VEHICLE PATTERN RECOGNITION USING MACHINE AND DEEPLEARNING TO PREDICT CAR MODEL

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ABSTRACT

In recent times, there has been a drastic change in people's lifestyles and with an increase in incomes and lower cost of automobiles there is a huge increment in the number of cars on the roads which has led to traffic and commotion. The manual efforts to keep people from breaking traffic rules such as the speed limit are not enough. There is not enough police and man force available to track the traffic and vehicles on roads and check them for speed control. Hence, we require technologically advanced speed calculators installed that effectively detect cars on the road and calculate their speeds.To implement the above idea two basic requirements, need to be met which are the effective detection of the cars on roads and their velocity measurement. For this purpose, we can use OpenCV software which uses the Haar cascade to train our machine to detect the object, in this case the car.we have developed a Haar cascade to detect cars on the roads, whose velocities are then measured using a python script. The real-time application of this project proves to be much useful as it is easy to implement, fast to process and efficient with low cost development. Also, the tool might be useful to apply in simulation tools to measure velocities of cars. This can be further developed to identify all kinds of vehicles as well as to check anyone who breaks a traffic light. The improvements in the project can be done by creating a bigger haar cascade since bigger the haar cascade developed, more the number of vehicles that can be detected on the roads.

Key Words : OpenCV, Haar Cascade

1. INTRODUCTION

Vehicle model prediction using machine and deep learning techniques is an area of research and application that aims to accurately predict the specific model or type of a car based on various input features. This prediction task has numerous practical applications in the automotive industry, including vehicle manufacturing, sales and marketing, insurance, and maintenance. Machine learning and deep learning algorithms provide powerful tools to process and analyze large volumes of data, enabling accurate predictions and valuable insights. By training models on historical data, these and relationships between car attributes and their corresponding models. The trained models can then be used to predict the model of a car given its characteristics. Machine learning approaches for vehicle model prediction often involve the use of algorithms such as random forests, support vector machines (SVM), or gradient boosting. These algorithms are capable of capturing complex patterns in the data and making accurate predictions based on the input features. Deep learning techniques, on the other hand, leverage artificial neural networks with multiple layers to extract intricate representations and patterns from the input data. Neural networks, with their ability to learn hierarchical features, have shown great success in various domains, including computer vision and natural language processing. In the context of vehicle model prediction, deep learning models can learn complex relationships between car attributes and predict the car model with high accuracy.The process of vehicle model prediction involves several key steps. First, a dataset containing features such as make, year, horsepower, fuel efficiency, and other relevant attributes is collected. This dataset is then preprocessed, which may include handling missing values, encoding the categorical variables, and normalizing numerical features.Next, the dataset is divided into a training set and a test set. The training set is used to train the machine learning or deep learning model, while the test set is used to evaluate the model's performance and assess its ability to generalize to unseen data.During the training phase, the model learns the underlying patterns and relationships between the input features and the target variable (car model) through an optimization process that minimizes the prediction errors. The model's performance is evaluated using various metrics, such as accuracy, precision, recall, or F1-score, to assess its predictive capabilities.Once the model is trained and validated, it can be deployed and used to predict the model of new, unseen cars. By inputting the relevant attributes of a car into the model, it can provide a prediction of the car's model with a certain level of confidence.Overall vehicle model prediction using machine and deep learning techniques offers a valuable tool for automakers, dealerships, insurance companies, and other stakeholders in the automotive industry. Accurate predictions can assist in inventory improved customer experience.

2. LITERATURE SURVEY

2.1 INTRODUCTION

Vehicle detection and statistics in highway monitoring video scenes are of considerable significance to intelligent trafficmanagement and control of the highway. With the popular installation of traffic surveillance cameras, a vast database of traffic video footage has been obtained for analysis. Generally, at a high viewing angle, a more-distant road surface can be considered. The object size of the vehicle changes greatly at this viewing angle, and the detection accuracy of a small object far away from the road is low. In the face of complex camera scenes, it is essential to effectively solve the above problems and further apply them. In this article, we focus on the above issues to propose a viable solution, and we apply the vehicle detection results to multi-object tracking and vehicle counting.

2.2 EXISTING SYSTEM

Oneof the technologies our law enforcement department uses to measure the speed of a moving vehicle is Doppler radar. It beams a radio wave at a vehicle, and then estimate the vehicles speed by measuring change in reflected wave frequency. It is a fixed or hand-held device and is reliable when a moving object is in the field of view and no other moving objects are nearby. Cosine error has to be taken care if the gun is not in the line of sight. Also Radio interference which causes errors in speed detection has to be taken care. With the increase in urban population in many cities, amounts of vehicles have been drastically increased. In a recent study over-speeding caused most of the accidents, followed by drunken driving. Over-speeding of two-wheelers and three wheelers is one of the major reasons of accidents. In order to support traffic management system in our country we need to build economical traffic monitoring systems. In recent times image and video processing has been applied to the field of traffic management system. This paper explicitly concentrates on the speed of the vehicles, which is one of the important parameters to make roads safe.

2.3 PROPOSED SYSTEM

The manual efforts to keep people from breaking traffic rules such as the speed limit are not enough. There is not enough police and man force available to track the traffic and vehicles on roads and check them for speed control.Hence, we here require technologically advanced speed calculators installed that effectively detect cars on the road and calculate their speeds. To implement the above idea two basic requirements, need to be met which are the effective detection of the cars on roads and their velocity measurement. For this purpose, we can use OpenCV software which uses the HAAR cascade to train our machine to detect the object, in this case the car.

3. DESIGN

Design is a meaningful engineering representation of something that is to be built. Software design is a process through which the requirements are translated into a representation of the software. Design is the place where quality is fostered in software engineering. Design is the perfect way to accurately translate customer's requirement in to a finished software product. Design creates a representation or model, provides detail about software data structure, architecture, interfaces and components that are necessary to implement a system

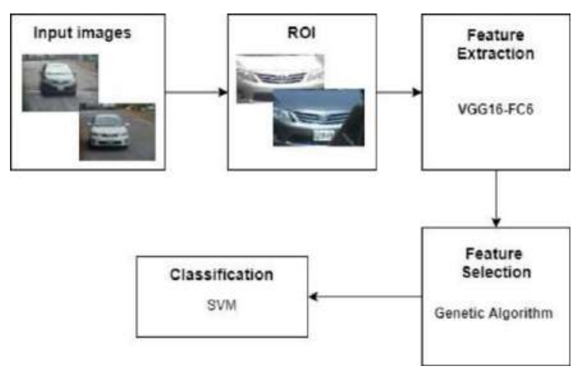

Figure 1. System Architecture

4. FUTURE ENHANCEMENT

In future the noise will be consider as a pre-processing step. The proposed model performed well without noise, providing accurate prediction of some test images. Although it is accurate, but that it is not 100% accurate. We hope that our system will benefit from progress in this area.

Future Enhancements for Vehicle Model Prediction using Machine and Deep Learning to predict car models can include: Enhanced Model Architectures: Explore more advanced deep learning architectures such as recurrent neural networks (RNNs), long short-term memory (LSTM) networks, or transformer models to capture temporal dependencies and long-term patterns in vehicle data.

Transfer Learning: Investigate the use of transfer learning techniques to leverage pre-trained models on large- scale datasets, such as ImageNet, and adapt them to the vehicle model prediction task. This approach can help improve performance, especially when limited labeled data is available.

5. IMPLEMENTATION

5.1. Upload Image:

we apply each component on all the preparation pictures. For each component, it finds the best limit which will characterize the countenances to positive and negative. Be that as it may, clearly, there will be blunders or misclassifications. We select the elements with least mistake rate, which implies they are the elements that best orders the auto and non-auto pictures.

5.2. Train Dataset:

Now every single conceivable size and areas of every part is utilized to ascertain a lot of components. (Simply envision what amount of calculation it needs? Indeed, even a 24x24 window comes about more than 160000

5.3. Upload Test & Classify:

This velocity and the distance of the camera in feet from the car (i.e. the height of camera above the car) is printed on the output screen.

6. CONCLUSION

In conclusion, vehicle model prediction using machine and deep learning techniques offers promising possibilities in accurately identifying car models based on various input features. By leveraging large datasets and powerful algorithms, these models can provide valuable insights and applications in automotive industry, such as manufacturing, marketing, insurance, and maintenance.

7. REFERENCES

1. The Primary News Article: http:// articles.timesofindia.indiatimes.com/ 2012-06- 27/chandigarh/32439930_1_road-accidents-nakas-internalroads PF Felzenszwalb, RB Girshick, D Mcallester, and D Ramanan, "Object detection with discriminatively trained part-based models," IEEE Transactions on Pattern Analysis and

Machine Intelligence, Vol. 32, No. 9, pp. 1627-1645, 2010.

2. Y Jia, E Shelhamer, J Donahue, S Karayev, J Long, R Girshick, S Guadarrama, and T Darrell, “Caffe: Convolutional architecture for fast feature embedding,” Proceedings of the 22nd ACM international conference on Multimedia, Orlando, Florida, USA, 03-07 November, 2014, pp 675-678.

3. A Krizhevsky, I Sutskever, and GE Hinton, “Imagenet classification with deep convolutional neural networks,” Proceedings of the 25th International Conference on Neural Information Processing Systems, Lake Tahoe, Nevada, 03-06 December, 2012, Vol. 1, pp. 1097-1105.

4. Z Cao, T Simon, S-E Wei, and Y Sheikh, “Real time multi-person 2D pose estimation using part affinity fields,” Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Honolulu, HI, USA, 21-26 July 2017.