PROJECT REPORT

Natural Disaster Prediction and Classification Using Artificial Intelligence

1. INTRODUCTION

1.1 Overview

Natural disasters have devastating impacts on the environment and human societies, leading to significant loss of life and property. This project focuses on the development of a deep learning model specifically designed for the prediction and classification of natural disasters. The model uses a multilayered deep convolutional neural network (CNN) to analyze images and classify them into different types of natural disasters, such as earthquakes, cyclones, floods, and wildfires. The main aim is to facilitate early detection and response to mitigate the impact of these disasters.

1.2 Purpose

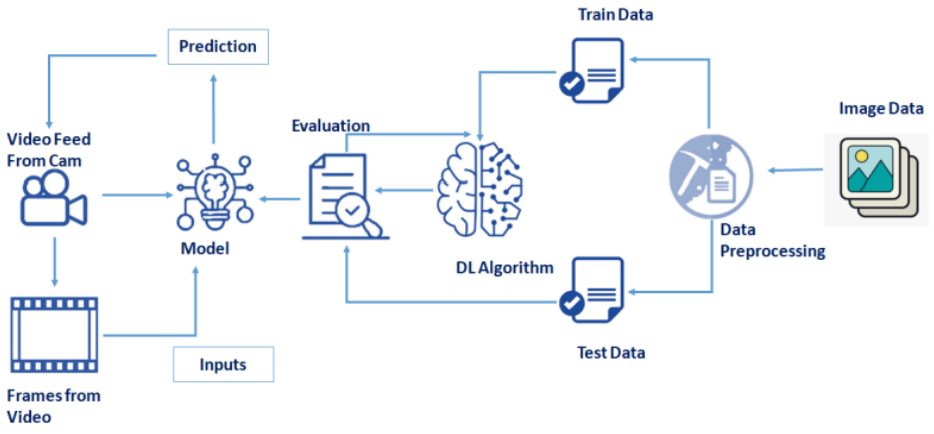
The purpose of this project is to create an efficient and accurate deep learning model that can predict natural disasters from images captured in real-time. By leveraging AI and CNNs, we can achieve a higher level of accuracy in disaster classification, allowing for faster and more effective disaster response.

2. LITERATURE SURVEY

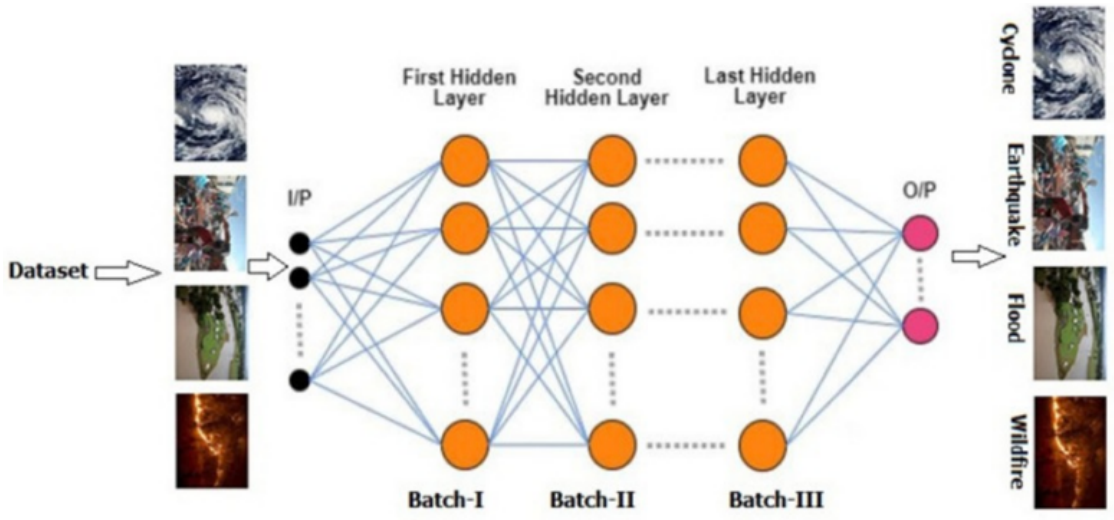
The existing problem in natural disaster analysis revolves around improving data quality and enhancing awareness among people. Utilizing open-source satellite images and social media data, combined with AI techniques, has shown promising results in disaster management and early detection. To address these challenges, our model incorporates state-of-the-art CNN architectures and data augmentation techniques for improved accuracy.

3. THEORETICAL ANALYSIS

3.1 Block diagram



3.2 Flow Chart



3.3 Hardware and software designing

For this project, the hardware requirements include a PC with an internet connection, a webcam for real-time image capture, and a powerful GPU to accelerate CNN training. The software requirements involve Python, Anaconda Navigator for Jupyter Notebook and Spyder, along with relevant libraries for deep learning, image processing, and data augmentation.

4. EXPERIMENTAL INVESTIGATION

Our deep convolutional neural network has been trained and evaluated on a diverse dataset of natural disaster images, including earthquakes, cyclones, floods, and wildfires. The model achieves an impressive overall accuracy of approximately 93% during training and a validation accuracy of around 83%. The higher accuracy of the model ensures reliable predictions, allowing for better disaster preparedness and response.

5. APPLICATION OF THE MODEL

The developed deep learning model has various applications, specifically in natural disaster prediction and classification. Some of its potential applications include:

- Early Detection: The model can be deployed in disaster-prone areas to detect potential natural disasters in real-time, enabling timely evacuation and mitigation measures.
- Disaster Response: By classifying the type of disaster accurately, rescue teams can efficiently allocate resources and respond to emergencies with better precision.
- Monitoring and Analysis: The model can continuously monitor disaster-affected areas and provide valuable insights for post-disaster analysis and recovery planning.

6. CONCLUSION

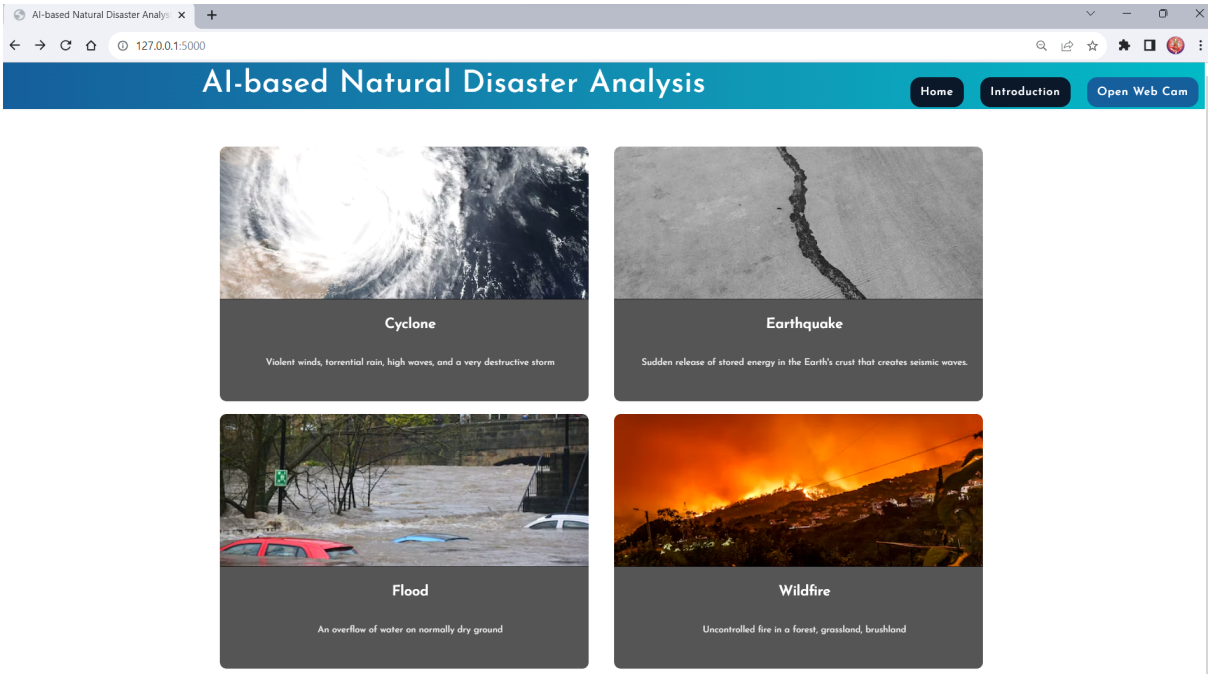
In this project, we successfully developed a deep learning model for the prediction and classification of natural disasters. The model utilizes a multilayered deep convolutional neural network to achieve an impressive accuracy of approximately 93% during training and 83% during validation. The high accuracy of the model is crucial for reliable predictions, which can significantly improve disaster preparedness and response. By leveraging AI and CNNs, this model holds the potential to save lives and minimize the impact of natural disasters.

7. FUTURE SCOPE

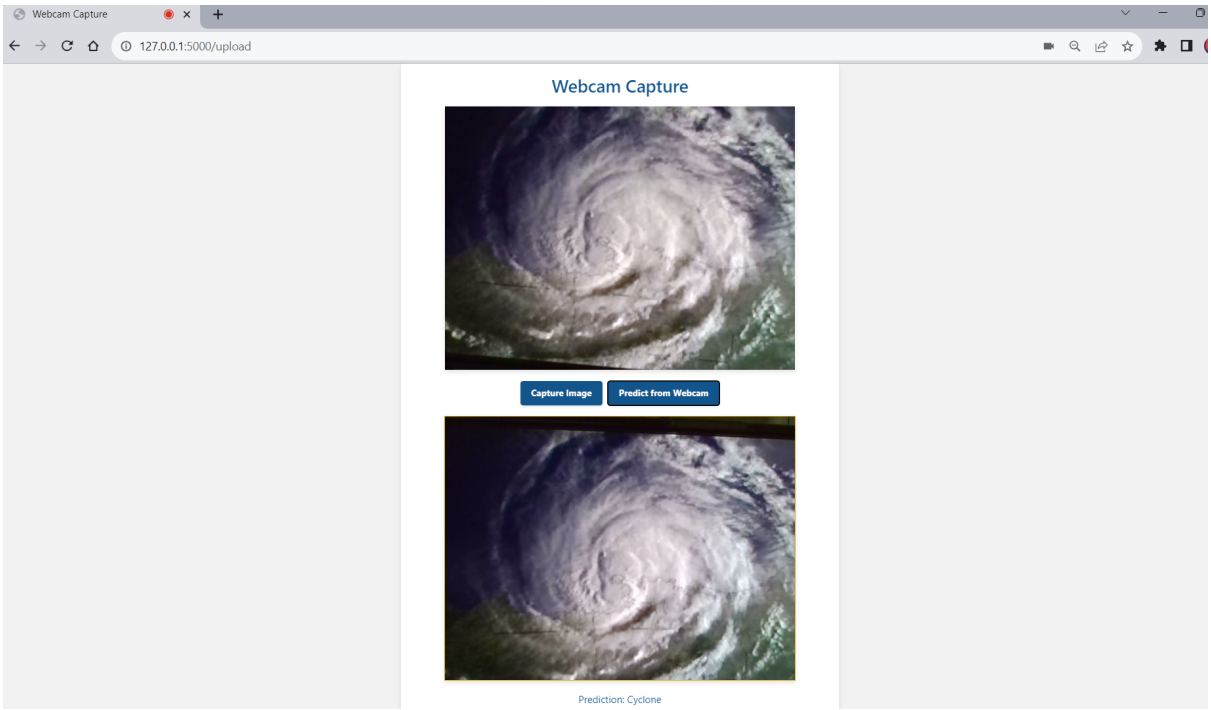
While the model has shown promising results, there are opportunities for further improvement and expansion. Future enhancements can include:

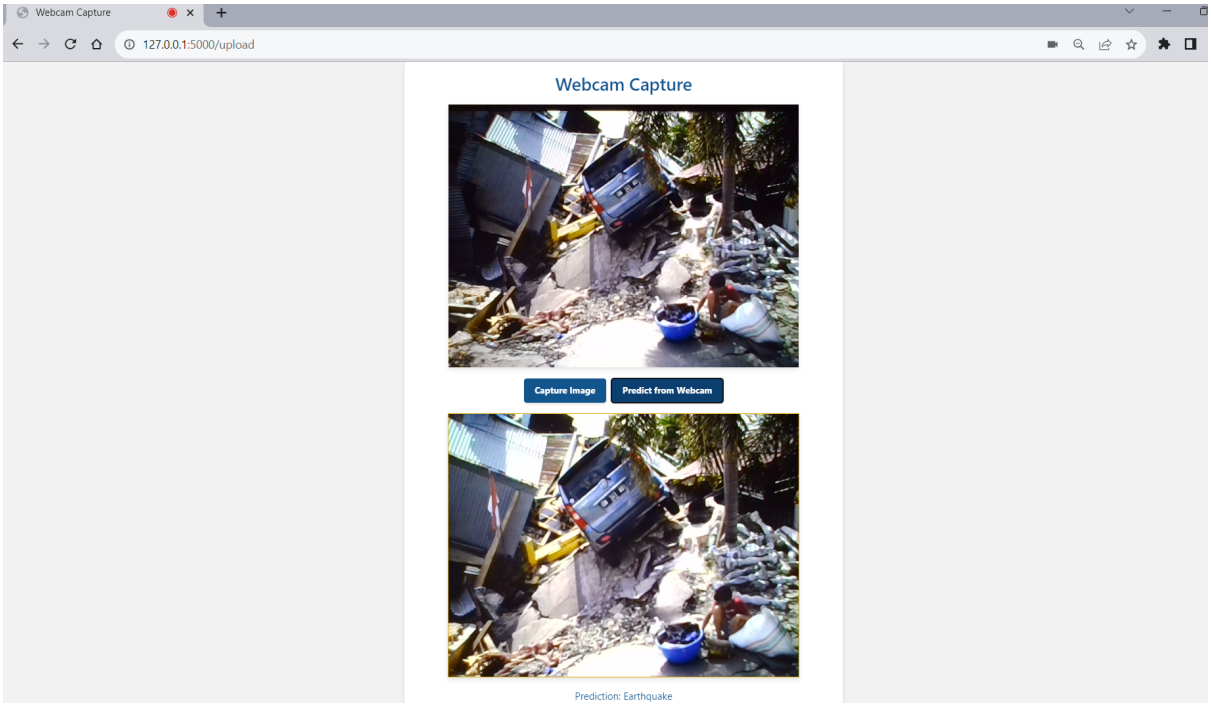
- Fine-tuning the model: Applying hyperparameter tuning and optimizing the CNN architecture to achieve even higher accuracy.
- Data enrichment: Expanding the dataset with more diverse and real-world images of natural disasters to enhance model generalization.
- Real-time deployment: Integrating the model with a real-time image capture system and disaster monitoring platforms for immediate predictions and response.

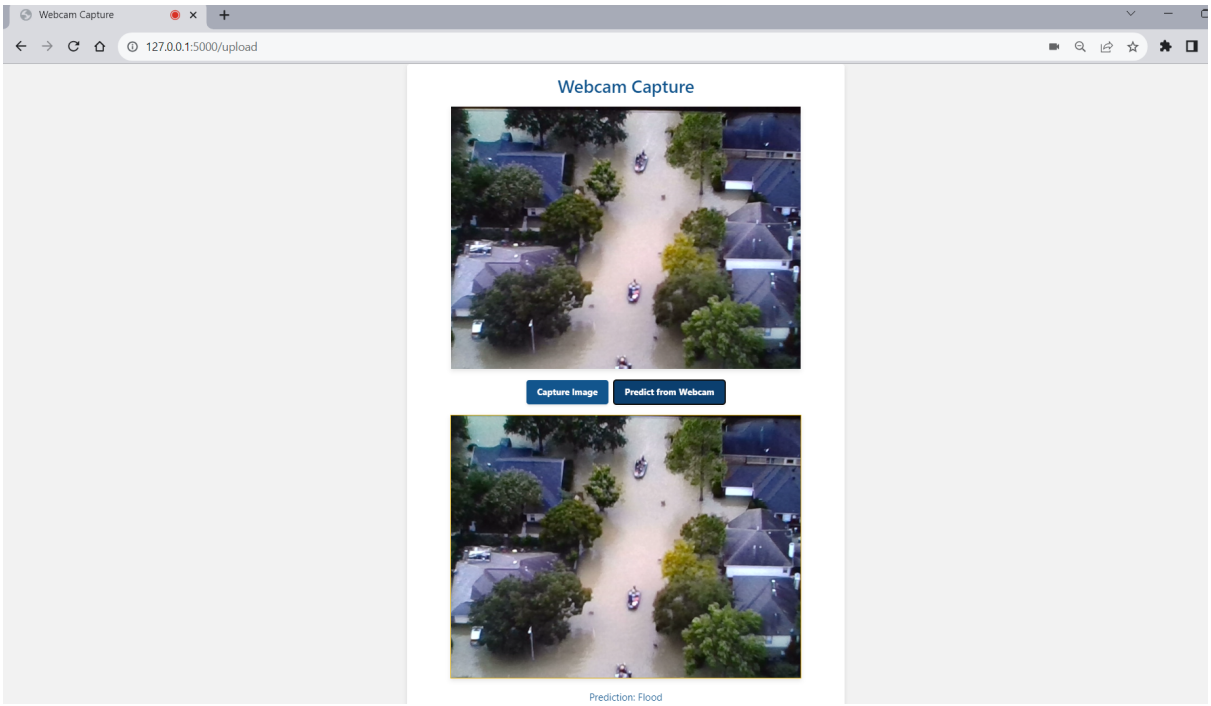
8. OUTPUT SCREENSHOTS

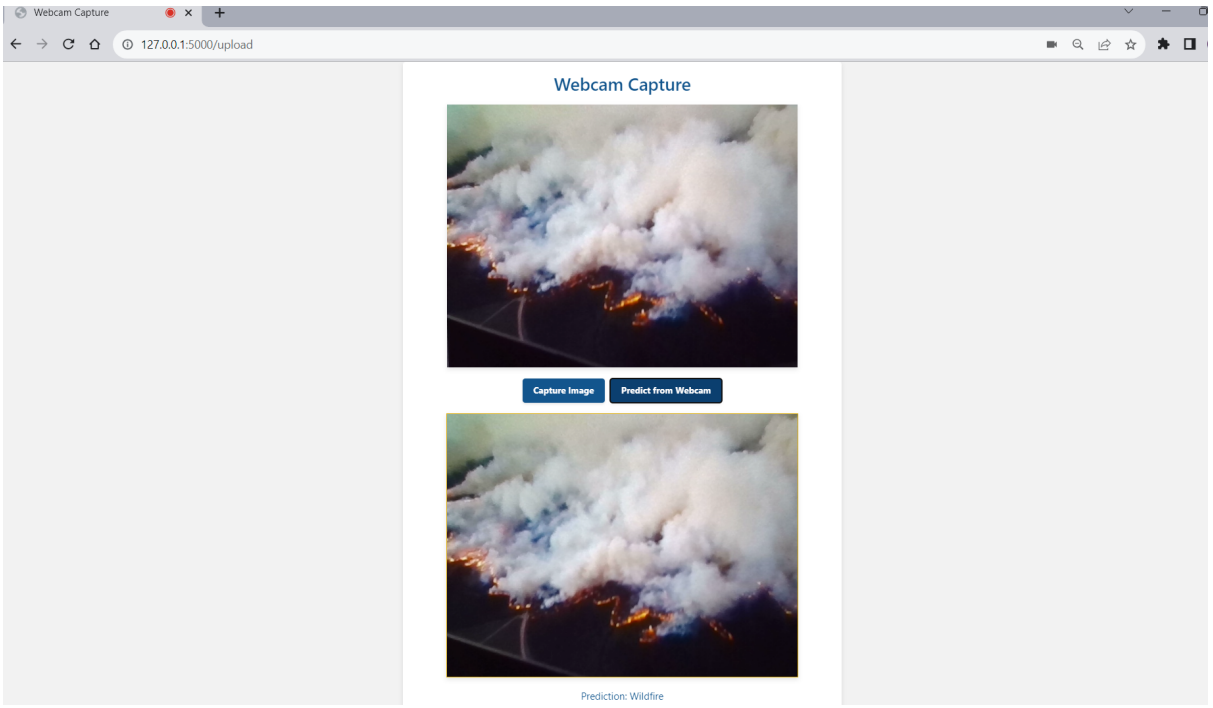


China, India, and the United States are among the countries of the world most affected by natural disasters. Natural disasters have the potential to wreck and even end the lives of those people, who stand in their way. However, whether or not you are likely to be affected by a natural disaster greatly depends on where in the world you live. The objective of the project is to human build a web application to detect the type of disaster. The input is taken from the in-built webcam, which in turn is given to the pre-trained model. The model predicts the type of disaster and displayed on UI.




Webcam Capture
127.0.0.1:5000/upload
Webcam Capture
Capture Image
Predict from Webcam
Prediction: Earthquake


Webcam Capture
127.0.0.1:5000/upload
Webcam Capture
Capture Image
Predict from Webcam
Prediction: Flood



9. SOURCE CODE

GitHub Link:
github.com/Sreeja799/Natural_Disasters_Intensity_Analysis_And_Classification

10. REFERENCES

https://www.tensorflow.org/api_docs/python/tf
https://keras.io/guides/sequential_model/
https://www.youtube.com/watch?v=BzouqMGJ41k&ab_channel=SmartInternz

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