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# Traffic and Accident Prediction for Images and Video Using Deep Learning Techniques

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**Abstract:** As rapid growth of deep-learning approaches, numerous different responsibilities in clinical diagnostics, robotics, etc. have been found to apply. However, it is unanticipated that there are hardly any successful applications in the system, particularly in view of the large amount of video and image traffic used to monitor the urban road network and the highway, have been reported. Depending on the current situation, most cameras act as passive monitors and cannot detect the congestion automatically on time. When it comes to the alarm system, the detection of traffic jams and accidents relies mainly on lots of staff to manually report the status. The monitoring of the current surveillance system, the identification of congestions in the traffic control hall and immediate reporting of accidents are highly tedious and can be done more efficiently. Moreover, all cameras can't be watched with human eyes because many cameras are on the highway that cover a large region. However, it is important to detect traffic congestion and respond to accidents quickly in a large region.

The main aim of this project is to build an efficient Traffic management system and quick accident response system.

**KEYWORDS:** Convolution Neural Network, OpenCV, Keras, TensorFlow

## I. INTRODUCTION

As deep-learning methodologies have grown in popularity, a variety of new roles in clinical diagnostics, robotics, and other fields have emerged. However, it was unexpected that so few successful applications in the system have been documented, especially given the vast amount of video and picture traffic utilised to monitor the urban road network and the highway. Most cameras, depending on the situation, serve as passive monitors and are unable to identify traffic congestion in a timely manner. When it comes to the alarm system, the detection of traffic jams is mostly based on the manual reporting of congestion by a large number of people. Monitoring the present surveillance system and identifying traffic congestion in the traffic control hall are both time-consuming and laborious tasks. Furthermore, because there are so many cameras on the roadway that cover such a broad area, human eyes cannot see all of them. However, across a vast area, it is critical to detect traffic congestion early.

This project is mainly based on CNN algorithm. There are four classes of images. They are dense traffic, sparse traffic, fire accident and normal accident. We consider the high and low traffic detection under traffic section and the fire and normal accident are considered under the accident section. Our main objective is to classify the given input image or video into high traffic, low traffic, fire accident and normal accident by obtaining the trained model from input traffic and accident dataset. First, the video is divided into frames using openCV and then series of operations such as dimension reduction, noise reduction, are done on each frame(image) and passed through the trained CNN model to identify the image. This live process identification from the surveillance cameras can predict traffic and suggest best traffic routes for the commuters and also save lives by immediately responding to the accidents and fire accidents on road. Traffic congestion can be easily recognized by placing the cameras in junctions and areas Where we expect usual traffic but accidents can happen anywhere on the road. So we can take an advantage of the infrastructure used for autonomous cars which need 5G network pole for every 500mtrs of distance alongside of the road. Implementing this system has many advantages, it does not need special infrastructure, easy for police surveillance, accident alert, safer for people (women, children) travelling on road, traffic moderation and reduce congestion.



Convolutional Neural networks (CNN) are a form of neural network commonly used in computer vision. Its name originates from the secret layers of its type. Instead of the usual activation function, it uses convolution functions and pooling. Before understanding convolution functions and pooling functions, we have to understand how to use computer vision techniques in order to conceptualize the hidden mechanism of the CNN. The gap between the machines and humans were bridged by AI and the focus of researchers and developers turned to the main field of Computer vision and the advancements of DL has increased day by day on Image and video recognition, NLP, etc. were based on one algorithm which is Convolution Neural Network. ConvNet is used while classification is used for learning the filters. ConvNet is used to three-dimensional and progressive dependencies the image resolution of the image part without any feature default and for prediction accuracy. Feed forward is used to flatten the dimension of the image.

## II. OBJECTIVE

The objective of our study is to implement traffic detection system using Convolutional Neural Networks (CNN). Our main objective is to classify the given input image or video into high traffic, low traffic, fire accident and normal accident by obtaining the trained model from input traffic and accident dataset. First, the video is divided into frames using openCV and then series of operations such as dimension reduction, noise reduction, are done on the image and passed through the trained CNN model to identify the image.

## III. LITERATURE REVIEW

“P. Wang, L. Li, Y. Jin, and G. Wang” proposed that It is important to detect traffic congestion. Although the surveillance system has been in use on the road for years, it is difficult for various illuminations, weather and other disturbances to automatically identify and report the congestion of traffic in complicated transport. The human eye-based detection process is time consuming and tedious, because it does not satisfy the demands of practical applications with the machine detection accuracy. This paper proposes a new classifier to generate four TrafficNets by means of convolutionary neuronal networks. This new structure trains and tests congestion and non-congestion images. Over 30,000 image database from existing traffic monitoring videos is extracted. Trained and tested with the database, traffic accuracy is compared and training times are compared. The research shows that the precision of the method proposed is far greater than the conventional method based on functional extraction without profound knowledge, up to 90 percent.

“X. Zhu, Y. Wang, J. Dai, L. Yuan, and Y. Wei” proposed that Detection accuracy is affected by degenerated objects in videos. Existing work tries to use temporal information, but such methods are not fully trained. We present flow-oriented add-on, a precise and end-to-end video object detection learning framework. It instead uses time consistency at the level of the feature. It enhances the per-frame characteristics by adding the nearby characteristics along the motion paths. Our method improves significantly on strong baselines on single frames, particularly with fast-moving objects in the ImageNet. Without any additional bells and whistles, this framework is designed and consistent with the other best systems to win the 2016 ImageNet VID Challenges. It'd release the code.

] “Z. Zhao, W. Chen, X. Wu, P. C. Chen, and J. Liu” proposed that One of the essential problems in intelligent transport systems is the short-term traffic forecast. Exact forecasts allow travellers to make suitable modes of travel, travel routes and departure time that are significant in traffic control. A more desired approach for the analysis of traffic data is a workable way to promote forecast accuracy. The provision of ample data of traffic and computational power in recent years has led us through in-depth learning approaches to increase the accuracy of the traffic projections. It instead uses time consistency at the level of the feature. It enhances the perframe characteristics by adding the nearby characteristics along the motion paths. A new LSTM model for traffic forecasting is proposed. The LSTM network will achieve a much best performance in comparison with other representative prediction models.

“J. Zhao, Z. Zhang, W. Yu, and T.-K. Truong” proposed that In ships detection from SAR images, convolutionary neural networks found applications. Some challenges are, however, hindering their progress. First, the boundary boxes detected are not too compact. Secondly, a lot of small and densely clustered ships lack detections. Thirdly, analogical scattered objects on the ground are erroneously detected as ships. This paper proposes a cascade-coupling visual care method for the detection of SAR vessels by CNN. The newly submitted 3C2N model is considered as a qualified generator of ship proposals as the spatial information of the images is used more adequately. A sequence of cascade detectors is It may also detect the specific object displayed on the screen at any given time based on user input. For this assignment, a sequential frame extraction method of films is employed, as well as a deep learning methodology of



CNN and Fully Connected CNN. \_The approach has an accuracy of around 75 per cent. The proposals 17 could be further refined, reducing the missing detections and false alarms significantly. Moreover, data are used to remove ship-like goals on land from a digital elevation model.

#### IV. USERS CLASSES AND CHARACTERSTICS

##### A. User characteristics

This project is aimed to be used by the traffic management system where they can get to know the type of traffic or type of accident through online portal and takes required action. It will be designed in a way that even an illiterate can also make use of the product. But this application which we are developing is mainly aims to the traffic system as they need to keep up to the technology of current generation.

##### B. User Requirements

To create a portal lets user to know the type of accident or type of traffic. To create a web-based transport system. To get the image of video prediction with the accuracy of more than 80%.

##### C. Product Perspective

This project is a web-based portal that is used to report the type of traffic or type of accident in a particular area. The web application should be compatible with all browser platforms. User uploads the image or a video of the traffic present in his locality. The location of the traffic found by the user Data has to be stored in a database following all the ACID properties.

#### V. APPLICATION HARDWARE AND SOFTWARE OVERVIEW

##### A. Efficiency

This application must store an image of garbage even bigger than 5MB. This application can store a total of 300 images depending on the free space available. This application must predict the type of image or accident within 2 seconds. This database can be scaled to add more images of garbage.

##### B. Portability

The application is a full stack web application. Hence, it is compatible to all the browsers that support and render web pages. It is easily portable as it is implied on a regular computer. The user can access the computer from the place where the system was installed.

##### C. Usability

Our portal is intuitive and self-explanatory. It has an easy workflow of tasks that can be done by the user. The software system is simple to comprehend, discover and manage. The portrait as signal can be provided by the reader.

##### D. Reliability

For any number of users input the system must produce accurate results. Also, the application needs to be available all the time.

##### E. Economic

This project will determine the economic impact of the system on the company. The costs incurred during the project development phase must be justified. Consequently, the system built was made budgetary by the fact that most of the technologies used were readily available. The only items to be purchased were personalized items.

##### F. Environmental

This project needs an explicit computer to process the data that is being recorded in traffic cameras.

##### G. Social

The main social requirement of the project is the acceptance rate of the user. The user using the application shouldn't rebel with the application but instead should accept the product and promote the product if necessary.



#### H. Political

The government can also support implementation of this by allocating dedicated ambulance services to this system so that response would be quick.

#### I. Ethical

The application is to adhere and oblige all the ethical standards set by the ethical board committee. This product's use does not include any unethical practices and adheres to all legal societal prosperities; as long as it is used in a good manner, there will be no ethical issues.

#### J. Health and Safety

Implementation of this in traffic video monitoring could actually save many lives by responding immediately to accidents, as humans cannot always check everything.

#### K. Sustainability

Since there is no confidentiality in data collected and obtained there would be no problems like theft and hacking.

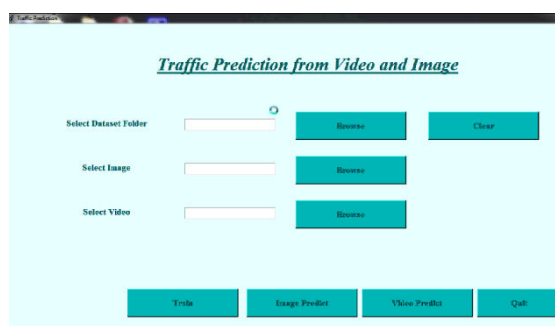
#### L. Legality

It is published as an open-source software which can be implemented in a traffic monitoring system.

### VI. FUNCTIONALITY OF THE PROPOSED MODEL

This project is aimed to be used by the traffic management system where they can get to know the type of traffic or type of accident through online portal and takes required action. It will be designed in a way that even an illiterate can also make use of the product. But this application which we are developing is mainly aims to the traffic system as they need to keep up to the technology of current generation. This model can be implemented effectively with higher internet speeds.

### VII. IMPLEMENTATION



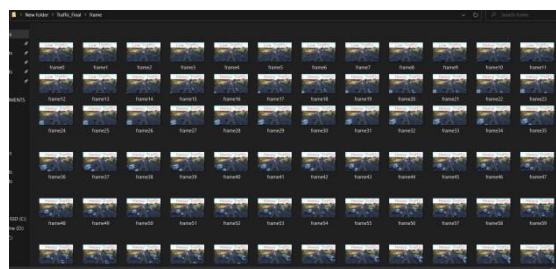
**Fig1:** Main page: To import files , images , and vedios.





(d)

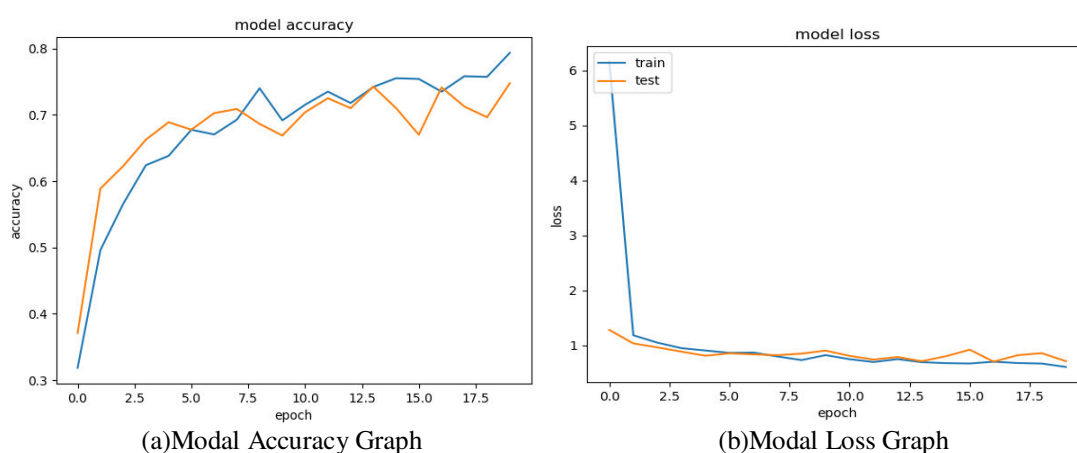
**Fig 2:** Predicted output embedded on the image.(a)Heavy Traffic (b) Low Traffic (c)Fire Accident (d)Accident



**Fig 3:** Predicted output for video by dividing into frames

## VIII. PERFORMANCE ANALYSIS

The experiment is carried out with the input parameters in the convolution neural network. Our model is tested on the input of 200 images on each class once the training is completed. The experimental results show that 80 percent of our model is accurate. We used an epoch of 20, with a number of epochs, the precision increased.



**Fig 4:**(a)Modal Accuracy Graph (b)Modal Loss Graph

This project is mainly based on CNN algorithm. There are four classes of images. They are dense traffic, sparse traffic, fire accident and normal accident. We consider the high and low traffic detection under traffic section and the fire and accident are considered under the accident section. Our main objective is to classify the given input image or video into high traffic, low traffic, fire accident and normal accident by obtaining the trained model from input traffic and accident dataset. First, the video is divided into frames using openCV and then series of operations such as dimension reduction,

noise reduction, are done on the image and passed through the trained CNN model to identify the image. This live process identification from the surveillance cameras can predict traffic and suggest best traffic routes for the commuters and also save lives by immediately responding to the accidents and fire accidents on road.

## IX .CONCLUSION

The theoretical network is specialised to automatically detect road state of congestion in order to facilitate the deployment of deep learning technologies in transportation applications. This is offered as a way to connect today's powerful deep learning algorithms with real-world applications. For training and validation, we proposed the Convolutional Neural Network (CNN). We looked at it as a problem with many classes. The detection accuracy for the fresh input images, on the other hand, is not as good as it is for the validation set.

## X. ACKNOWLEDGEMENT

This activity allows us to have a better understanding of the subject and go beyond the book's scope. We'd want to use this opportunity to offer our heartfelt gratitude to our instructor for his assistance and encouragement during this effort.

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