FOREST COMBUSTION RECOGNITION USING AI
DOCUMENTATION

1.INTRODUCTION

1.1 Overview

Our project is based on AI for identification of " FOREST COMBUSTION".The main aim is to predict and detect forest fires in a sparsely populated forest areas using ground based methods like Cameras and Video based approach.It includes two modules :
1.For Forest Fire Identification.
2.For Forest Fire Management.

1.2 Purpose

Forest fires are a major environmental issue, creating economic and ecological damage while endangering human lives. There are typically about 100,000 wildfires in the United States every year. Over 9 million acres of land have been destroyed due to treacherous wildfires.Our project ensures to identify fire affected areas and also provide remedial measures for forest fire (all about detecting).

2.LITERATURE SURVEY

2.1 Existing problem

Forest fires are a major environmental issue, creating economic and ecological damage while endangering human lives. There are typically about 100,000 wildfires in the United States every year. Over 9 million acres of land have been destroyed due to treacherous wildfires. It is difficult to predict and detect Forest Fire in a sparsely populated forest area and it is more difficult if the prediction is done using ground based methods like Camera or Video Based approach. Satellites can be an important source of data prior to and also during the Fire due to its reliability and efficiency.

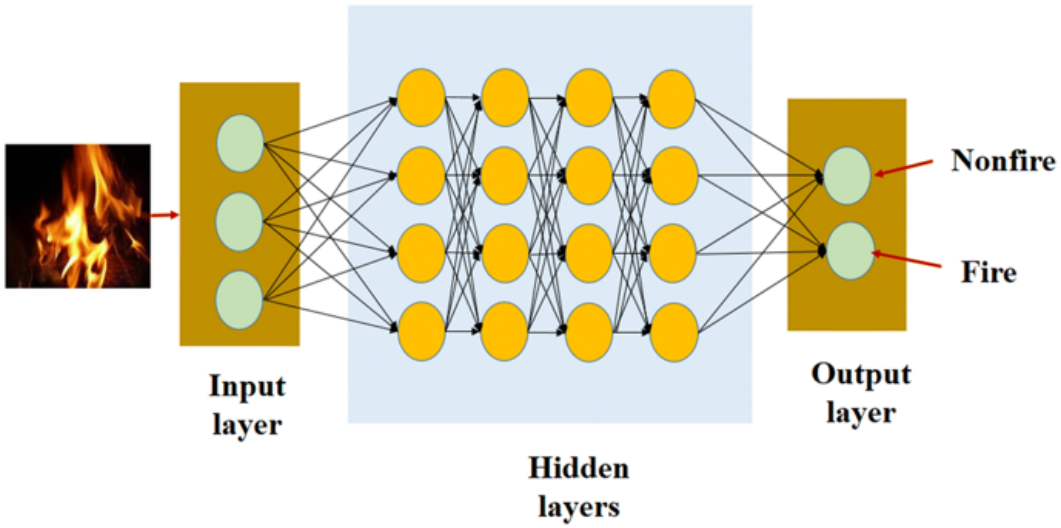
2.2 Proposed solution

The proposed **Forest Fire Prediction** model is based on Convolutional Neural Networks(**CNN**) incorporated to an alert system. The developmental approach of the proposed system includes two modules:

- Forest Fire Identification: Identification of fire affected areas.
- Forest Fire Management: Remedial measures for Forest Fire is all about detecting where the fire initiated in the forest.

3. THEORITICAL ANALYSIS

3.1.Block Diagram



3.2.Hardware/Software Designing

Software:

Python,Python Web Frame Works,CNN.

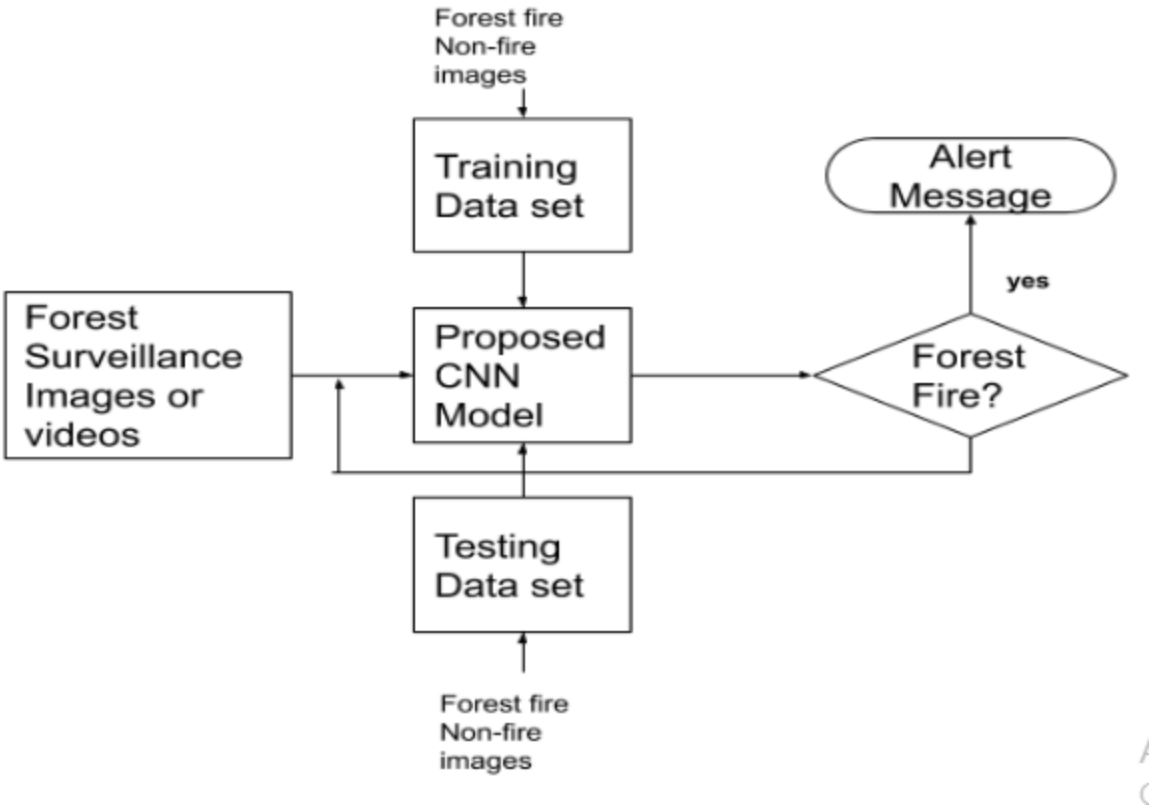
Hardware:

Laptop.

4.EXPERIMENTAL INVESTIGATION ON FOREST COMBUSTION USING AI

Fire disasters are either natural or man-made disasters, which cause ecological, social, and economic damage.Forest fires pose a serious threat to natural environment and public safety. Forest fires importantly influence our environment and lives. The ability of accurately predicting the area that is affected in a forest fire may help in optimizing fire management efforts. The early detection of a forest fire is very important for an effective fighting, as once the forest fire reaches a certain extent it can be hardly controlled. Compared with satellite monitoring, video fire detection systems build on ground can detect a forest fire more quickly.Forest fires are well-known events, especially during summer. Forest fires, regularly experienced in regions with hot, dry, or mediterranean climates, represent a risk to life and extant infrastructure. In Portugal, there are typically between 15 000 and 25 000 forest fires each year (Mateus and Fernandes 2014), burning from 150000 ha to 250 000 ha. Notwithstanding the fact that these fires can cause extensive economic damage (typically with tangible repercussions for many years to come), they also threaten human life. Furthermore,the aftermath of forest fires can have other far-reaching consequences.Experimental results, achieved using a database of 517 forest fire events between 2000 and 2003, showed the appropriateness of the proposed system for the prediction of the burned areas.

5.FLOWCHART



6.RESULT

Training and validation of CNN for predicting and detecting forest fire.The results show that the proposed algorithm achieves good detection rates. We were able to detect forest fires with 98% accuracy.To measure the performance of the proposed model, we have tested our model by providing it with various images ,some containing forest fire and some without forest fires,collected from internet randomly.The model has perfectly detected the images with forest fires.We have even trained out model to detect the forest fire from video with the help of video processing using openCV.Videos were shown live from internet through webcam and the model detected the ones with forest fire perfectly. An alarm system is built by sending an EMail to people around to be cautious about the forest fire.These results indicate the good performance of the proposed method in forest fire detection as well as prediction.

7.ADVANTAGES & DISADVANTAGES

Advantages:

The CNN has the following advantages. First, because the CNN can consider the correlation of adjacent spatial information, it has advantages in the study of problems with spatial and geographical correlation characteristics. Second, the CNN preserves the spatial relationships between pixels by learning the internal feature representations from factor vectors. The process of DL reveals the deep features and can distinguish the differences between different geographical units. The CNN was used to conduct multiple convolution and pooling operations to extract the characteristics. As the convolutions and pooling increased, these features became more advanced and more abstract. These abstract features depicted the degree of forest fire susceptibility, which was the decisive factor for determining forest fire susceptibility. Third, the CNN reduces the number of weights that need to be trained and the computational complexity of the network through weight sharing.

Disadvantages:

The architecture of the CNN model should be selected in accordance with the quantity of sample data and the problem complexity. For those with small quantities of sample data and simple classification problems, the complex structure was prone to model overfitting. For those with large quantities of sample data and complex classification problems, the simple structure was prone to model nonconvergence. Both of these problems should be avoided as much as possible in the training of the CNN model.The CNN requires a large number of training samples, and its performance increases as the scale of data increases. Because the CNN model inherently performs a large number of matrix multiplication operations, they rely heavily on high-end machines compared to traditional ML algorithms that can run on low-end machines.

8.APPLICATIONS

1.Convolutional neural networks are employed to identify the hierarchy or conceptual structure of an image.
2.Convolutional neural networks are trainable multi-stage architectures with the inputs and outputs of each stage consisting of sets of arrays called feature maps.
3.Convolutional Neural Networks have been traditionally applied in the field of Computer Vision. CNNs have provided major breakthroughs in image classification.
4..CNN is also used to extract information from raw signals.
5.CNN is mostly applied in Radiology which are divided into different categories namely classification,segmentation and detection.
6. CNN is better than other deep learning methods in applications pertaining to computer vision and natural language processing because it mitigates most of the traditional problems. We hope that this paper gives a better understanding of why CNN is used in various applications and help others in future to use CNN in other fields.

9.CONCLUSION

Convolution neural networks approach is used to predict and detect forest fires.The proposed neural network is a multilayer perceptron whose number and size of hidden layers can be heuristically determined for each application using its available data examples. The learning algorithm used to train this neural network is the backpropagation algorithm ensures the convergence to a local minimum of the global error observed at the output layer of the network.In this study, we conducted to detect forest fires through providing pictures as well as the videos.However, we tried to make it possible to apply more accurate and various forest disaster events by combining the deep learning technology. So we conducted research on large-scale fire disasters in Gangneung, Samcheok, and Sangj in May 2017. We collected image data sets of normal forests and fire prone forests and trained them with our CNN model and used OpenCV for processing videos with or without forest fire.

10.FUTURE SCOPE

In future , we can be able to reduce the forest fire disasters which cause ecological, social, and economical damage.For future work, the system could be improved by using automated forest fire-alarm systems which would be more impactful.

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