in image and video recognition, recommender systems, image classification, medical image analysis, natural language processing, brain-computer interfaces, and financial time series. CNNs are regularized versions of multilayer perceptrons. Multilayer perceptrons usually mean fully connected networks, that is, each neuron in one layer is connected to all neurons in the next layer. The "fully-connectedness" of these networks makes them prone to over fitting data. Typical ways of regularization include adding some form of magnitude measurement of weights to the loss function. CNNs take a different approach towards regularization: they take advantage of the hierarchical pattern in data and assemble more complex patterns using smaller and simpler patterns. Therefore, on the scale of connectedness and complexity, CNNs are on the lower extreme. Convolutional networks were inspired by biological processes in that the

connectivity pattern between neurons resembles the organization of the animal visual cortex

PREDICTION

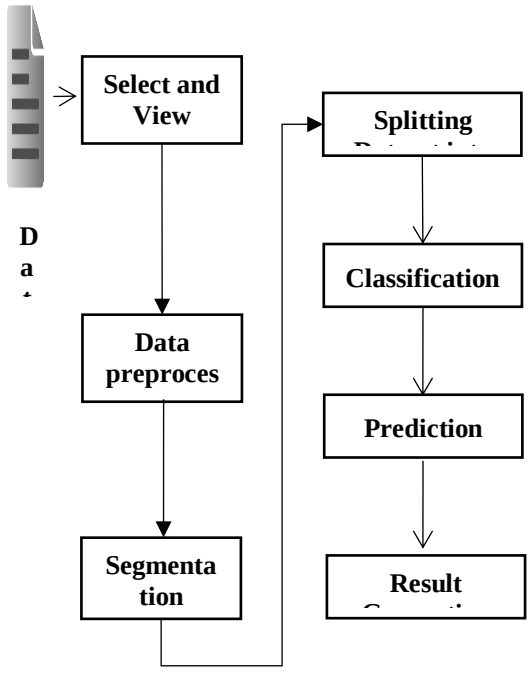
- It's a process of forest fire from the dataset.
- This project will effectively detect the data from dataset by enhancing the performance of the overall prediction results.

RESULT GENERATION

The Final Result will get generated based on the overall classification and prediction. The performance of this proposed approach is evaluated using some measures like,

- Accuracy
- Graph based on prediction

SYSTEM ARCHITECTURE



V.SYSTEM TESTING AND IMPLEMENTATION

System testing is the stage of implementation, which aimed at ensuring that system works accurately and efficiently before the live operation commence. Testing is the process of executing a program with the intent of finding an error. A good test case is one that has a high probability of finding an error. A successful test is one that answers a yet undiscovered error.

UNIT TESTING

Unit testing is the testing of each module and the integration of the overall system is done. Unit testing becomes verification efforts on the smallest unit of software design in the module. This is also known as 'module testing'. The modules of the system are tested separately. This testing is carried out during the programming itself. In this testing step, each model is found to be working satisfactorily as regard to the expected output from the module. There are some validation checks for the fields.

WHITE BOX TESTING

White Box testing is a test case design method that uses the control structure of the procedural design to drive cases. Using the white box testing methods, we derived test cases

that guarantee that all independent paths within a module have been exercised at least once.

BLACK BOX TESTING

- ✓ Black box testing is done to find incorrect or missing function
- ✓ Interface error
- ✓ Errors in external database access
- ✓ Performance errors
- ✓ Initialization and termination errors

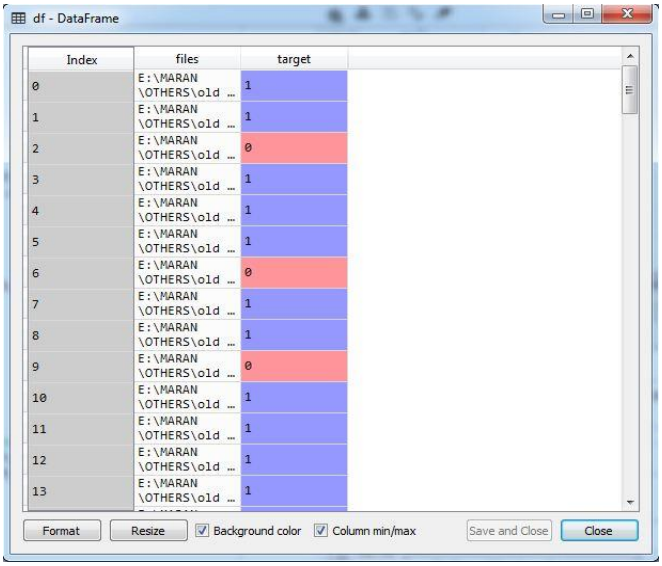
VALIDATION TESTING

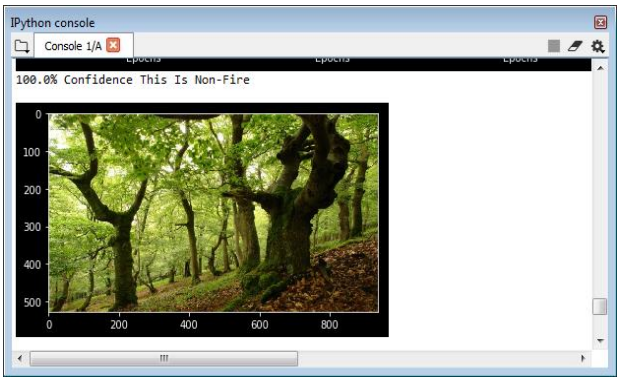
After the culmination of black box testing, software is completed assembly as a package, interfacing errors have been uncovered and corrected and final series of software validation tests begin validation testing can be defined as many, but a single definition is that validation succeeds when the software functions in a manner that can be reasonably expected by the customer.

USER ACCEPTANCE TESTING

User acceptance of the system is the key factor for the success of the system. The system under consideration is tested for user acceptance by constantly keeping in touch with prospective system at the time of developing changes whenever required.

WORKING





FUTURE WORK

In future, we will implement this process in different platforms.

Image processing is one of the most widely used methods to extract data from different sources and organize them for better usage. The system could be improved by using a

combination of rules of different color spaces; however, the challenge is selecting the right rules from different color spaces to build the method.

CONCLUSION

In **Convolutional Neural Network Long Short Term Memory (CNN)** used for the improvement of satellite image-based forest fire detection methods is proposed. The ability to merge information has been shown to measure both the computational effects and the spatial magnitude of the forest fire detection images. The importance of using satellite image properties, unique types of advance commonly used techniques are advised to define the progressive development of satellite image analysis. Test results show that the proposed model works well in terms of accuracy of fire detection; it gives a low false-positive in large locations. This model outlines various studies of satellite image classification techniques and procedures. The improved system can be further developed by using natural-scale expansion calculation investigations.

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