Realtime Fire Detection System

TEAM NO.: 96
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Project Details:

- We have used a Fire dataset having 2000 images divided between two classes: Fire & Neutral out of which 1800 were used for training and rest 200 for testing.
- We have made our model on top of InceptionV3 which is 48 layers deep object classification model made by google for classifying images.
- With the help of Transfer Learning, we were able to retrain the existing neural network for Video Processing by adding custom layers to our model.
- As soon as the model detects fire in the input image frame, it turns the video feed black and white simulating an alarm system and outputs the probability of fire in the terminal.

Problem Statement:

- Due to the recent rise in wild fires at various places in the world such as recent burning of the Amazon rainforest, detecting a fire as early as possible has become an imminent necessity.
- Conventional methods of Fire Detection like smoke detectors or thermal imaging devices are not that efficient with a high rate of False Alarms.

Need of Project:

- During times of high heat waves, fire detection through thermal imaging is inefficient and smoke detectors, generally, can easily be adulterated.
- So, we need a cost-effective fire detection solution with both indoor and outdoor applications to help save human lives, infrastructure, and our forests.

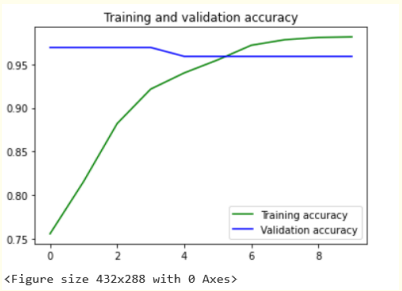
Proposed Solution:

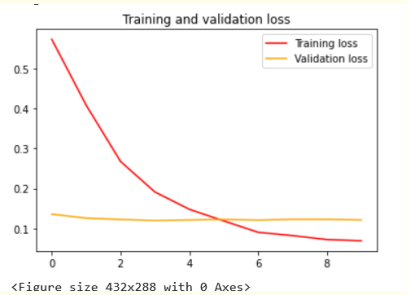
- A fire detection system using Deep Learning and Computer Vision that can be embedded to any device with an input video/image feed.
- It greatly reduces false alarms by using a CNN model which checks every pixel for presence of fire using various features such as colour, dynamic edge, etc.

Technology Used:

- **Python**
- **TensorFlow**
- **OpenCV**

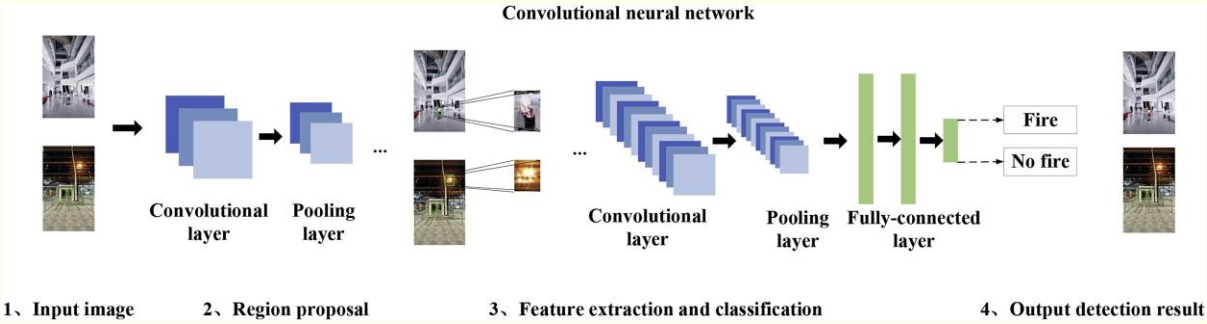
Project Outcomes:





- We ended up with a really efficient model with working accuracy of about 96.94%.

Modelling:



Results:

https://drive.google.com/file/d/1ay-oaB28tjdhy0kMYCKxEvn9F8Hpoo06/view?usp=sharing

Future scope for project enhancement:

- Our model can be exported and embedded on any kind of system that has an input video frame or an image.
- So, it is also possible to integrate **Live Satellite Data** and process real time detection of the fires anywhere in the world remotely.
- This enhances time complexity of detection of fires and improves the speed of remedial action.
- Also, we can license the software to CCTV companies so that it can be utilized globally within a very short period with no extra cost of a new device or even manual upgrading to the end users.
- It can all just be implemented on the software side and almost immediately we would have improved safety against fire hazards worldwide – Indoors and Outdoors.