**Deep Convolutional Neural Network for Fire Detection**

**Alternative title**:

Action recognition in movie scenes using deep features technologies

**Aim**:

To efficient CNN based system for fire detection in videos captured in uncertain surveillance scenarios

**Synopsis:**

Vision based fire detection framework has lately picked up popularity when contrasted with customary fire recognition framework dependent on sensors. The need of video perception at private, Modern, business regions and woods areas has expanded the use of vision based fire acknowledgment system Recently lots of fire related accidents has occurred due to improper Surveillance or unable to cover those uncertain regions like restricted areas in forest or any factory buildings. In order to overcome such accidents , we propose a new method using Convolutional neural networks (CNN). To solve these problems, a more advanced fire detection scheme proposing the use of CNN technology. instead of feature description has attracted more and more attention. In this article, we propose an ef\_cient neural network architecture for forest fire detection and recognition based on CNN.

**Existing System:**

To detect fire, researchers have presented both traditional and learned representation based fire detection methods. In literature, the traditional methods use either color or motion characteristics for fire detection. For instance, used color features for fire detection by exploring different color models including HSI, YUV, YCbCr, RGB, and YUC. The major issue with these methods is their high rate of false alarms. Several attempts have been made to solve this issue by combing the color information with motion and analyses of fire’s shape and other characteristics

**Proposed System**:

We propose an efficient CNN based system for fire detection in videos captured in uncertain surveillance scenarios. Our approach uses light-weight deep neural networks with no dense fully connected layers, making it computationally inexpensive. Once detect a fire the information will pass through the firebase. Firebase is a one type of cloud database. Then the firebase to send a notification in android smartphone.

**Module Description:**

* Dataset Creation
* Frame by frame detection
* Convolutional Neural Network
* Detection

**Dataset Creation:**

To Collect images of fire and non fire images and train both the fire and non fire images separately. Now there created a trained dataset with well determined fire images which compares with the video sequence.

**Frame by frame detection**

The captured images are splitted into frame by frame and the frame is again splitted into pixels with the help of cnn algorithm from the surveillance

**Convolutional Neural Network**

Any neural network is divided into three layers. First layer being the input layer, the second as the hidden layer and the third layer is the output layer. Each layer consists of several nodes and this number is generally in the power of 2 to maintain the symmetry of the entire model. The nodes of one layer are connected to the nodes of another layer by means of an edge. And this edge is assigned with a weight which signifies the importance of that node in the outcome of the network. At every node, the outcome is calculated by the summation of the product of the input nodes and the weights assigned to them. And then an activation function is assigned to the summation and the outcome of the node is calculated. Activation functions include Relu, Sigmoid, etc. and based on the outcome, the appropriate activation function is chosen. This process is carried on for every node in the network and the final outcome is assigned.

When we are dealing with images, the data is generally huge and if it is fed as it is, the model becomes clumsy and the training will take a lot of time as well as the memory requirements will be huge. So, we will make use of a Convolutional neural network. The pre-processed data is fed into the input layer of the Convolutional neural network. At the time of reading the pre-processed data, a filter is applied which helps in decreasing the dimensions of the input data.

**Detection:**

We give the input video and the program analysis the video. If any fire detected means suddenly the value sent the firebase. The firebase send a notification to the end user.

**Software Requirements:**

* Operating System : Windows 7 , 8, 10 (64 bit)
* Software : Python 3.7
* Tools : Anaconda (Jupyter Note Book IDE)
* Database : Firebase database

**Hardware Requirements:**

* Hard Disk : 500GB and Above
* RAM : 4GB and Above
* Processor : I3 and Above
* Webcam 1

**Architecture Diagram:**

Classification

Fire [or] Non-fire

Webcam

Video Stream

Firebase

Android