A Computer Vision Method for Detecting Traffic Accidents

BY

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The Degree of Masters of Science in Computer Science and Engineering

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APPROVAL

This Project/Thesis titled **"A Computer Vision Method for Detecting Traffic Accidents"**, submitted by Afrin Jaman Bonny, ID No: 0242310005103039 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of M.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 06-07-2024.

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Abstract

The study of computer vision makes it possible for machines to replicate the visual system of humans. It is a type of artificial intelligence that gathers data from movies or digital photos and manipulates them to specify the properties. Throughout the process, images are acquired, screened, analyzed, and identified as the information is extracted. Computers can recognize and respond appropriately to visual input thanks to this sophisticated processing. This study's major objective is to utilize computer vision to identify traffic accidents, as these incidents frequently result in fatalities. One of Bangladesh's key problems is the country's high rate of traffic accidents, which is a worldwide problem that impacts more than just Bangladesh. The majority of traffic accidents happen abruptly and without warning, having a major negative impact on both human activity and traffic flow. It is vital to identify traffic incidents as soon as possible and alert oncoming motorists since in the majority of instances, subsequent accidents may be prevented if only prompt identification and prompt rescue were permitted. The organizations' lack of coordination and the careless driving that goes along with it are the causes of these circumstances. Sadly, the primary cause of the high fatality rate in road accidents is the delayed delivery of emergency assistance to accident victims. An accident sufferer may be left neglected for an extended period on highways with light and quick traffic, which might lead to the deaths of those involved in the accident. This paper employs computer vision in detecting accidents from image frames of CCTV footage. The primary goal of this work is to categorize video frames into accident and non-accident categories by training a deep-learning convolution neural network model using each frame of the movie. Convolutional Neural Networks are a quick and accurate method of categorizing photos; with comparably smaller datasets, CNN-based image classifiers have demonstrated an accuracy of over 89%.

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Chapter 1: Introduction

1.1 Introduction

These days, the main cause of fatalities is traffic accidents. The number of fatal traffic accidents rises in tandem with the rate at which cars are manufactured. People are becoming increasingly reckless, which has dire repercussions and a high fatality rate in big cities. The availability of several forms and modes of transportation nowadays is contributing to an increase in traffic accidents. The flow of traffic on roads has become an essential aspect of human existence, influencing many services and activities daily. Therefore, efficient road traffic organization and management is essential for efficient transit, particularly in metropolitan regions where people.

In direct proportion to the quantity of automobiles produced and the number of crashes, the number of fatalities and property damage each year is skyrocketing. Approximately 1.19 million individuals worldwide lose their lives in traffic-related incidents each year, and 20 to 50 million more suffer non-fatal injuries. Pedestrians, cyclists, and motorcyclists are among the vulnerable road users who suffer more than half of all traffic fatalities [1]. Due to the rapidly growing population, the astounding rate of automation, and the constantly expanding urbanization, people are unable to stop the frequent traffic accidents that result in fatalities, injuries, and disabilities. The rate of loss is larger in emerging nations than in industrialized nations. Even with fewer art mobiles, underdeveloped nations nonetheless suffer more losses than affluent nations with greater car ownership [2].

Road accidents occur for a variety of causes, including driver distraction when operating a vehicle, diverting attention from Rome Road, fatigue from extended driving, which leads to avoidable mistakes, and the combination of poor visibility and dangerous road layout. Accidents can occur for a variety of causes, but they usually have the same outcome—a significant loss.

In Bangladesh, 6,261 traffic incidents resulted in 7,902 fatalities and 10,372 injuries in total throughout 2023. Over the past nine years, there has been a rise in small vehicles, especially

motorcycles and easy bikes, and the number of registered vehicles has climbed four to five times, which has increased road accidents and deaths. The fact that simple bikes, motorcycles, and three-wheelers are still in use on national and regional highways despite official prohibition has led to a growth in their numbers.52.83 percent of the overall incidents involved cars crashing into people, 20.5 percent were head-on crashes, and 14.29 percent resulted from cars swerving out of control. 34.86 percent of the total number of accidents happened on national highways, followed by regional highways (28.11%) and feeder roads (28.5%) [3].

According to statistics, automobile accidents are the main cause of death by injury, and thousands of people have perished as a result of them [1]. Accidents can happen for a variety of reasons, some of which include overloading, inadequate traffic management, driving while inebriated, using a cell phone while driving, and a lack of training facilities.

Nonetheless, it has been noted that the majority of the time, the deaths that result from traffic accidents are caused by the ambulance arriving to the scene of the accident too late. Even if the majority of the time the injuries are not serious enough for us to be able to save the victims' lives, sometimes they become deadly when the rescue squad arrives too late [4].

1.2 Motivation

The flow of traffic on roads has become an essential aspect of human existence, influencing many services and activities on a daily basis. According to reports, the quantity of collateral and the number of fatalities

The amount of damage has increased in direct proportion to the number of traffic accidents and the annual production of automobiles. While many efforts are made to enhance CCTV surveillance—such as installing cameras at intersections and sophisticated radars to catch speeding cars on freeways—many fatalities result from a failure to promptly report accidents, which prolongs the time it takes to get medical attention. This work suggests a strategy to mitigate the problem at hand by detecting and reporting vehicle crashes practically instantly. This can assist local law enforcement and medical authorities in responding to the condition quickly [5].

The way that current traffic management technology interprets recorded footage primarily depends on human interpretation. This does not allow for any real-time reaction to unforeseen situations and requires a significant amount of work from human operators. Detecting car accidents has become a common use of computer vision in recent years, allowing for the efficient provision of first aid without the need for human operators to keep an eye on such incidents. To address the aforementioned issue, this study suggests a practical approach that would enable the local traffic authorities and paramedics to identify vehicular collisions nearly instantly, hence allowing for prompt relief of the situation [6].

1.3 Rationale of the Study

The model was created to identify traffic accidents, which are a common occurrence in our daily lives despite numerous government efforts to prevent them, such as the installation of CCTV and traffic police. These incidents are mostly caused by careless drivers and citizens who disregard safety precautions when driving. Nonetheless, the failure to provide immediate assistance to victims of traffic accidents accounts for thousands of fatalities.
.It is regrettable to report, but most of the time help doesn't get to them promptly, which could have prevented thousands of deaths from resulting from a lack of emergency medical services. Most accidents are reported as soon as they occur, prolonging people's suffering and increasing the number of deaths [7].

The study aims to develop a computer vision-based system that can promptly identify accidents. Government-installed cameras will be of great assistance in this regard, as they enable authorities to identify accidents as they occur and promptly respond to assist the affected parties.

1.4 Research Questions

To obtain directions for a research article, project, or thesis project, one must have a strong research question. It provides labor a clear focus and goal and indicates precisely what needs to be found out.

RQ1: Can we utilize a model that can detect accidents?
Yes, we can utilize such a model that can detect accidents with the help of computer vision.

RQ2: What are the appropriate algorithms to detect traffic accidents?
For this study CNN algorithm was used which accrued a high level of accuracy.

1.5 Expected Output

The focus of this initiative is research and publishing research about this topic is the main goal. The proposed study represents a major advancement in the field of using computer vision to identify accidents. Through CCTV put at each intersection of the road, this research will be able to notify the authorities, enabling them to promptly offer the required assistance to accident victims.

By applying Deep Learning algorithms to classify the photos, this study aims to provide a result that attains analysis with mathematical proof through the use of Computer Vision. The best-performing algorithm on the dataset and the understanding of various algorithms will both benefit from this investigation.

1.6 Project Management and Finance

There was no money spent on this study, and no software, hardware, or other equipment was purchased. This study took a while to complete because of the data collection and data processing. The Table —shows how much time we spent on each stage of this research

Table: 1.6.1 Timeline of the Research Management

Stages of Research work	Timeline for Each Stage
Determining and finalizing the topic	1 month 15 days (approximate)
Data collection	1 month (approximate)
Literature review	15 days (approximate)
Experiment	15 days (approximate)
Experiments and validations	1 month (approximate)
Report writing	20 days(approximate)
Total	5 months 5 days (approximate)

1.7 Report Layout

The following is the content of this research paper:

●I have provided a summary of the research, the justification for the investigation, and the anticipated results in Chapter One. We have also briefly discussed the need for accident detection models in contemporary society.

● The related work for this research endeavor is included in Chapter 2, along with a brief discussion, a description of the work with a comparative analysis, and any potential issues or roadblocks.

● The third chapter delves into the inner workings of our research project, including the study's topic, data gathering procedures, statistical analysis, methodology, and implementation needs.

● In Chapter 4, the experimental setup, findings, and analysis are discussed together with the experimental results and commentary.

● In Chapter 5 of our study project, we talk about the social impact on our society, ethical issues, and a sustainability plan.

● The sixth chapter presents conjectures on our study's summary and conclusion, along with the implications for further investigation.

Chapter 2: Background

2.1 Preliminaries/Terminologies

Traffic accidents typically happen suddenly and unexpectedly, with serious repercussions for both human activity and traffic flow. However, if only prompt detection and rescue were permitted, accidents could be prevented, so it is imperative to identify traffic accidents as soon as possible and to alert oncoming vehicles. These days, monitoring cameras are already widely used for traffic surveillance. It does not, however, provide a real-time response to unforeseen situations and requires a significant amount of work to artificially observe the image shoots.

Thankfully, computer vision and image processing algorithms-based intelligent monitoring systems are becoming increasingly important for target detection, tracking, and analysis. These systems are utilized in traffic monitoring and can analyze vehicle behavior in real-time, allowing for prompt response to unexpected events. As a result of its enormous application potential in intelligent transportation systems—which may greatly aid in the preservation of human lives lost in traffic accidents—traffic accident detection has recently emerged as one of the most fascinating disciplines [8].

In this study, a Convolution Neural Network is utilized to assess the model for analyzing the traffic accident photos, enabling the CCTV footage to identify incidents occurring and promptly notify the authorities. Some sample photographs that can act as guidelines for my work are shown in Figs. 1 and 2.

Fig:2.1.1. Image of Accident

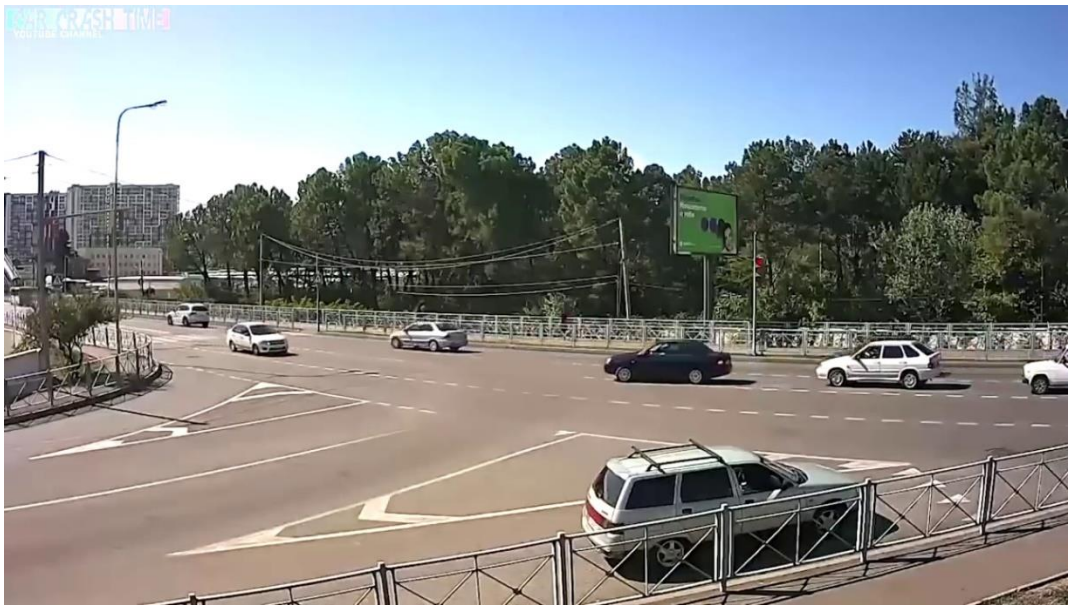

Fig2.1.2. Image of No Accident

2.2 Related Works

Several recent research have helped to detect traffic accidents by enhancing the intelligence system's ability to identify accidents from CCTV footage. I will now examine several traffic accident detection techniques that have been investigated by different academics.

This paper intends to present a system that would detect an accident based on the live feed of video from a CCTV camera installed on a highway which takes each frame of a video and runs it through a deep learning convolution neural network model that has been trained to classify frames of a video into accident or non-accident. Convolutional Neural Networks have proven to be a fast and accurate approach to classifying images it also sends the frame at which it detected an accident and what percentage of accidents it is which helps to track an accident at its moment of occurrence and sends an instantaneous alert SMS regarding the accident to the nearby hospitals and police stations which includes details like timestamp and the geographical location. This article provides an overview of the technologies linked to automated road accident detection systems and how they are interrelated. LSTM (Long Short-Term Memory) is used to manage the time dependency of each video in order to assess the model's performance [2].

The goal of this paper is to present a system that uses a live feed of video from a CCTV camera mounted on a highway to detect accidents. Each frame of the video is fed through a deep learning convolution neural network model, which has been trained to distinguish between frames that show an accident and those that don't. Convolutional Neural Networks have shown to be a quick and accurate method for categorizing photos. It can also transmit the frame at which it detected an accident and the percentage of accidents it is, which helps to track an accident at the scene and instantly sends an SMS alert to the local police station and hospitals with information about the accident, including a timestamp [9].

The occlusion effect between vehicles is the most challenging issue with vehicle tracking. To address this issue, the author of this study used a spatiotemporal Markov random field (MRF) for traffic images at intersections. MRF tracks the problem by figuring out each pixel's state, how it transits, and how it does so along the image and time axes. the creation of a robust, expandable

event recognition system using the hidden Markov model (HMM) platform. The system uses the tracking system's output to identify the current event chains once it has learned different event behavior patterns from each vehicle in the HMM chains. The existing system is capable of identifying jamming, passing, and bumping. Nevertheless, the system may be expanded to detect more events, such as reckless driving or illegal U-turns, by adding more event patterns to the training set. This might help to reduce the number of traffic accidents [10].

This study presents a unique technique for automatic road accident identification that uses video data from security cameras placed on highways and roads to identify damaged automobiles that may have been involved in an accident. In the realm of machine vision, the identification of damaged automobiles falls under the category of object detection. Five support vector machines trained using HOG and GLCM features are used in the three phases [11].

To identify accidents from CCTV footage and notify rescue services, this study uses computer vision. To get around this, we employed AI and computer vision algorithms to identify accidents and send out an Android application notice. The Yolov3 algorithm has been applied to the identification of vehicles and accidents. Following detection, the device will use an Android application to communicate accident photos and videos to rescue services including police stations and ambulances. In order to get there as quickly as possible, they will also receive a route direction and the Geolocation of the incident location via Google Maps. With constant illumination, camera placement, and camera quality, the system operated effectively [12].

Through the use of a dashboard camera and the Mask R-CNN framework for vehicle identification and a centroid tracking algorithm for following the identified vehicle, the author of this study presents a novel support system for self-driving automobiles that can identify traffic accidents. Furthermore, the framework computes many metrics including velocity, acceleration, and path to ascertain if any of the monitored cars had been involved in an accident. The system can reliably identify accidents with a 79.05% accident detection rate and a 34.44% false alarm rate on the recordings. The framework has been tested on a proprietary dataset of dashcam footage, and it achieves a high accident identification rate while retaining a low false alarm rate [13].

The suggested framework offers a reliable way to get, on ordinary road-traffic CCTV surveillance footage, a high Detection Rate and a low False Alarm Rate. Using the suggested dataset, this framework was tested in a variety of weather situations, including bright sunshine, poor visibility, rain, hail, and snow.The effectiveness of this framework was determined, and it opens the door for the creation of real-time, general-purpose vehicle accident detection algorithms with a 71% detection rate and a 0.53% false alarm rate on accident recordings collected in a variety of ambient circumstances, including night, day, and snow [14].

This study deals with accident detection, where we identify typical attributes of objects in addition to detecting them with classes. Specifically, our goal is to simultaneously identify the state of item class bounding boxes on roads—such as safe, dangerous, or The Attention R-CNN accident detection network, which is comprised of two streams—one for characteristic property calculation and the other for object recognition with classes—leads to a notable enhancement in the detection of both object characteristics and object classes [15].

2.3 Comparative Analysis and Summary

In order to make sure the model is reliable and capable of identifying various accident kinds, I utilized deep learning methods in this work to train and test it on a sizable dataset of accident and non-accident photographs from "Kggale", YouTube and Google. The dataset is broad and includes a range of accident scenarios. The utilized dataset consists of three distinct folders (train, test, and validation split), each including two files: one for accident photographs and the other for non-accident images. To improve the model's performance, the data was trained using a Normalization and Google MobileNetV2 model that has already been trained. The model's performance was assessed using a convolutional neural network technique, and it attained a 89% accuracy rate.

2.4 Scope of the Problem

This study's primary goal is to develop a model that can use CCTV video to identify various types of traffic or road accidents. The issue is that the data was gathered from Kaggle, YouTube and Google rather than the real-time dataset gathered from Bangladeshi CCTV footage. As a result, the model is unable to recognize incidents involving vehicles such as motorbikes and rickshaw pullers which are very common vehicle in our country but I was able to use images related to vehicle named CNG. This method may be mistaken for any of the many distinct types of cars that exist in Bangladesh. Convolutional Neural Network (CNN) model classifier, however, has achieved 89% accuracy in processing traffic or accident photographs.

2.5 Challenges

The objective is to achieve the maximum level of accuracy and precision from the standpoint of the road situation in Bangladesh. To train the model, it will be more beneficial to get a real-time database of traffic accidents in Bangladesh. Because the data was gathered from a website, I had to clean it up to match my intended dataset and divide it into two categories: accident and no accident. Normalization and Google MobileNetV2, a pre-trained model, was used to train the data in order to maximize the model's accuracy potential.

Chapter 3: Research Methodology

3.1 Introduction

An overview of our methodology and thesis may be found in this portion of the publication. It gives us thorough information and practical strategies. This refers to targeted application and actualization for our aims. It will have the same effect on our data-gathering activities' legitimacy. It will show how they should be used in the classification of potato leaf diseases. Here, the research instruments and techniques will be discussed.

3.2 Research Subject and Instrumentation

Information was gathered for the study "An accident detection model using CNN" from the well-known data supplier website "Kaggle",YouTube and Google[16-18].A total of 990 accident and non-accident frames from road recordings that are accessible on YouTube were gathered for the accident detection dataset using CCTV footage.

To improve the model's performance, the data was trained using a Google MobileNetV2 pre-trained model. I have omitted the top layer of the model since we will be doing classification, and I have set trainable to false to ensure the model won't make any changes regarding the weight of any layers that have been already frozen during training. The basic model and three additional convolutional layers make up the final model. The second convolutional layer's output is flattened and supplied to a dense output layer, which performs classification.

In order to create a neural model that eliminates unnecessary image sources and noises and converts them into correlations with quality ratings, convolutional neural networks (CNNs) are used. This creates a special space where multiple neural networks can be built to address the key issues that arise during the request process.

3.3 Data Collection Procedure

For any research, gathering pertinent data is crucial. A genuine data set may be very useful in this situation. The data that was gathered was processed successfully, even if some noise was discovered. At first Normalization method was used to clean the data and train it, in order to create an accident detection model. The 990 files are divided into 101 (47 accident, 54 non accident) Tests, 98 Validation (52 accident, 46 non accident) frames, and 791 (369 accident, 492-non accident) Training frames.

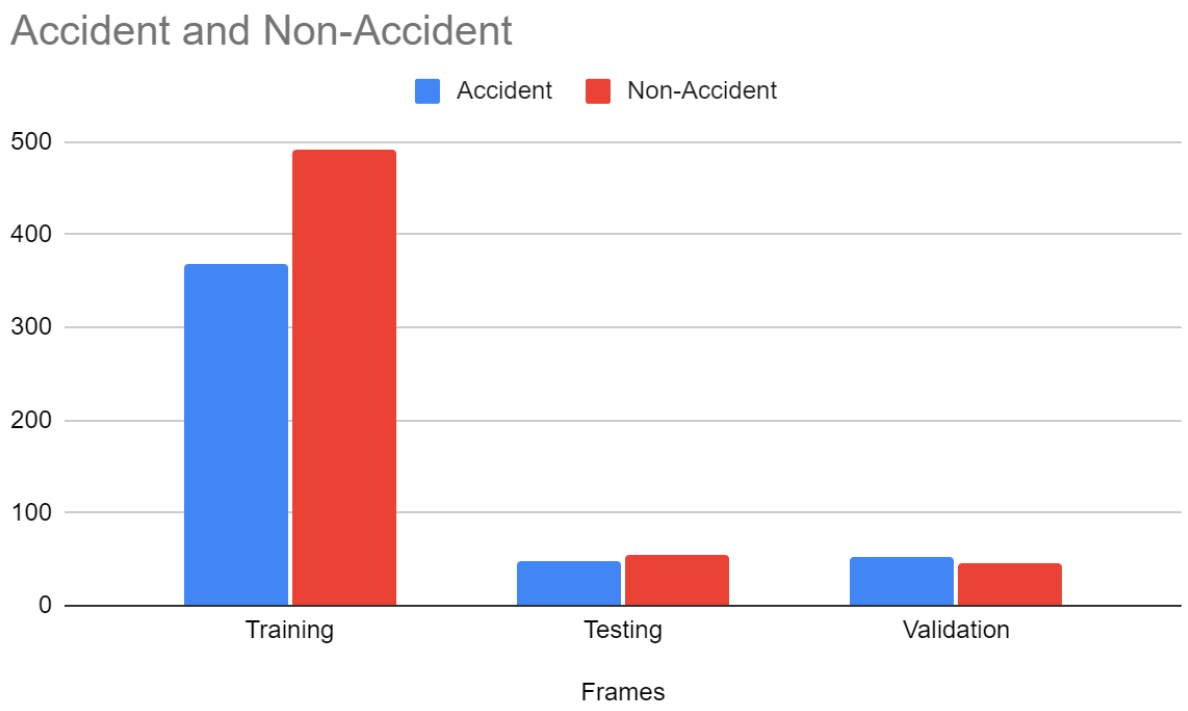

Fig:3.3.1 The distribution of Dataset

It was found that this collection's photographs' overall resolution was not very good. As a result, the sound was played without being modified beforehand. The images in the database were downscaled from RGB to grayscale, which sped up the model's training process and reduced the amount of time needed to finish a training cycle. Because it has been trained on millions of photos, the pre-trained convent knows exactly what features to search for in an image and can discover

them quite successfully. Therefore, we define the basic pre-trained layer and train the model using Normalization method to detect the existence of features.

Fig: 3.3.2. Dataset after Normalization

3.4 Statistical Analysis

Following verification that the model would not alter the weights of any layers that had previously been frozen during training, the best model was not allowed to carry out classification.The basic model and three additional layers for convolution make up the final model. The convolution layer's output is flattened and supplied to a dense output layer, which does classification.The database's images were batch-sized 32 and resized to 48 by 48 pixels.

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 254, 254, 16)	448
max_pooling2d (MaxPooling2D)	(None, 127, 127, 16)	0
conv2d_1 (Conv2D)	(None, 125, 125, 32)	4,640
max_pooling2d_1 (MaxPooling2D)	(None, 62, 62, 32)	0
conv2d_2 (Conv2D)	(None, 60, 60, 16)	4,624
max_pooling2d_2 (MaxPooling2D)	(None, 30, 30, 16)	0
flatten (Flatten)	(None, 14400)	0
dense (Dense)	(None, 256)	3,686,656
dense_1 (Dense)	(None, 1)	257

Total params: 3,696,625 (14.10 MB)

Trainable params: 3,696,625 (14.10 MB)

Non-trainable params: 0 (0.00 B)

Fig:3.4.1 Sequential Model

A CNN can be used to create a personal computer model that can be used to filter out irrelevant image sources and convert them into correlations with output grades. The model consists of two

parts: the first part extracts the fundamental features that are used to make a classification decision, and the second part performs the classification. The extraction of the fundamental features is accomplished using layers of convolution pooling and other techniques, while the layers responsible for the decision-making process are perceptron layering Dense.

3.5 Proposed Model Workflow

Many steps have been performed in order to create an accident detection model that works, as seen in the following Fig. 3.5.1.

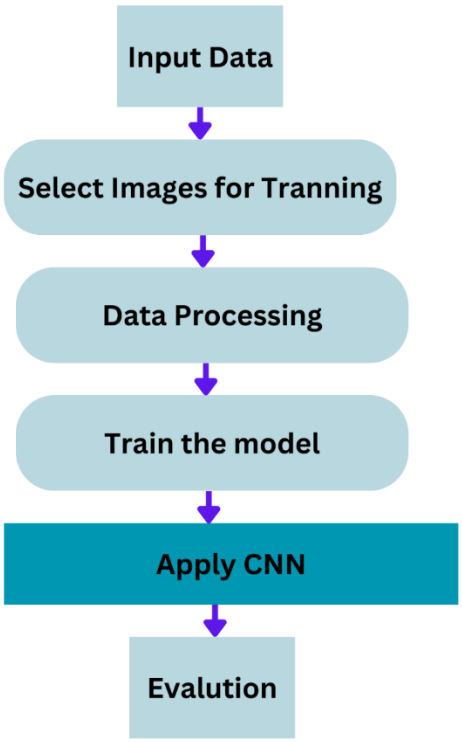

Fig. 3.6.1. Proposed Model Workflow

3.6.1. CNN

Convolutional neural networks (CNNs) function by extracting a hierarchy of features and looking for them in various picture patches. Low level characteristics, such as edges and dark spots, may be detected by the first layers. These features are then used to extract mid level features, such as eyes, ears, and noses, which are utilized to identify high level features, such as face structures. Different variants of the same item may be handled using just image patches and a hierarchy [16].

Computer vision problems have been transformed by Convolutional Neural Networks (CNNs), which have made significant progress in picture analysis and recognition possible. Let's investigate the foundations of CNNs, look at their architecture, and analyze how they are used in object identification, picture segmentation, and image classification. We will also investigate CNNs' efficacy in fields like medical imaging and driverless driving [17].

CNN are made especially to process input data that resembles a grid, like photographs. Convolutional layers, pooling layers, and fully linked layers are the main parts of a CNN.

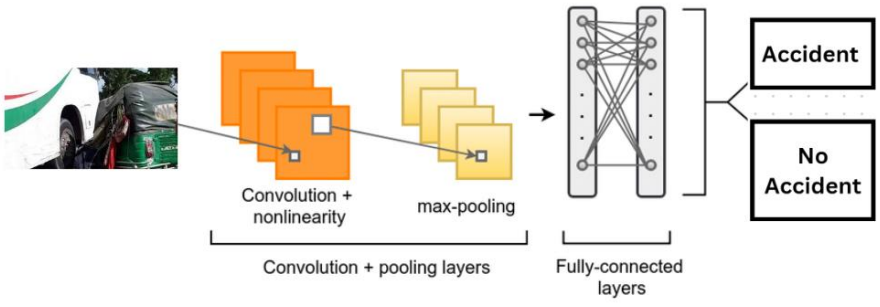

Fig: 3.6.1.a. Layers of CNN

CNNs are now the preferred option for a wide range of computer vision tasks. They have demonstrated ground-breaking accuracy in classifying thousands of object categories, making it

easier to identify and categorize objects like cars, pedestrians, and traffic signs and facilitating accurate perception and decision-making.

3.7 Implementation Requirements

There are some requirements to implement this project.

Hardware or Software Requirements

- Windows 7 or above operating system
- Portable or in-built Hard Disk above 300 GB
- Minimum 2 GB RAM
- Google Chrome or Mozilla Firefox

Developing Tools

- Python with Tensor flow
- Jupyter Notebook

Chapter 4: Experimental Results and Discussion

4.1 Experimental Setup

We have set up everything needed, from data collection to model evaluation, based on our experimental requirements. Our laptop, which had the following specifications: Corei3 8th Gen, 4 GB RAM, 1 TB ROM, and Windows 10 64 Bit OS, was used for data collection, pre-processing, classification algorithms to mine reviewers' opinions, and model evaluation.

4.2 Experimental Results & Analysis

Since the study focuses on using computer vision to identify traffic or accidents on the road, the data used in the study were picture datasets. The 990 files are divided into 101 (47-accident, 54-non-accident) Tests, 98 Validation (52-accident, 46-non-accident) Frames, and 791 (369-accident, 492-non-accident) Training.

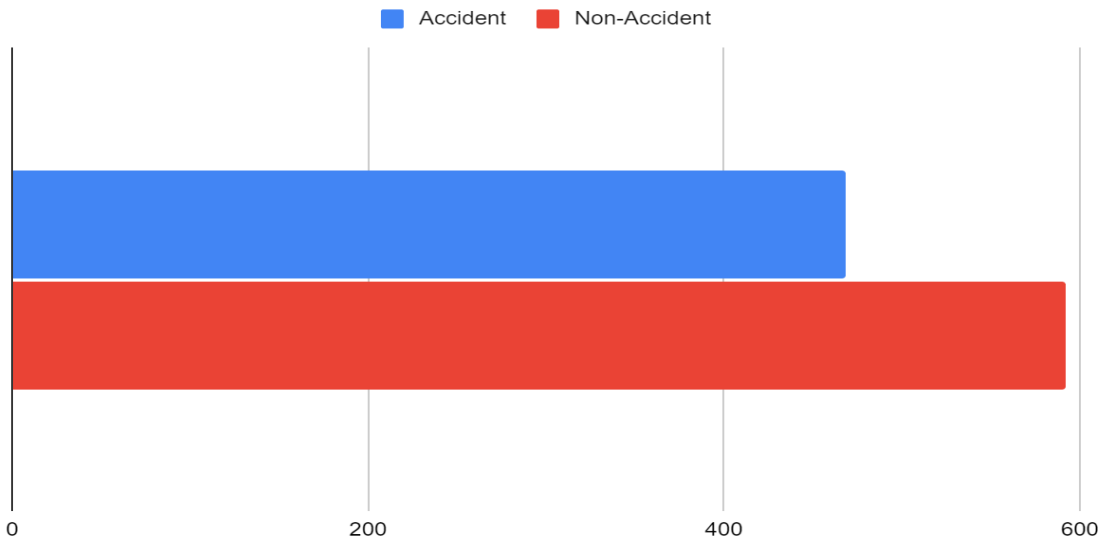

Fig: 4.2.1 Dataset

The confusion matrix of the model is shown below:

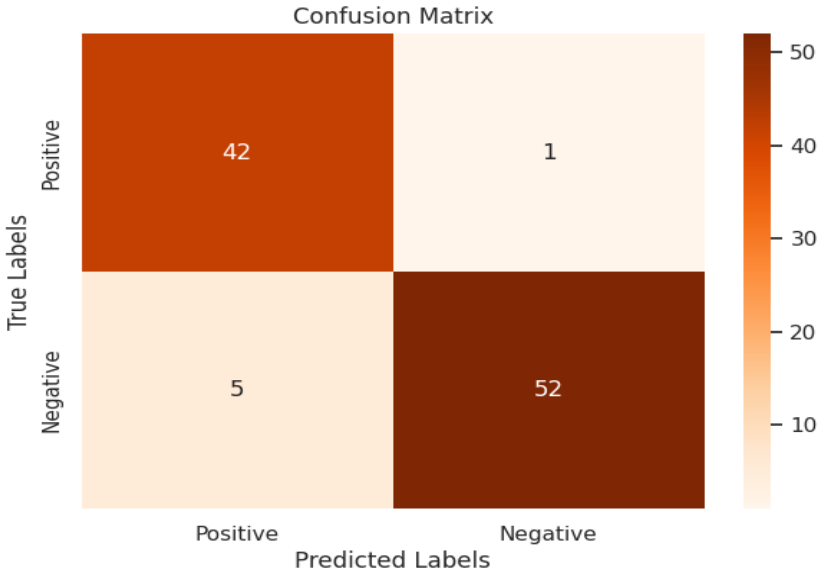

Fig: 4.2.1. Confusion matrix

No machine can produce data that is 100% correct. Although the model I employed produced decent results, it was not always 100% correct. It sometimes produces some incorrect results in a very short period. When using an image dataset, this incorrect result is barely noticeable. Following accuracy and loss tests, the graphical representation of our model is shown below:

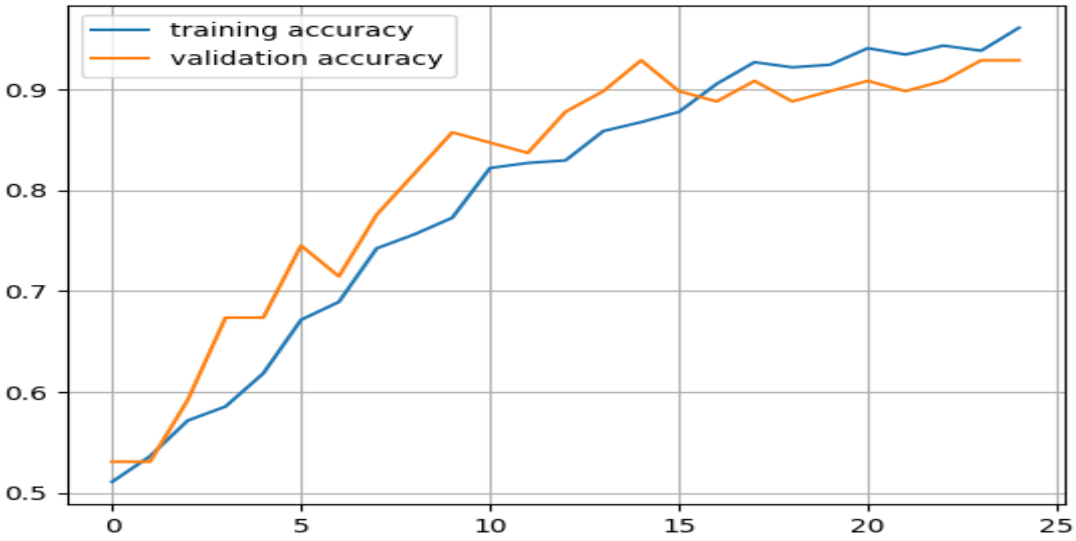

Fig: 4.2.3. Training and validation accuracy

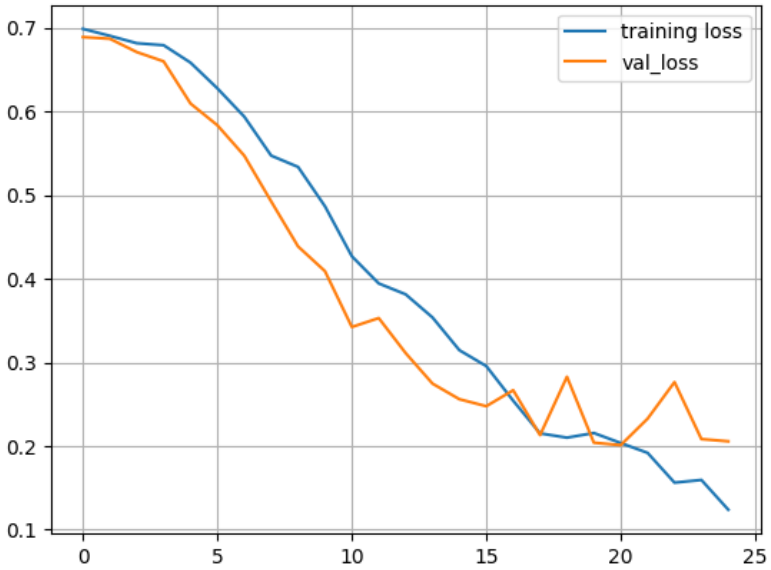

Fig4.2.4: Training and validation loss

4.3 Discussion

The CNN method was used to test the model for this accident detection investigation, where the data was divided into two classes: accident and No-accident. The model achieved an extremely high accuracy rate of 89% along with 78% precision, 80% recall, and 75% F1-score.

Table 6.3.1 Evaluation metrics of the applied algorithm

Algorithm	Accuracy	Precision	Recall	*F*1-Score
CNN	89%	95%	83%	88%

The training set of the model has accumulated a loss of 0.096 and an accuracy of 0.9722. The table displays the loss and accuracy of the model's testing, validation, and training states. There has been a loss of 0.244 and an accuracy of 0.91 for the testing set, and a loss of 0.20 and an accuracy of 0.90 for the validation set training set. The graphical representation is given below-

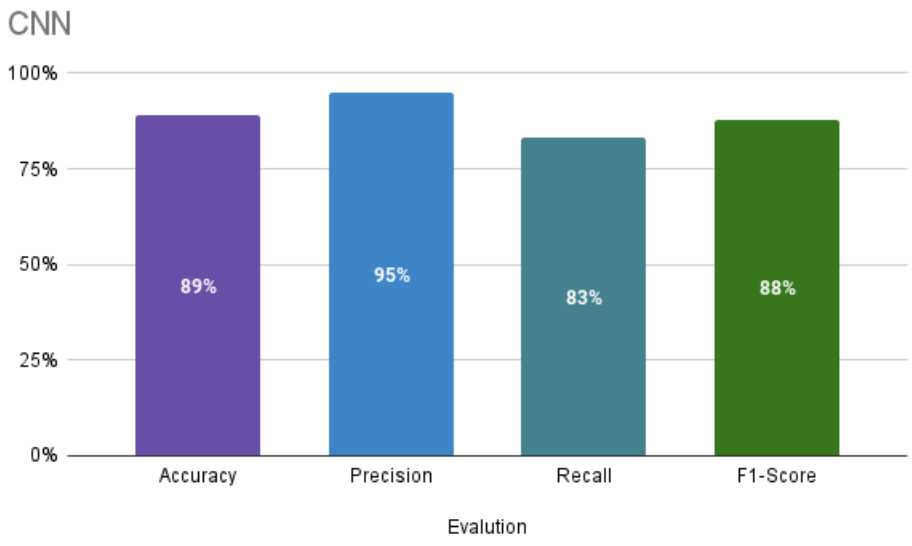

Fig 6.3.1 Evalution

Table 6.3.1 Loss and Accuracy of the Dataset

State	Loss	Accuracy
Training	**0.0960**	**0.9722**
Validation	**0.2011**	**0.9082**
Testing	**0.2447**	**0.9100**

These numbers aid in the assessment of our model's effectiveness. Before using the techniques to avoid models from overfitting and to obtain an accurate assessment from the models we have constructed, the dataset was used for training, validation, and testing.

Chapter 5: Impact on Society, Environment and Sustainability

5.1 Impact on Society

There will be a big societal impact from this study. Life security is one of the most basic and unassailable ideas of a civilized society, and it has been put in jeopardy by numerous incidents and highway accidents. In our fast-paced society, the number of accident-related deaths is increasing quickly. Rough driving, sleepiness, intoxicated driving, carelessness, etc. are major contributing factors to these collisions. The amount of time that passes between an accident occurring and the sufferer receiving medical attention is a good way to gauge survival rates after discovering incidents.

Rapid technological innovation has simplified everything, but it has also led to an increase in accidents. Owing to this postponed medical care, the accident victims may also perish. As a result, my work on accident detection has a significant influence on public safety. To lower the number of accidents that are rising daily, our government has put in place a number of stringent regulations. Sadly, though, it has not been demonstrated that they are adequate to lower the frequency of accidents. If this study can be used to analyze the CCTV video in our county, it will have a big influence on our society.

Because the generated dataset is used to train the model architecture, it has a high degree of accuracy when detecting accidents. Our initial assessment demonstrates that the system is fully functional and scalable. This device will allow medical personnel get at the scene of the accident in time to save precious human lives by enabling prompt action to be taken by sending notifications to the authorities.

5.2 Impact on Environment

Since our study has no direct influence on the environment, it does not break any laws that might be harmful or have a significant impact on the environment.

5.3Ethical Aspects

We can declare with confidence that there was no ethical violation in our research. While manually gathering data from the Kaggle picture dataset, I have avoided including any type of sensitive information about any individual, such as name, address, or other personal information. Consequently, the data collected will not be harmful to others and cannot be used against another person. Through this initiative, awareness will be raised on the need to take action to stop the daily traffic accidents that claim thousands of lives.

By identifying accidents and delivering aid as quickly as feasible, this kind of technology might be a small step toward guaranteeing a safe and secure workplace. We are positive that no one will ever be harmed by this study.

My own computer (PC) was utilized for all project-related work. The study was conducted independently, with no outside support. We didn't ask for help, and I didn't utilize anyone else's equipment. While conducting the research, all pertinent institutional and governmental regulations were followed, and moral integrity was upheld. Privacy and human dignity have been safeguarded.

5.4 Sustainability Plan

Every day, a great deal of innocent lives are lost in traffic accidents. Errors committed by drivers and delayed emergency services responses are the frequent causes. To save the lives of those wounded in traffic accidents, an efficient information-sharing and detection system must be in place. Thus, the results of this research may help identify traffic or roadside incidents. This is an ongoing process that never ends. Without a sure, this research will be around for a very long time in the field of technology. We want to improve both the accuracy and the data range in the future. We intend to compare and identify which algorithm offers the best degree of accuracy in the future by utilizing other algorithms.

Chapter 6: Summary, Conclusion, Recommendation and Implication for Future Research

6.1 Summary of the Study

The incidence of mortality from traffic accidents is rising together with the pace of automotive manufacture, as traffic accidents are currently the leading cause of fatalities. This report's primary goal is to implement an accident-detection deep learning technique. As a result, a significant amount of data was gathered and classified as either accident or not accident. To improve the model's performance, the data was trained using a Google MobileNetV2 model that has already been trained. To improve the model's performance, the dataset was divided into training, testing, and validation batches of 32.

I employed 50 epochs to increase the model's accuracy while evaluating its performance using the CNN deep learning technique. Keras and Tensorflow were also utilized. As a gauge of the model's performance, the CNN algorithm achieved an accuracy of 89% after training the model.

6.2 Conclusions

The current work functions as a framework for detecting accidents, and all of the experiments carried out on it verify the validity and effectiveness of the idea and, therefore, the framework's ability to provide timely and useful information to the relevant authorities. The dependability of our method is increased by using numerous criteria to assess the likelihood of an accident. An accident can be tracked by the suggested vehicle accident detection system as soon as it happens. This study's main objective is to create a model that can identify accidents and use CNN to assess the model's effectiveness. The study's findings make it abundantly evident that CNN is the best technique for finding these kinds of things. Nonetheless, this model's validation accuracy rises to 89%.

6.3 Implication for Further Study

Currently, there is a great need for accident detection studies in order to develop intelligent systems, and several studies are being conducted in this area. The concept worked well, but it has a drawback in that it is not very effective in poor weather, which increases the risk of accidents. My goal is to create a model that can function exceptionally well in every weather scenario in the future. To do this, I want to use a variety of methods and improve the model's performance.

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