ADVANCED TRAFFIC SIGN AND LANE DETECTION FOR AUTONOMOUS VEHICLES USING SSLA TECHNIQUES

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ABSTRACT—Autonomous vehicles are another term for self-driving automobiles. This vehicle has the ability to sense its environment. The different actuators in the automobile work in line with the processed detected parameters without the need for human interaction. An autonomous vehicle functions without a human driver, just like a conventional automobile. Autonomous vehicles employ sensors, actuators, software, and machine learning techniques for all Automated Functions. Autonomous cars rely heavily on software. The software architecture acts as a conduit between applications and physical components. The standardised software for automobiles is called AUTOSAR. AUTOSAR is a standardised architecture that links application software and hardware. This standardised architecture provides all of the essential software, device drivers, communication interfaces, and run-time environment. There are two main components of self-driving cars. These are lane-detection and traffic signal autonomous systems that don't need human assistance. This study proposes a machine learning algorithm. This technique is primarily used to train form models and helps with the shape identification process for lane and traffic sign detection. The OpenCV2 and Numpy libraries are used to write each of these tasks in Python, and the Hough Detection algorithm is applied to determine which traffic light circles are suitable.Using all of these technologies, all shape models are trained using supervised training techniques, and detection is done in a way that makes it easier for autonomous cars to recognise lane and traffic signals.

Keywords: lane detection, traffic signal detection, and self-driving automobiles

I. INTRODUCTION

Safety is the important aspect which must be noticed while driving vehicles.In a survey it is been published that more 10 lakhs of people die in the road accidents in a country [4] [14]. The Road accident happened due to Human Errors are about 98% [7]. So, to avoid this all over the world Autonomous Cars are under Research and Development.The term Autonomous Cars is that the car drives itself using various technologies without any Human intervention [1]. For Autonomous Cars Software task development is very much important [3] . The Software architecture acts as a bridge between Hardware Components and Application. The Standardized Software for Automotive cars is AUTOSAR. This Standardized Architecture provide all Communication Interfaces, Device Drivers, Basic Software and Run-Time Environment [10] [12].

There are two important tasks in Autonomous cars they are Lane detection and Traffic Sign Detection[11]. These two tasks are important because many accidents are due to malfunction of these two tasks.A New Algorithm SSLA (Shape Supervised Learning Algorithm) is proposed in this paper[5]. The Hough Line Transformation is the technique which is used to detect the Traffic Sign Detection.Matplolib and numpy is the library files in python used for

Lane Detection. These two techniques are possible by Open CV, numpy libraries in python [6]. The Hough line Transformation is used to detect any shapes. In order to detect the Lane in which the car is to drive is by using various Edge detection techniques which makes use of colors in python [13].

II. LITERATURE SURVEY

"Autonomous cars: Past, present and future a review of the developments in the last century, the present scenario and the expected future of autonomous vehicle technology,"

The field of autonomous automation is of interest to researchers, and much has been accomplished in this area, of which this paper presents a detailed chronology. This paper can help one understand the trends in autonomous vehicle technology for the past, present, and future. We see a drastic change in autonomous vehicle technology since 1920s, when the first radio controlled vehicles were designed. In the subsequent decades, we see fairly autonomous electric cars powered by embedded circuits in the roads. By 1960s, autonomous cars having similar electronic guide systems came into picture. 1980s saw vision guided autonomous vehicles, which was a major milestone in technology and till date we use similar or modified forms of vision and radio guided technologies. Various semi-autonomous features introduced in modern cars such as lane keeping, automatic braking and adaptive cruise control are based on such systems. Extensive network guided systems in conjunction with vision guided features is the future of autonomous vehicles. It is predicted that most companies will launch fully autonomous vehicles by the advent of next decade. The future of autonomous vehicles is an ambitious era of safe and comfortable transportation.

"Traceability maintenance: factors and guidelines."

Traceability is an important concern for numerous software engineering activities. Establishing traceability links is a challenging and cost-intensive task, which is uneconomical without suitable strategies for maintaining high link quality. Current approaches to Traceability Management (TM), however, often make important assumptions and choices without ensuring that the consequences and implications for trace-ability maintenance are feasible and desirable in practice. In this paper, therefore, we identify a set of core factors that influence how the quality of traceability links can be maintained. For each factor, we discuss relevant challenges and provide guidelines on how best to ensure viable traceability maintenance in a practical TM approach. Our guidelines are meant to be used by tool developers and users to select the most appropriate TM approach for their needs. Our results are based on and supported by data collected from interviews conducted with: (i) 9 of our industrial and academic project partners to elicit requirements for a TM tool, and (ii) 24 software development stakeholders from 15 industrial cases to provide a broader overview of the current state of the practice on TM. To evaluate the feasibility of our guidelines, we investigate a set of existing TM approaches used in industry with respect to our guidelines.

" Knowledge and skills requirements for the software design and testing of automotive applications"

The required knowledge and skills that should be provided to the novice developer, designing and testing the safety critical device in automotive industry using Hardware-in-the-Loop (HiL), are presented in the paper. They should be available to the student finishing the MSc level of Electrical Engineering or Mechatronics that aims to seek the employment in the automotive industry. The development process is presented in short, together with the brief explanations of phases, which include some typical examples of written text in the documentation (requirements, test cases, etc.). The process follows the Automotive SPICE and focuses on the tip of the V-model. The presented text can serve as a useful information in the process of adapting the existing curriculum to the new occurring needs introduced by the new development and testing processes in industry.

"Road Safety and Accident Prevention in India: A review"

Road accidents are a human tragedy. They involve high human suffering and monetary costs in terms of untimely deaths, injuries and loss of potential income. Although we have undertaken many initiatives and are implementing various road safety improvement program the overall situation as revealed by data is far from satisfactory. During the calendar year 2010, there were close to 5 lakh road accidents in India, which resulted in more than 1.3 lakh persons. These numbers translate intone road accident every minute, and one road accident death every 4 minutes. Unfortunately, more than half the victims are in the economically active age group of 25-65 years. The loss of the main bread winner can be catastrophic. Road traffic accidents are amenable to remedial action. Many a countries have curbed the menace of road accidents by adopting a multipronged approach to road safety that encompasses broad range of measures, such as, traffic management, design and quality of road infrastructure, application of intelligent transport system, safer vehicles, law enforcement, effective and quick accident response and care etc. The Government alone cannot tackle road safety problems. There is a need for active involvement of all stake- holders to promote policy reform and implementation of road safety measures. Addressing road safety is comprehensive manner underscores the need to involve multiple agencies and sectors like health, transport and police. The present study provides the magnitude and various dimensions of road accident in India. The analysis on road accidents in this study will help to create awareness, guidelines and assist in informed decision making on road safety

III. EXISTING SYSTEM

In the existing work there are Automotive cars which work through Sensors, Actuators and an Embedded System Control. Here the Lane Keeping is very much important in terms of safety measures to prevent road accidents. In the Concept of Lane keeping the LiDar ,radar and GPS is used in existing research work to keep the vehicles in the lane .Also, the lane keeping in the existing

papers are achieved through ADAS based system with the help of Adaptive cruise control and this technique is performed thorugh Deep Neural Networks .The Simulation part is possible in Carla Software also.

Disadvantages of Existing System:

- Time consuming process.
- Less Accuracy.

IV. PROPOSED SYSTEM

In Proposed research works and models the traffic sign and lane detection is done through SVM. Where thousands of images are put into training models to get an accurate output model.An Algorithm is proposed in this paper which is used to identify the appropriate shape. This Identification is possible through training model. The proposed Algorithm holds Hough line transformation technique which is used to detect any shape. Even the shape is broken also this technique works in an Efficient way. The shape which is detected in turned out in a mathematical form by using various formulae. The maximum Area of the shape is 64480. In this Paper, the circle shape is required to be detected because Traffic signals are in the shape of circle. Not all circles are detected. It is because the traffic sign is placed on the higher place

Advantages of Proposed System:

- Gives Accurate result.
- Taking Less time

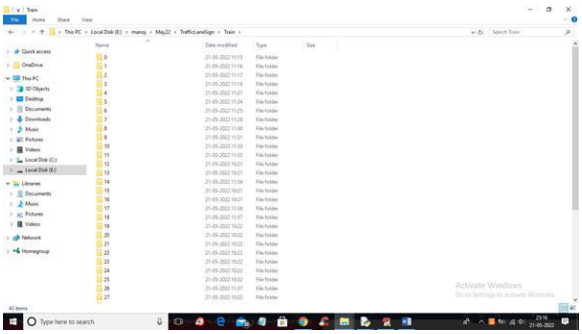
V. IMPLEMENTATION

Modules Information:

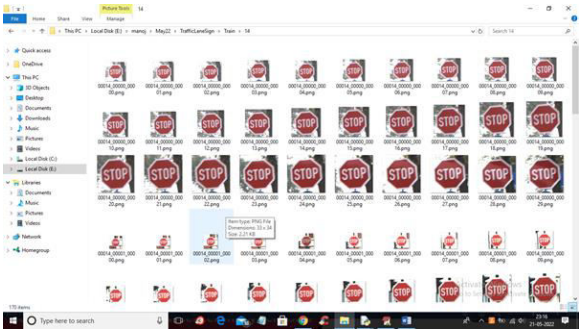
To implement this project we have designed following modules

1) Generate & Load Machine Learning Model: using this module we will train ML model and then load it
2) Upload Video & Detect Hough Lane, Signal: using this module we will upload TEST video and then CV2 HOUGH algorithm will detect LANE and ML will detect and recognize traffic signs.

VI. SCREEN SHOTS

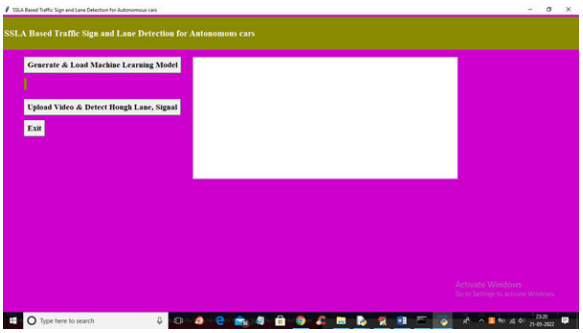


In above screen we have 43 different signs but we trained with few SIGNS and just go inside any folder to view sign images

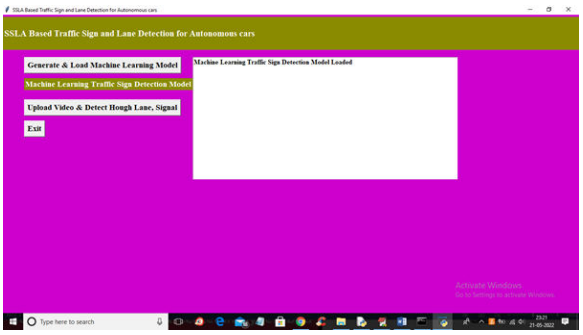


So we will used above images to train ML model

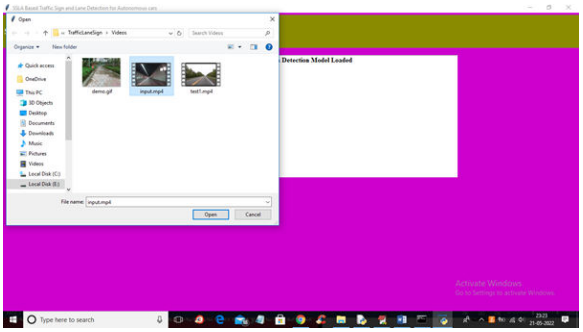
To run project double click on 'run.bat' file to get below screen



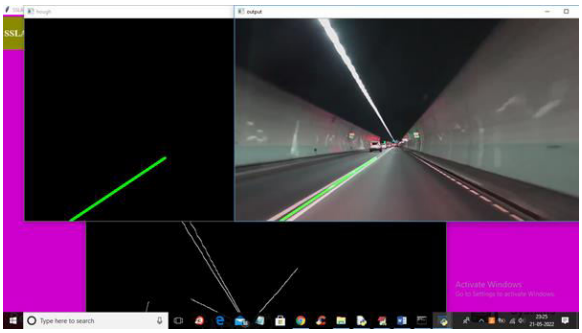
In above screen click on 'Generate & Load Machine Learning Model' to generate and load ML model and get below output



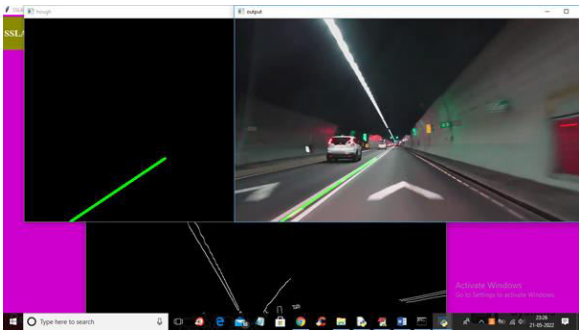
In above screen we can see model loaded and now click on 'Upload Video & Detect Hough Lane, Signal' button to upload video and get below output



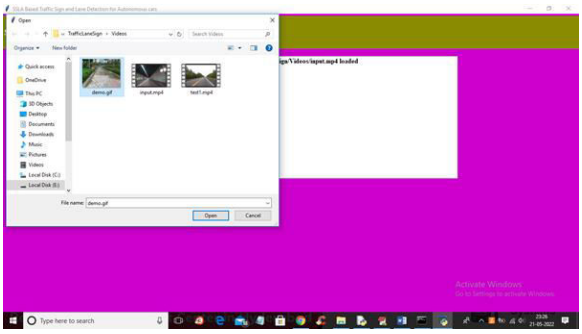
In above screen selecting and uploading 'input.MP4' file and then click on 'Open' button to get below output



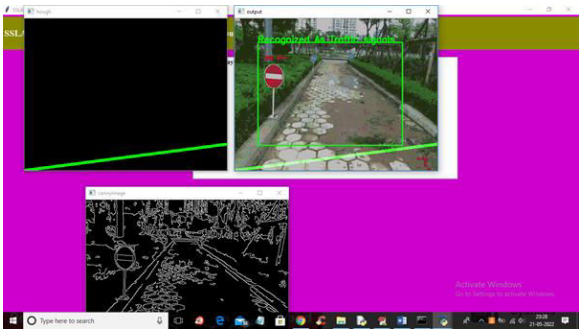
In above screen we can see the green line as lane detection and the same line we can see in BLACK HOGH window and CANNY EDGE DETECTION WINDOW but this video has not TRAFFIC signs so we will upload other video

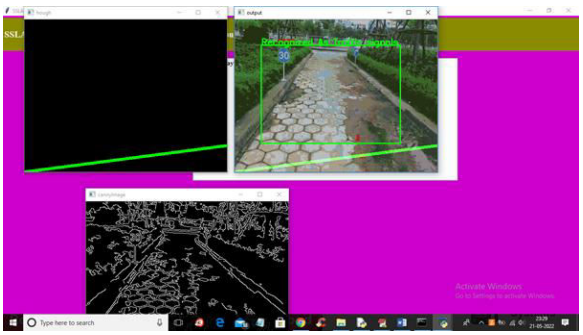


In above screen with green line application clearly detecting LANE and now see other output video



In above screen selecting and uploading 'demo.gif' file and then click on 'Open' button to get below output





In above screens we can see ML model able to detect TRAFFIC SIGNS and similarly application detecting LANES also and both output LANE showing is GREEN LINE and SIGN showing with green colour bounding BOXES.

VII. CONCLUSION

This paper's conclusion is that the two crucial Machine learning techniques are used to recognise traffic signals and lanes. Python programming is used for image processing and detection in order to identify lanes and traffic signs in a video data collection. In terms of safety and prevention, autonomous vehicles benefit greatly from the SSLA Algorithm.

FUTURE WORK

The same work may be expanded in the future with hardware, and other safety precautions and issues need to be resolved for autonomous vehicles.

REFERENCE:

[1]K. Bimbraw, "Autonomous cars: Past, present and future a review of the developments in the last century, the present scenario and the expected future of autonomous vehicle technology," 2015 12th International Conference on Informatics in Control, Automation and Robotics (ICINCO), Colmar, France, 2015, pp. 191-198.

[2] Maro S, Anjorin A, Wohlrab R, Steghöfer JP. “Traceability maintenance: factors and guidelines.” International Conference on Automated Software Engineering (pp. 414-425), 2020.

[3] J. Zabavnik, A. Riel, M. Marguč, M. Rodič.” Knowledge and skills requirements for the software design and testing of automotive applications”2020

[4] Pawan Deshpande, "Road Safety and Accident Prevention in India: A review", Int J Adv Engg Tech., vol. V, no. II, pp. 64-68, April-June 2014.

[5] A. R. Fayjie, S. Hossain, D. Oualid and D. Lee, "Driverless Car: Autonomous Driving Using Deep Reinforcement Learning in Urban Environment," 2018 15th International Conference on Ubiquitous Robots (UR), Honolulu, HI, USA, 2018, pp. 896-901, doi: 10.1109/URAI.2018.8441797.

[6] A. Agafonov and A. Yumaganov, "3D Objects Detection in an Autonomous Car Driving Problem," 2020 International Conference on Information Technology and Nanotechnology (ITNT), Samara, Russia, 2020, pp. 1-5,doi: 10.1109/ITNT49337.2020.9253253.

[7] R. Hussain and S. Zeadally, "Autonomous Cars: Research Results, Issues, and Future Challenges," in IEEE Communications Surveys & Tutorials, vol. 21, no. 2, pp.1275-1313,Secondquarter2019,doi:10.1109/COMST.2018.2869360.

[8] M. Ikhlayel, A. J. Iswara, A. Kurniawan, A. Zaini and E. M. Yuniarno, "Traffic Sign Detection for Navigation of Autonomous Car Prototype using Convolutional Neural Network," 2020 International Conference on

Computer Engineering, Network, and Intelligent Multimedia (CENIM), Surabaya, Indonesia, 2020, pp. 205-210, doi: 10.1109/CENIM51130.2020.9297973.

[9] A. Josef Mík and B. P. Bouchner, "Safety of crews of autonomous cars," 2020 Smart City Symposium Prague (SCSP), Prague, Czech Republic, 2020, pp. 1-5, doi: 10.1109/SCSP49987.2020.9133942.

[10] Sandhya, D. R., Sivakumar, P., & Balaji, R. (2019). AUTOSAR Architecture Based Kernel Development for Automotive Application. In International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) 2018. ICICI 2018 (Vol. 26). Springer.

[11]. Sivakumar, P., Devi, R. S., Buvanesswaran, A. D., Kumar, B. V., Raguram, R., & Ranjithkumar, M. (2020, July). Model-Based Testing of Car Engine Start/Stop Button Debouncer Model. In 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA) (pp. 1077-1082). IEEE.

[12] Sivakumar, P., RS Sandhya Devi, A. Neeraja Lakshmi, B. VinothKumar, and B. Vinod. "Automotive Grade Linux Software Architecture for Automotive Infotainment System." In 2020 International Conference on Inventive Computation Technologies (ICICT), pp. 391-395. IEEE, 2020.

[13] Sivakumar, P., Devi, R. S., Buvanesswaran, A. D., Kumar, B. V., Raguram, R., & Ranjithkumar, M. (2020, July). Model-Based Testing of Car Engine Start/Stop Button Debouncer Model. In 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA) (pp. 1077-1082). IEEE

[14] Yuen, Kum Fai, Yiik Diew Wong, Fei Ma, and Xueqin Wang. "The determinants of public acceptance of autonomous vehicles: An innovation diffusion perspective." Journal of Cleaner Production 270 (2020): 121904.

[15] Saini, S., Nikhil, S., Konda, K. R., Bharadwaj, H. S., & Ganeshan, N. (2017, June). An efficient vision-based traffic light detection and state recognition for autonomous vehicles. In 2017 IEEE Intelligent Vehicles Symposium (IV) (pp. 606-611). IEEE.