Traffic Prediction Using Convolution Neural Network

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Abstract- *This project will be accurate and timely with the use of a computer tool. In addition to traffic signals, accidents, rallies, and road repairs that cause traffic jams, the traffic environment includes traffic signals, accidents, rallies, and traffic jams. The above and other factors affecting traffic allow us to make an informed decision based on our prior knowledge. Additionally, autonomous vehicles will benefit from it. Statistics on traffic have become more important in recent years. As a sector, transportation has been experiencing exponential growth in data generation. Real-world applications do not lend themselves to many traffic flow models. After collecting traffic data and building modeling models, it was decided to investigate the forecasting of traffic flow. Considering there are so many data points available, it can be difficult to forecast transportation system traffic flow accurately. In order to reduce the complexity of the traffic analysis, we used machine learning, openCV algorithms, and deep learning algorithms. As part of the project, we used this image for categories such as accidents, dense traffic, fires, and sparse traffic. Machine learning systems use these images to recognize traffic patterns and provide monitoring, analysis, and alerts in real-time. DeepQuest AI produces machine learning algorithms using this model that can recognize, comprehend and adapt to a range of daily situations they confront.*

I. INTRODUCTION

Traffic flow information is essential for businesses, government agencies, and individuals. Intelligent Transportation Systems (ITSs) enable traffic flow predictions to be more accurate, thereby reducing congestion, improving traffic operations, and reducing carbon emissions. In addition to inductive loops, radars, cameras, mobile GPS, crowdsourced data, and social media, this system combines sensors to create a traffic flow. Data about transport and traffic can be used in the present, as well as in the past, to determine traffic flow. An outlet of news. We are entering the era of massive data transport and traffic data is exploding with the advent of new sensors and new technologies. In recent years, traffic control and management have become increasingly data-driven. Despite the enormous amounts of data, numerous systems and models use shallow traffic models and as a result fail.

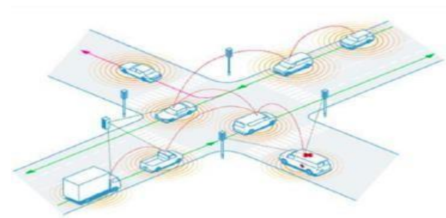

Fig.1 Virtual representation of traffic

II. RELATED WORK

CAs a result of an enormous amount of complicated algorithms and statistical models, computer systems are no longer able to accomplish simple tasks. Instead, traffic-management servers are the preferred way to compare In lA long with improved accuracy, the things algorithms will also be improved. large cities, GPS navigation is a popular method of navigating and computing becomes increasingly difficult on a daily basis, the collected data could be used to visualize the current traffic in the city.ed In the future, it will also be possible to prepare traffic forecasts and analyze. We waste resources and time in vehicular traffic.ime In this paper, a machine learning algorithm is presented for traffic prediction. this paper. As well as the data included in the US traffic 2015 dataset, since this is actual traffic data, not a simulation, researchers are able to leverage patterns from this study to make significant advances over time using different dataset sets. GBy focusing on data-driven solutions, we can find the answer to tough problems. We propose a method in this paper for constructing a machine learning model that can use hidden insights into vehicular movements to predict traffic volume. share their contribution of predicting traffic in In this article, they share their contribution of predicting traffic in the future, in order to make life on a daily basis more efficient. The use of Genetic Algorithms and Machine Learning in data analysis is the machine learning community, it has not received much discussion. accuratIn addition to being more accurate, it also has a higher level of complexity. accuracy from the things algorithms, it will be enhanced.

III. METHODOLOGY

A CNN analyzes a small region in an image by using a set of neurons arranged into three-dimensional structures. The visual cortex in the human brain is the organ in which

CNN simulates the connectivity pattern of neurons. In the brain, a particular group of neurons is responsible for identifying certain features of an image. In a CNN, each feature is converted into a vector of probability scores showing whether each belongs to a specific class based on its features. In order to determine a CNN's performance and efficiency, its architecture is crucial. Often, how a layer is structured, arranged, and designed will determine how quickly a system will perform certain functions. It uses multichannel images and is driven by volume. Color digital images are encoded as RGB (red-blue-green) colors which are blended into the perceived color spectrum by CNNs. Three layers of images like this are fed into the convolutional network repeatedly. When you look at a color image, you see a rectangular box whose dimensions are determined by how many pixels there are.

IV. RESULTS

Figures shows the results of the type of traffic causes predicted in this project. Fig 1(a) is the Fire input read by the camera, Fig 1(b) is the predicted output of Fire. When two or more vehicles collide ,and if the vehicles catches fire or if fire is occurred on the road due to some miscellaneous activities then it predicts the output as fire incident and this is shown in the form of percentage .

Fig 1(a)

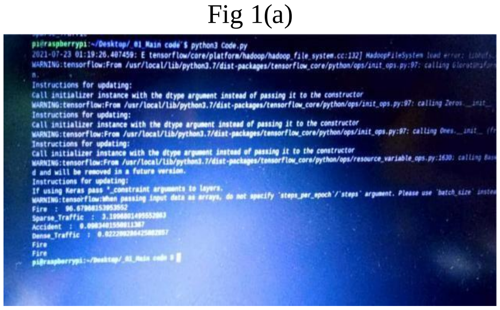

Fig 1(b)

In fig 1(b), the value of fire is greater than other parameters. The value of fire from the given input is 96.67%, therefore the output is fire. The percentage of sparse traffic, dense traffic and accident are 3.15%, 0.92% and 0.03% respectively.

Fig 2(a) is the Sparse Traffic input read by the camera, Fig 2(b) is the predicted output of Sparse Traffic when there are less number of vehicles on the road, the cnn module predicts it as sparse traffic . Sparse traffic results are given in the form of percentage.

Fig 2(a)

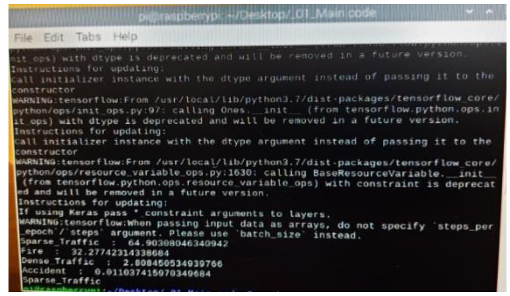

Fig 2(b)

In fig 2(b), the value of sparse traffic is greater than other parameters. The value of sparse traffic from the given input is 64.90%, therefore the output is sparse traffic. The percentage of fire, dense traffic and accident are 3.2%, 2.8% and 0.01% respectively.

Fig 3(a)

Dense Traffic input is shown in figure 3(a) by the observer watching from a lag car as it is read by camera data. The result of Dense Traffic is shown in Fig. 3(b). Based on the observations on 40 data points collected during the survey, the data is in the form of observer counts and times.

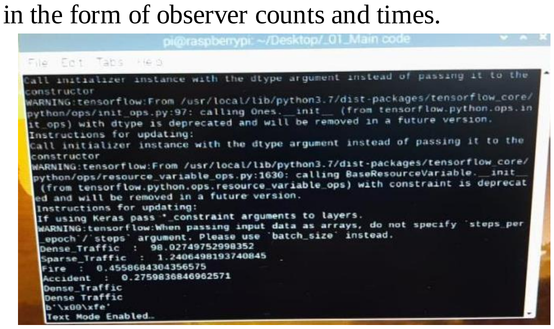

Fig 3(b)

In fig 3(b), the value of dense traffic is greater than other parameters. The value of dense traffic from the given input is 98.02%, therefore the output is dense traffic. The percentage of fire, sparse traffic and accident are 0.45%, 1.24% and 0.27% respectively.

Fig 4(a)

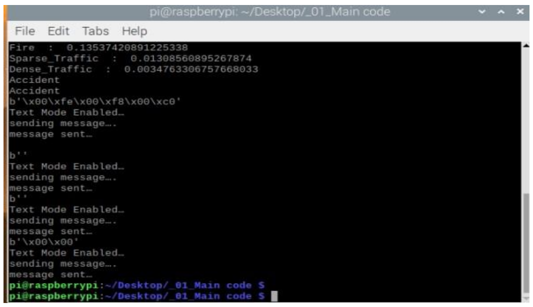

Fig 4(b)

For the entire survey period, tracking data are collected for both smart phones. There are about 8400 records per mobile, including geo-location, spot speed, and time within 0.01 seconds .

Fig 4(a) shows the input for the accident, while Fig 4(b) shows its output. Vehicles collide with pedestrians, animals, or stationary objects such as trees, poles, and buildings during a traffic crash. These accidents typically lead to serious injuries, disabilities, and deaths, in addition to extensive property damage and high medical bills. It's a fact that transport on the road is one of the most dangerous situations people face every day, but the number of casualties from such accidents finds less attention in the media than those from other, less common types of incidents.

In fig 4(b), the value of accident is greater than other parameters. The value of accident from the given input is 98.12%, therefore the output is dense traffic. The percentage of fire, sparse traffic and dense traffic are 0.13%, 0.01% and 0.003% respectively.

REFERENCES

[1] JESÚS MENA-OREJA AND JAVIER GOZALVEZ,A Comprehensive Evaluation of Deep Learning-Based Techniques for Traffic Prediction Digital Object Identifier 10.1109/ACCESS.2020.2994415,May 28, 2020

[2] B. Karthika, N.UmaMaheswari, R.Venkatesh, A Research of Traffic Prediction using Deep Learning Techniques, International Journal of Innovative Technology and Exploring Engineering (IJITEE)ISSN: 2278-3075, Volume8, Issue- 9S2, July 2019

[3] Yuhan Jia,1,2 Jianping Wu,1 and Ming Xu1,Traffic Flow Prediction with Rainfall Impact Using a Deep Learning Method, Hindawi Journal of Advanced Transportation, Volume 2017, Article ID 6575947

[4] Charalampos Bratsas , Kleanthis Koupidis ,Josep-Maria Salanova,Konstantinos Giannakopoulos, Aristeidis Kaloudis and Georgia Aifadopoulou ,A Comparison of Machine Learning Methods for the Prediction of Traffic Speed in Urban Places, MDPI Sustainability 2020, 12, 142; doi:10.3390/su12010142

[5] Bhaskar Chowdhury, Maithili Kinhikar, Mrs. N. Noor Alleema, Road Traffic Prediction using Machine Learning, International Research Journal of Engineering and Technology (IRJET) ,Volume: 06 Issue: 04 | Apr 2019

[6] Shu-bin Li, Guang-min Wang, Tao Wang, and Hua-ling Ren, Research on the Method of Traffic Organization and Optimization Based on Dynamic Traffic Flow Model, Hindawi Discrete Dynamics in Nature and Society Volume 2017, Article ID 529261

[7] Hongzhao Dong, Shuai Ma, Mingfei Guo, and Dongxu Liu on 17. Research on Analysis Method of Traffic Congestion Mechanism Based on Improved Cell Transmission Model Hindawi Publishing Corporation,2017.

[8] Aditya Krishna K.V.S, Abhishek K, Allam Swaraj, Shantala . Devi Patil, Gopala Krishna Shyam on Smart Traffic Analysis using Machine Learning,International Journal of Engineering and Advanced Technology (IJEAT),May, 2019

[9] Er. Faruk Bin Poyen, Amit Kumar Bhakta, B.Durga Man ohar, 19. Imran Ali, Arghya Santra, Awanish Pratap Rao on Density Based Traffic Control ,International Journal of Advanced Engineering, Management and Science (IJAEMS),Aug- 2016.

[10] Fei-Yue Wang et al. Parallel control and management for intelligent transportation systems: Concepts, architectures, and applications. IEEE Transactions on Intelligent Transportation Systems, 2010.

[11] Yongchang Ma, Mashrur Chowdhury, Mansoureh Jeihani, and Ryan Fries. Accelerated incident detection across transportation networks using vehicle kinetics and support vector machine in cooperation with infrastructure agents. IET intelligent transport systems, 4(4):328–337, 2010.

[12] Rutger Claes, Tom Holvoet, and Danny Weyns. A decentralized approach for anticipatory

vehicle routing using delegate multiagent systems. IEEE Transactions on Intelligent Transportation Systems, 12(2):364–373, 2011.

[13] Mehul Mahrishi and Sudha Morwal. Index point detection and semantic indexing of videos - a comparative review. Advances in Intelligent Systems and Computing, Springer, 2020.

[14] Joseph D Crabtree and Nikiforos Stamatiadis. Dedicated short-range communications technology for freeway incident detection: Performance assessment based on traffic simulation data. Transportation Research Record, 2000(1):59–69, 2007.

[15] H Qi, RL Cheu, and DH Lee. Freeway incident detection using kinematic data from probe vehicles. In 9th World Congress on Intelligent Transport SystemsITS America, ITS Japan, ERTICO (Intelligent Transport Systems and ServicesEurope), 2002.

[16] Soham Sarda, Janhavi Chavare, Rohit Bhosale,Akshay Birajdar on Traffic Congestion: Causes And Solutions Case Study: Hinjewadi, Pune, International Research Journal of Engineering and Technology (IRJET), 2018.

[17] Z. Zhao, W. Chen, X. Wu, P. C. Y. Chen, and J. Liu. Lstm network: a deep learning approach for short-term traffic forecast. IET Intelligent Transport Systems, 11(2):68–75, 2017.

[18] Chao Fang, Depan Gao,Yaning Xue, Zhihua Xiong. Research on short-term traffic flow prediction method based on real-time traffic status,IOP Conf. Series: Materials Science and Engineering 569 (2019)

[19] S. Narmadha, Dr.V.Vijaya Kumar,A SURVEY ON BIG DATA BASED VEHICLE TRAFFIC FLOWPREDICTION USING DEEP LEARNING ALGORITHMS, Internal Journal of Advance Research in Science and Engineering (IJARSE),Volume no :06,issue no:12,December 2017

[20] Rohit Jadhav, Prathamesh Josh, Chaitall Bhadane, Harshall Neve. On Automatic Traffic Management System. international Research Journal of Engineering and Technology (IRJET),nov 2019.