SELF DRIVING CAR FOR PREVENTING ACCIDENTS

Uttama Suryavanshi
Assistant. Professor
Information Technology Department
Kirodimal Institute Of Technology, Raigarh, India

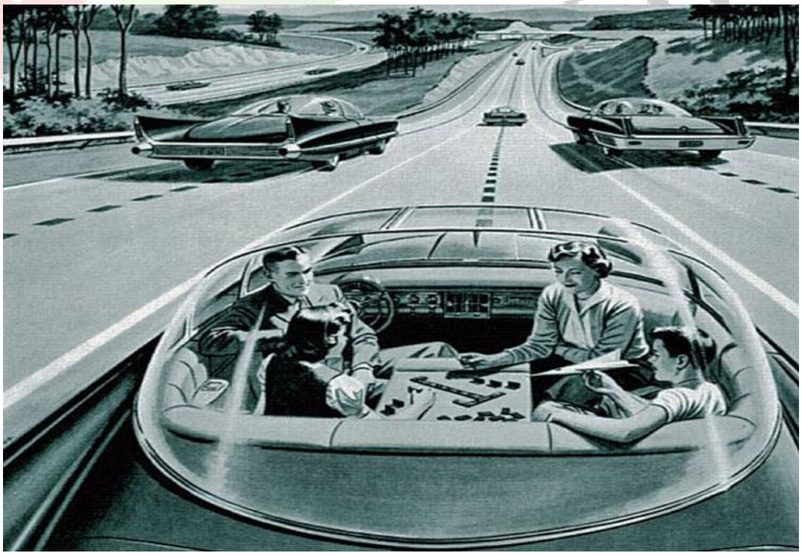
***ABSTRACT*:** Now in Present Time we are seeing that in Every 30 seconds, someone dies in a traffic accident, and every year 2 million people are die in automobile accidents And up to 1 million are injured These accidents are being not only in India but in whole worlds .Many of these death are due to driver error(Driver errors are, in turn, caused by lack of knowledge, failure to follow traffic rules, driver distraction, or driver incapacity or fatigue). or mechanical failure and other preventable causes. This research paper are in the area of self- driving of a vehicle. In this research paper we explain about a self-driving car (also called autonomous, *driverless* or *robotic* vehicles) to prevent automobile accident using machine learning technology . The main objective of this paper are three main aspects :- 1) Detection of an object .2) Identify type of an Object. 3) Object localization and prediction of movement.

***Index Terms* - self driving , machine learning , Accidents ,Detection ,Identification ,Prediction**

I .Introduction

When we consider how many people die each year from traffic-related accidents, it becomes clear why so many car companies are pushing the development of safer and more reliable self-driving car technology. The core issue that we have to consider when thinking about the promise of driverless technology is how many people could autonomous vehicles save in the coming years? Research and development of autonomous vehicles is becoming more and more popular in the automotive industry. It is believed that autonomous vehicles are the future for easy and enceinte transportation that will make for safer, less congested roadways. An autonomous vehicle can drive itself from Point A to Point B with no manual input from the driver. The vehicle uses a combination of cameras, radar systems, sensors, and global positioning system (GPS) receivers to determine its surroundings and uses artificial intelligence to determine the quickest and safest path to its destination. Mechatronic units and actuators allow the "brain" of the car to accelerate, brake, and steer as necessary. a self-driving car (driverless, autonomous, robotic car) is a vehicle that is capable of sensing its environment and navigating without human input. Self-driving cars can detect environments using a variety of techniques such as radar, GPS and computer vision. Advanced control systems interpret sensory information to identify appropriate navigational paths, as well as obstacles and relevant signage.

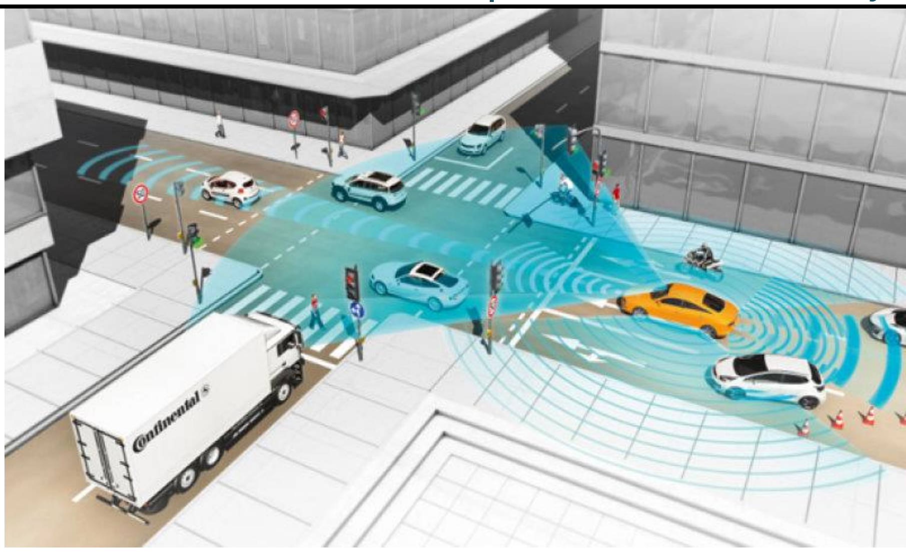
Self-driving cars have control systems that are capable of analysing sensory data to distinguish between different cars on the road. This is very useful in planning a path to the desired destination .For instance, should autonomous vehicles be programmed to always minimize the number of deaths. they combine sensors and software to control, navigate, and drive the vehicle. .A Self driving cars can also sense surrounding using lidar . Biggest benefit of self-driving cars is reduced number of accidents.



"Fig.1" -A Self Driving Car in a Road

II. DETECTION OF AN OBJECT

For object (vehicle or non-vehicle) detection, it is important to identify and anticipate its position on the road, how far it is from the reference car, which way they are going to and how fast they are moving. Same way as we do with our own eye when we drive. Here are some of the characteristics that are useful for identifying objects on an image:Colour, Position within the image, Shape, Apparent size.



"Fig. 2" – Object Detection

III. OBJECT DETECTION TECHNIQUE

This is being done by using computer vision techniques and the Support Vector Machines (SVM) classier. The same can be done using Deep Learning. Here is how we do this:

3.1. HOG feature extraction to find the features of images HOG (Histogram of gradient descents) is a powerful computer vision technique to identify the shape of an object using the direction of gradient along its edges.

3.2. Train a Support Vector Machines (SVM) classier Once we have extracted the HOG features from a car, we can train a SVM classier to learn between car and not car images.

3.3. Implement sliding windows to detect presence of car across the Image To detect car across an image, we done windows of different sizes and slide them across the image. At each point, we extract HOG features and pass them through our classier to predict presence of car in that window. If car is detected, we save the window location.

3.4. Combine overlapping boxes and remove false positive detections Almost there the above technique is prone to generating false positives and multiple bounding boxes. To solve for this, we can combine detection across multiple frames of window and threshold the heat map to remove false positive "noise" that occurs in a few frames but not consistently. The result is a fairly robust detection of other vehicles on the road. This technique can also be extended to detection of pedestrians on the road.

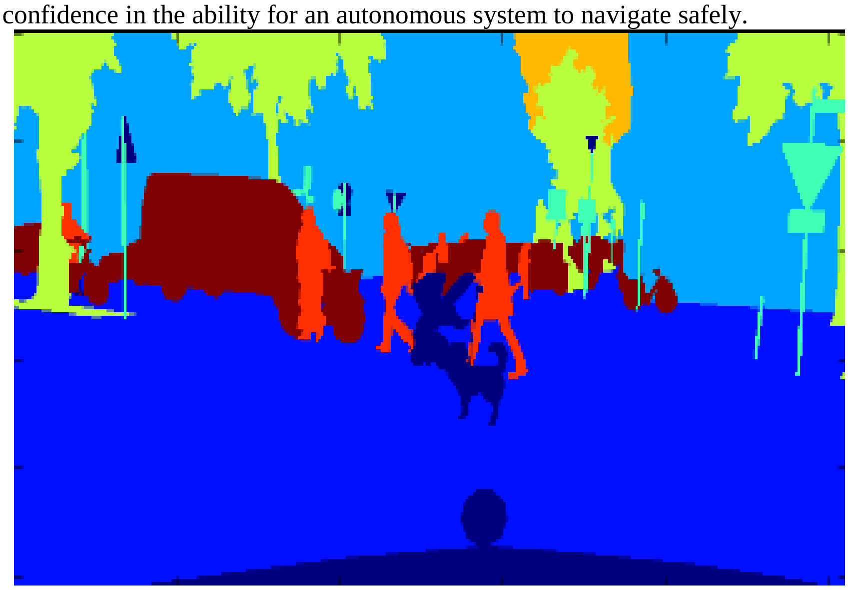
IV.HOW TO IDENTIFY TYPE OF AN OBJECT

Recognition of objects on an image is the essence of computer vision. When we look at the world with our own eyes, we are constantly detecting and classifying objects with our brain, and that perception of the world around us is important for driverless car systems.

There are two big categories of recognition

4.1 Semantic segmentation

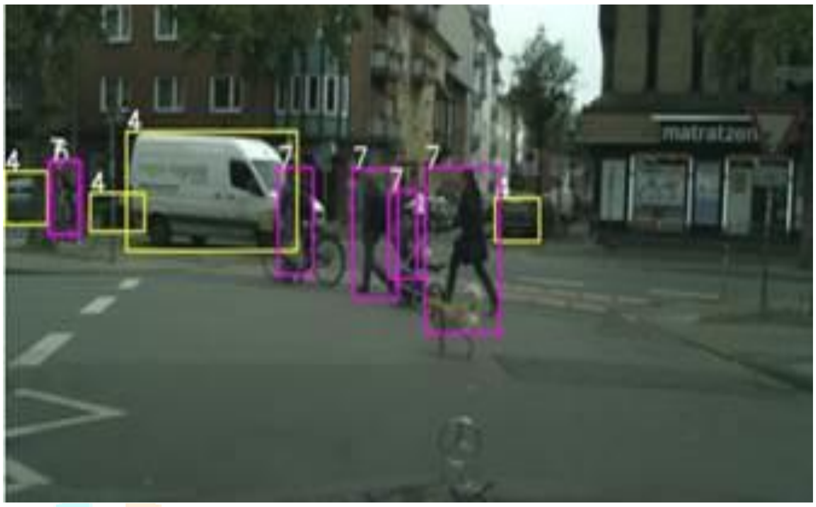
This is the ability to label the pixels — the tiny dots that make up a computer image — that belong to particular classes of object. We can see that in the example below. The road is blue. People are orange. Cars are red. If the computer can figure what's in the image to this level of detail, then we have greater confidence in the ability for an autonomous system to navigate safely.



"Fig. 3"- Segmented Object

4.2 Object detection

This is the ability to bound the location of an object with a box. see videos that show our ability to detect many classes of objects at the same time. In the example below, we have a detector that we've designed to identify people and cars. Bounding boxes is a simpler way than segmentation to describe the location of an object.

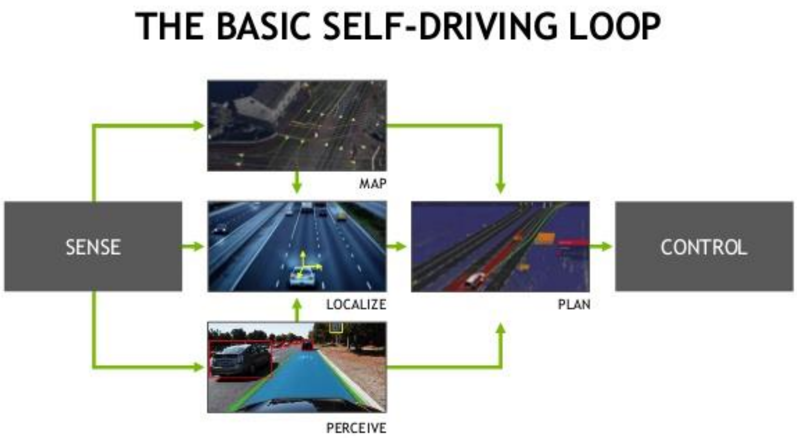


"Fig.4" – Detected Object

The technologies normally incorporated into vehicles today to achieve autonomy include radar, cameras, a variety of different sensors and GPS. Computer vision is the much harder problem of recognizing objects and understanding what they are doing. The way this currently works is through machine learning techniques in which a large training set can be used to teach an AI to recognize and understand something. That's really cool, but there is still a long way to go before these techniques reach the level of accuracy necessary for a commercial vehicle and can be trusted to know what to do in any scenario.

V. HOW TO LOCALIZE OBJECT

Localization is a critical prerequisite for effective decisions about where and how to navigate Localization, or knowing "where am I" is critical for a self driving car. At every instant it needs to know where in the world it is. When we drive a car we use GPS and Maps to know where our car is. and along with distinguish between bike rider, cyclist, pedestrian and other type of objects like road signs on the roadway. Self-driving cars need single-digit-level localization accuracy. To that end, we used sensor measurements and maps and sophisticated mathematical algorithms to localize the vehicle



"Fig .5"- The Basic localize Object

VI. STEPS OF PREDICTIVE MOVEMENT

There are different steps of Predictive Movement -

6.1 High-Definition maps.- High Definition Maps or HD Maps are the new generation maps that are powering machines and self-driving cars & autonomous cars .To construct high-definition (HD)maps, use vehicles equipped with lidar and cameras. These 3-D HD maps with 360-degree information about the surroundings. LIDR (Light Detection And Ranging) is a laser-based system. In addition to the transmitter (laser), the system requires a highly sensitive receiver. Used primarily to measure distances to stationary as well as moving objects. approximately 35 degrees maximum distance **of** 105 meters**.**

6.2 Rule-Based Decision Making With Angel- Here using with all possible combinations of if-then rules and then program vehicles accordingly in rule-based approaches.

6.3 Sensors – Ultrasonic sensors give us information of the velocity and the angle in which the car is moving. We move each of the particle by the same distance and in the same direction as the car. It capture maximum distance of 10 m.

6.4 Radar (Radio Detection And Ranging) is work in almost all environmental conditions. Radar sensors can be classified distance ranges they are : Short Range Radar 0.2 to 30m range, Medium Range Radar in the 30-80m range and Long Range Radar 80m to more than 200m range. The radar has long range sensing of up to 200 m in a 10 degree arc and 30 degree sensing arc with a lower range of 30 m.

6.5 V2X: Extend can car -see. With V2X (vehicle-to-everything) communications, cars can “talk” to other cars, motorcycles, emergency vehicles, traffic lights, digital road signs, and pedestrian’s .it support very high speeds range up to 500 km/hr relative.

Using this above technique to minimize the automobile accidents.

VII. RESEARCH METHODOLOGY

The overall methodology been applied for the development of an integrated monitoring tool based on Self Driving car localization and Predictive Movement analysis techniques is briefly presented below :

- Development of suitable experimental setup.
- Testing of software in simulated conditions.
- Performance and testing of the newly developed software and comparison with the previously existing tools for fault diagnosis.
- image is over-segmented into a set of regions by means of the Mean-shift algorithm.

Modify the software according to the diagnosis if required

VII. CONCLUSION

In this paper, explained about the Self-Driving car revolution which aims at the development of autonomous vehicles for preventing accidents without a driver. The driverless car technology helps to minimize loss of control by improving vehicle’s stability as these are designed to minimize accidents. But still these cars have a lot of hurdle to go through before they became everyday technology. Recent announcements that autonomous vehicles have safely driven millions of miles and major manufactures aspire to soon sell such vehicles, and optimistic predictions of their benefits, raise hopes that this technology will soon be widely available and solve many problems.

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