

Project 4

For-rest from Fires (Fire Detection Model using Deep Learning)

Problem Statement:

Lately, there have been many fire outbreaks which is becoming a growing issue and the damage caused by these types of incidents is tremendous to nature and human interests. Such incidents have highlighted the need for more effective and efficient fire detection systems.

The traditional systems that rely on temperature or smoke sensors have limitations such as slow response time and inefficiency when the fire is at a distance from the detectors.

Moreover, these systems are also costly. As an alternative, researchers are exploring computer vision and image processing techniques as a cost-effective solution. One such method is the use of surveillance cameras to detect fires and alert the relevant parties.

Computer vision-based fire detection, which utilizes image processing techniques, has the potential to be a useful approach in situations where traditional methods are not feasible. The algorithm for fire detection uses visual characteristics of fires such as brightness, color, texture, flicker, and trembling edges to distinguish them from other stimuli.

This project is aimed at building a Fire Detection Model using Deep Learning.

Objectives:

The main goal of this project is to create a fire detection system. The key objectives of the project is to identify fires from the images we can get from surveillance system or other resources

Your focus in this project should be on the following:

The following is recommendation of the steps that should be employed towards attempting to solve this problem statement:

- 📦 **Data collection:** Collect data on different types of fires, including images and videos of flames, smoke, and heat. The data should be collected in a controlled environment to ensure that it is representative of real-world fires.
- 📦 **Data preprocessing:** Clean and preprocess the data to ensure that it is ready for use in training the deep learning model. This may include resizing images, normalizing pixel values, and splitting the data into training, validation, and test sets.
- 📦 **Model development:** Use deep learning techniques such as convolutional neural networks (CNNs) to develop a model that can detect fires in the collected data. The model should be trained on the preprocessed data, and the accuracy of the model should be evaluated using the test set.

Timeline

We expect you to do your best and submit a solution within 2 weeks.

Deliverables

Please share the following deliverables in a zip file.

- A report (PDF) detailing:
- Description of design choices and Performance evaluation of the model
- Discussion of future work
- The source code used to create the pipeline

Tasks/Activities List

Your code should contain the following activities/Analysis:

- Collect the data from any possible resources.
- Data Preprocessing.
- Feature Engineering and feature selection.
- Train/Test Split
- Choose the metrics for the model evaluation
- Model Selection, Training, Predicting and Assessment
- Hyperparameter Tuning/Model Improvement
- Model deployment plan.

Success Metrics

Below are the metrics for the successful submission of this case study.

- The accuracy of the model on the test data set should be > 85%(Subjective in nature)
- Add methods for Hyperparameter tuning.
- Perform model validation.

Bonus Points

- You can package your solution in a zip file included with a README that explains the installation and execution of the end-to-end pipeline.

- You can demonstrate your documentation skills by describing how it benefits our company.

Data:

The dataset for this project can be accessed by clicking the link provided below.

[FOREST FIRE SMOKE AND NON FIRE DATASET.zip](#)