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Traffic anomaly detection using deep learning

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Abstract: Fatality on roads is one of the biggest issues due to which people lose their life. The enormous number of participant injuries and fatalities emphasizes the essential necessity for worldwide road safety. Our project focuses on gathering photos, comparing them to the training dataset, and categorizing them as accidents or not accidents. A message is then sent to the nearby hospital along with the coordinates of the accident's location. We employed the Densenet-161 architecture for this project where each layer is connected to all layers next to it. This is done in order to maximize the information flow between network tiers as each layer sends its information gained to all the layers next to it. In contrast to Resnet, it connects features rather than adding features to them to combine features. As a result, the "ith" layer contains I inputs and is made up of all the convolutional blocks' passing features. All other "n-i" layers are split into its own features. Data from on-board cameras is validated using a comparicon with straightforward classifiers that use only video or audio data. This introduces '(n(n+1))/2' connections in the network as opposed to just 'n' connections as in traditional deep learning using a learning system, the learning system is located. The trained algorithm is tested using YouTube clips of related incidents. According to experimental tests, the suggested CAR detection system outperforms various improved classifiers and it offers up to 80% accuracy.

Keywords: CNN, densenet, accidents.

1 INTRODUCTION

In India, deaths from people were the main cause of death. The cause of more than 80% of deaths related to the aftermath is not the casualty in and of themselves, but rather the delay in providing assistance to the sufferers. An accident victim may be unnoticed for a very long time on roadways with quick traffic and unattended injuries which might require immediate medical attention. We propose to develop a system that can recognise collisions based on real-time video feed from the surveillance camera placed on a highway. In order to categorize frames into accident/ no accident, a deep learning neural network model has been trained to do so for each frame of the video. oblique neural networks must be The system's early detection and subsequent notification of the appropriate authorities are intended to assist potential victims in an emergency. The emphasis is on the detector for accidents and no accidents, which uses advanced deep learning algorithms and unconventional accident and accident-freeing algorithms. We concentrate on installing this technology with this proposed approach on highways where there is less traffic and it is more difficult to provide victims with rapid assistance. uses the proposed incident detection model to run it in order to find when the accidents have occured.

2 LITERATURE REVIEW

Detecting Anomalies in Semantic Segmentation with Prototypes in [1] by Dario Fontanel,Fabio Cermelli,Massimiliano Mancini, Barbara Caputo published on 2021, IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR).The objectives of the work carried out are to propose a novel perspective for the anomaly segmentation problem, utilizing class specific scores rather than probabilities in the process of recognizing anomalous pixels.Gaps identified wereTraining these models is expensive, and their generated artifacts may create false anomalies.

Anomaly Detection in Road Traffic Using Visual Surveillance: A Survey in [2] by Kelathodi Kumaran Santhosh, Debi Prosad Dogra,Partha Pratim Roy published on 2019 ,arXiv.org, Cornell University.The objectives of the work carried out are they performed exhaustive study on anomaly detection and explored various techniques.No particular gap as it is a review paper.

Accident Detection, Severity Prediction, Identification of Accident Prone Areas in India and Feasibility Study using Improved Image Segmentation, Machine Learning and Sensors in [3] by Vipul Gaurav, Sanyam Kumar Singh, Avikant Srivastava published on 2019,International Journal of Engineering Research & Technology (IJERT) The objectives of the work carried out are to develop a system that could analyze road accidents and provide enhanced alert systems.Gaps identified were alert system could be enhanced through data collection system and tracking systems to monitor the accident prone areas.

Road Anomaly Detection by Partial Image Reconstruction with Segmentation Coupling in [4] by Tomas Vojir, Tomas Sipka, Rahaf Aljundi, Nikolay Chumerin, Daniel Olmeda Reino,Jiri Matas published on 2021 IEEE.org.The objectives of the work carried out are reconstruction module that can be used with many existing semantic segmentation networks

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trained to recognize and reconstruct road surfaces and its inability to reconstruct a part of the road is used as an indicator of an anomaly.Gaps identified were the method still produces false positives, especially on thin structures e.g. long cracks or lane markings. We also observed performance deterioration for lower image quality, e.g. due to strong JPEG artifacts or acquisition.

3 HYPOTHESIS

There are many existing systems that provide an accident detection system based on data read by the sensors. This project takes in video input feed from the cameras and detects whether there is an accident.That is, the user gives a video input.The input is read frame by frame and fed into the model which then gives the results in real time.

When the software starts a window comes up showing the video input.The input is read with a certain frame rate and when the accident is detected a text showing the accident label is displayed over the window.The window will run continuously till the video ends.
When an accident is detected a web page is opened in the background. The main landing page shows the latitude and longitude of the video location and distance from the location and a timestamp.Also the snapshots of all the accidents are saved and can be viewed through the link in the landing page.The webpage has been built using PHP and the backend video input feed using python and OpenCV.

4 METHODOLOGY

Accident detection with an effective alert system together could be a very effective solution.Use of convolution neural networks would be much simpler and powerful when trained correctly.Densenet model will be used which is a much more complex neural network than normal cnn.Training with a large dataset would yield a much better results.This aspect of using densenet would be different approach than that of the normal methods.The methodology comprises three major steps which are described as follows:
1. Data collection and preprocessing- The data is extracted from the kaggle repository and also random images from google.The dataset collected is around 15,000 images which have been divided into two labels accident and no accident.Each of the images are resized to 512 x 512 pixel sizes for evenness.Images are then preprocessed into grayscale images appropriate for the model.
2. We Enhanced the Densenet-161 architecture for this project. Dense Convolutional Network (DenseNet), which uses a feed-forward connection to connect each layer to each other layer. Our network has L(L+1)/2 direct connections, whereas standard convolutional networks with L layers have L connections—one between each layer and the following layer. All remaining layers' characters are utilized as inputs for each layer, and those levels' own characters are used as inputs for all succeeding layers. The vanishing gradient problem is reduced, functionality is improved, feature reuse is supported, and there are a lot less parameters thanks to dense networks.
3. Interface Development- An interactive web interface using php,html,css,js was developed.The application starts with video input where it displays the label if the accident is detected.When the accident is detected a website is opened in background which displays the timestamp of when the accident is detected and latitude,longitude details based on which it shows distance from our location to the accident site.The interface has a separate log button which redirects to another page where it displays all the frames form the video where accident was detected.
4 Taking care of methodologies is very important so is having clarity on it. Designing is the basic requirement for any kind of project development. Hence, having a detailed plan helps in the smooth development of the project.

5 RESULT AND ANALYSIS

This project uses densenet-161 model.Model was trained using 15000 images. The model was checked against the test set and the accuracy was around 92%.

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Test Loss: 0.180987

Test Accuracy of accident: 89% (878/983)
Test Accuracy of noaccident: 93% (1823/1943)

Test Accuracy (Overall): 92% (2701/2926)
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Fig 1. Testing accuracies of the model.

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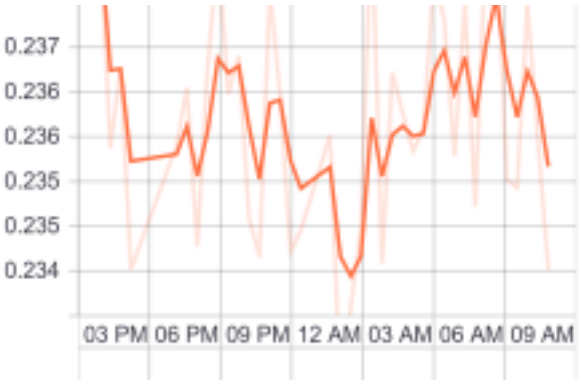

Fig 2. Training loss of the model over the epochs for accident detection

The above models have been implemented in an algorithm for detecting accidents in the video input provided by the user.It will use video input, read it frame by frame and show an accident label when there is an accident detected.It also will redirect user to a web interface where use can see the details like time date of when the accident is detected and also location.User can view frames of the videos where accident is detected in the interface.This project is tested on the local system and is also evaluated with random test videos.

5

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Fig 3. UI of the application

Figure 3 represents the UI for the project that has been implemented using php,html and css.

6 CONCLUSION AND FUTURE WORK

Road accidents on a daily basis is one of the biggest reasons why people lose their life and property. The suggested strategy provides a highly useful and efficient answer to this problem. The proposed technology for detecting traffic accidents can monitor the accidents caused and immediately report it to the nearest hospital/police station as it happens. Compared to other systems already in use, which are made up of expensive sensors and underused technology, the suggested system is far more dependable, cost-effective, and accurate than its rivals. This is mostly due to the model-based approach. It is now possible to deploy this approach in the majority of cases thanks to the results of experimentation, testing, and verification using photographs, which demonstrate thajt greater sensitivity and accuracy are now indeed accomplished with this method.

7 REFERENCES

[1]"Detecting Anomalies in Semantic Segmentation with Prototypes",Fontanel,Fabio Cermelli,Massimiliano Mancini,Barbara Caputo,IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR),2021.

[2] "Anomaly Detection in Road Traffic Using Visual Surveillance: A Survey", Kelathodi Kumaran Santhosh, Debi Prosad Dogra,Partha Pratim Roy,arXiv.org, Cornell University,ISSN:2331-8422,2019.

[3] "Accident Detection, Severity Prediction, Identification of Accident Prone Areas in India and Feasibility Study using Improved Image Segmentation, Machine Learning and Sensors" ,Vipul Gaurav, Sanyam Kumar Singh, Avikant Srivastava, International Journal of Engineering Research & Technology (IJERT),2019.

[4] "Road Anomaly Detection by Partial Image Reconstruction with Segmentation Coupling",Tomas Vojir, Tomas Sipka, Rahaf Aljundi,Nikolay Chumerin, Daniel Olmeda Reino,Jiri Matas, IEEE.org,2021

[5]National Crime Records Bureau of Data, India, 2016

[6] The World Health Organization Global Status Report on Road Safety, The World Health Organization; Geneva, Switzerland, 2018.

[7] Manisha Nuikar, "National Statistics of Road Accidents in India", Journal of Orthopaedics,Traumatology and Rehabilitation, January, 2013.

[8] Nikki Kattukkaran, Arun George, Mithun Haridas T.P., "Intelligent Accident Detection and Alert System for Emergency Medical Assistance", IEEE International Conference on Computer communication and Informatics, 2017.

[9] Sanjay Kumar Singh, "Road Traffic Accidents in India: Issues and Challenges", World Conference on Transport Research - WCTR 2016 Shanghai. 10-15 July, 2016. [10] Chaitali Khandbahale, Nikita Pawar, Jay Rathod, Karan More, "Multi Object Detection inVehicle for Accident Prevention and Safety Assistance using Embedded System-Implementation Paper", International Journal of Engineering Research & Technology, May 5,2019.

[11] Nedjet Dogru,Abdulhamit Subasi, "Traffic Accident Detection By Using Machine Learning Methods", International Symposium on Sustainable Development , March 2012.

[13] Vipul Rana, Hemant Joshi, Deepak Parmar, Pradnya Jadhav Monika Kanojiya, "Accident Detection using Machine Learning Algorithm", International Research Journal of Engineering and Technology(IRJET), March 3, 2019.

[14] Deeksha Gour , Amit Kanskar, "Optimised YOLO:Algorithm for CPU to Detect Road Traffic Accident and Alert System", International Journal of Engineering Research & Technology (IJERT), September 16, 2019.

[15] Xi Jianfeng, Guo Hongyu, Tian Jian, Lisa Liu, Liu Haizhu, "A Classification and Recognition Model for the Severity of Road Traffic Accidents ", SAGE Journal , May 22 ,2019.

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ISO 3297:2007 Certified ⁜ Impact Factor 7.39 ⁜ Vol. 11, Issue 7, July 2022

DOI: 10.17148/IJARCCE.2022.11791

[16] Raad Ahmed Hadi, Ghazali Sulong, Loay Edwar George, "Vehicle Detection and Tracking Techniques: A Concise Review", Signal and Image Processing: an International Journal, Vol 5,February, 2014.

[17] Zhong-Qiu Zhao, Peng Zheng, Shou-tao Xu, and Xindong Wu, "Object Detection with Deep Learning: A Review", IEEE Transactions on Neural Networks and Learning Systems,April 16, 2019.

[18] Kaiming He, Georgia Gkioxari, Piotr Dollar, Ross Girshick, "Mask R-CNN", Facebook AI Department of ISE 2021-22 Page 32 Traffic anomaly detection using deep learning AI/ML Project Research (FAIR), 2018.

[19] Sodikov, Jamshid, "Road Traffic Accident Data Analysis and Visualization in R", International Journal of Computer Science Engineering and Information Technology Research(IJCSEITR), 2018.

[20] S. Ramya, SK Reshma, V. Dhatri Manogana, Y. Satya Saroja, "Accident Severity Prediction using Data Mining Methods", International Journal of Scientific Research in Computer Science,Engineering and Information Technology, Vol 5, Issue 2, 2019. [21] Jabar H. Yousif, Al Rababba Mamoun S, "Neural Technique for Predicting TrafficAccidents in Jordan", Journal of American Sciences, November, 2013.