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Self Driving Vehicles Using AI

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Abstract: *In the modern era, the vehicles are focused to be automated to give human driver relaxed driving. In the field of automobile various aspects have been considered which makes a vehicle automated. Google, the biggest network has started working on the self-driving cars since 2010 and still developing new changes to give a whole new level to the automated vehicles. In this paper we have focused on two applications of an automated car, one in which two vehicles have same destination and one knows the route, where other don't. The following vehicle will follow the target (i.e., Front) vehicle automatically. The other application is automated driving during the heavy traffic jam, hence relaxing driver from continuously pushing brake, accelerator, or clutch. The idea described in this paper has been taken from the self-driving car, defining the one aspect here under consideration is making the destination dynamic. This can be done by a vehicle automatically following the destination of another vehicle. Since taking intelligent decisions in the traffic is also an issue for the automated vehicle so this aspect has been also, under consideration in this paper.*

Keywords: Self-Driving Car, AI

I. INTRODUCTION

AI technologies power self-driving car systems. Developers of self-driving cars use vast amounts of data from image recognition systems, along with machine learning and neural networks, to build systems that can drive autonomously. The neural networks identify patterns in the data, which is fed to the machine learning algorithms. That data includes images from cameras on self-driving cars from which the neural network learns to identify traffic lights, trees, curbs, pedestrians, street signs and other parts of any given driving environment.

Road accidents are one of the major causes of passing, as concurring to report by Deshpande et al that about 3000 individuals passed on day by day because of road accidents, among which half of them are not within the car, other than that it has also been reported that in case a few safety measures are not taken this will develop up to 2.4 million a year making the 5th largest cause of passing within the World. This number can be enormously diminished by putting independent cars into activity which are far more dependable and respond swiftly than people. It'll moreover cause reduction in the traffic congestion, as the effectiveness of driverless car makes it reliable in a way of keeping exceptionally little crevices between vehicles, and its exceptional administration of speed and time. Taking after the navigation track without considering any other diversion makes it friendlier than the ordinary cars worked by drivers.

II. SIGNIFICANCE AND MOTIVATION

Self-driving technology is perhaps the most debated technology in the automotive industry right now and many companies are developing autonomous driving features to be added on to their production cars. The motivation behind this technology showdown is to improve car safety and efficiency. Sebastian Thrun, the leading engineer of Google's self-driving car project, wrote in his blog that the goal of developing self-driving car is to "help prevent traffic accidents, free up people's time and reduce carbon emissions."

According to the World Health Organization, more than 1 million people lose their lives on the road due to car accidents, and C2ES (Center for Climate and Energy Solutions) states that about 60% of total energy consumed by transportation is from automobiles. These numbers show that cars cause serious casualties and are major source of greenhouse gas emission. There have been attempts to solve these problems, but none of the solutions have been

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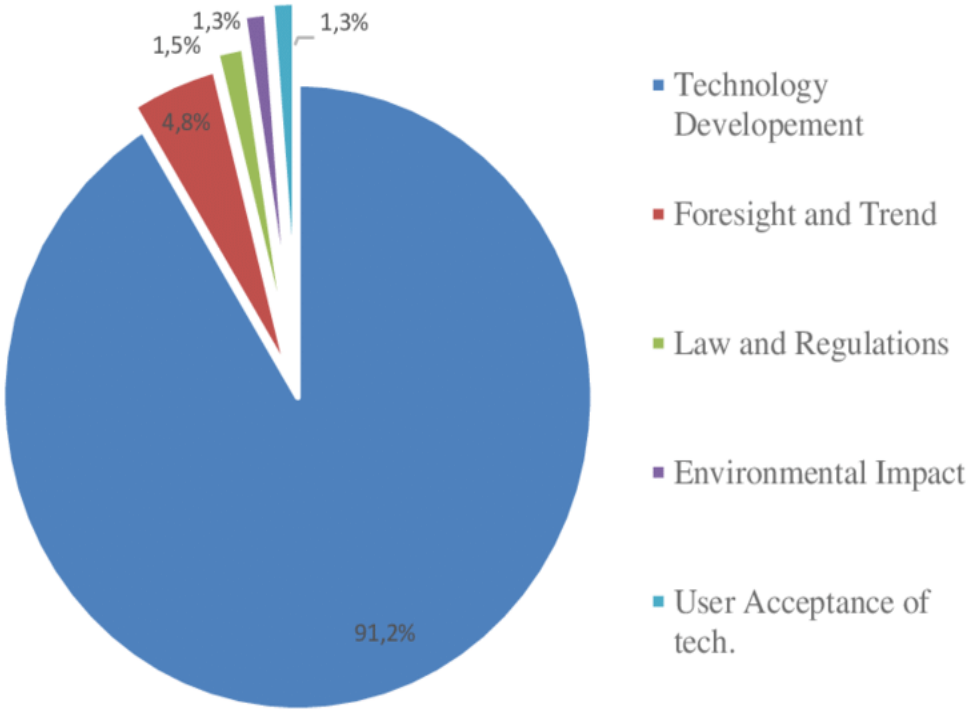
particularly effective. However, self-driving technology has potential to change all these problems. If self-driving cars can be driven safer and much more efficiently, it could save valuable lives and preserve the environment.



III. Literature Survey

In order to understand the development of research in autonomous driving in the last years, it is important to conduct a literature review to understand the different fields of application through which autonomous driving has evolved as well as to identify research gaps.

Table 1: Literature Survey

Cites	Authors	Title	Year	Source
557	C. Urmson C. Baker et ál.	Autonomous driving in urban environments: Boss and the Urban Challenge	2008	Journal of Field Robotics
364	M. Bertozzi A. Broggi, A. Fascioli,	Vision-based intelligent vehicles: State of the art and perspectives	2000	Robotics and Autonomous Systems
330	P.A. Ioannou, C.C. Chien,	Autonomous intelligent cruise control	1993	IEEE Transactions on vehicular technology
311	U. Franke, D. Gavrila, et ál	Autonomous driving goes downtown	1998	IEEE Intelligent systems and their applications
201	J. Leonard, J. How, et ál.	A Perception-Driven Autonomous Urban Vehicle	2008	Journal of Field Robotics
157	K. Konolige, J. Bowman et ál.	View-based Maps.	2010	International Journal of Robotics Research

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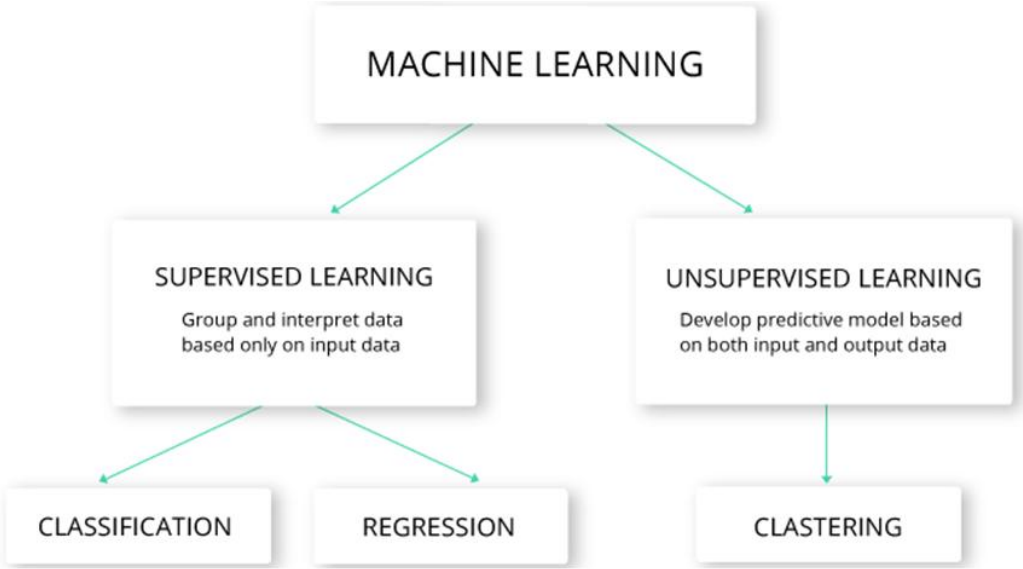
Table 2: Levels of Automation

Level	Judgment standard
No-automation (Level 0)	The driver completely controls the vehicle all the time.
Function-specific automation (Level 1)	Individual vehicle controls are automated, such as electronic stability control or automatic braking.
Combined function automation (Level 2)	At least two controls can be automated in unison, such as adaptive cruise control in combination with lane keeping.
Limited self-driving automation (Level 3)	The driver can fully cede control of all safety-critical functions in certain conditions. The car senses when conditions require the driver to retake control and provides a "sufficiently comfortable transition time" for the driver to do so.
Full self-driving automation (Level 4)	The vehicle performs all safety-critical functions for the entire trip, with the driver not expected to control the vehicle at any time. As this vehicle would control all functions from start to stop, including all parking functions, it could include unoccupied cars.

IV. ALGORITHMS

AI-powered vehicles see the physical world, but how are they able to identify things like street signs, other cars, road markings and many other things encountered on the road? This is where data annotation plays a crucial role. This is when all of the raw training data is prepared through various annotation methods that allow the AI-system to understand what it needs to learn. For the automotive sector, the most common data annotation methods include 3D Point Cloud annotation, video labeling, full scene segmentation and many others.



Machine learning has two learning models: supervised and unsupervised. With unsupervised learning, a machine learning algorithm receives unlabeled data and no instructions on how to process it, so it has to figure out what to do on its own.

With the supervised model, an algorithm is fed instructions on how to interpret the input data. This is the preferred approach to learning for self-driving cars. It allows the algorithm to evaluate training data based on a fully labelled dataset, making supervised learning more useful where classification is concerned.

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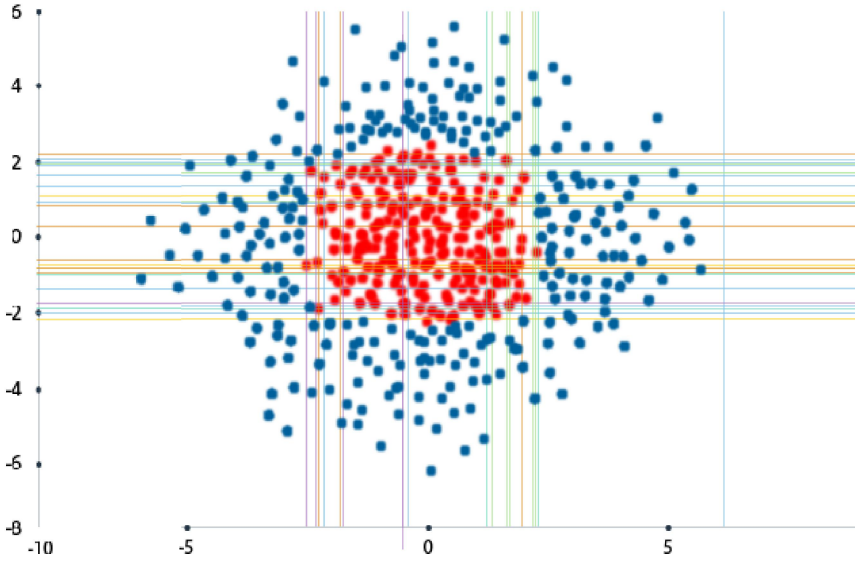
4.1 Machine Learning Algorithms used by Self-Driving Cars

SIFT (Scale-Invariant Feature Transform) for Feature Extraction

SIFT algorithms detect objects and interpret images. For example, for a triangular sign, the three points of the sign are entered as features. A car can then easily identify the sign using those points.

4.2 AdaBoost for Data Classification:

This algorithm collects data and classifies it to boost the learning process and performance of vehicles. It groups different low-performing classifiers to get a single high-performing classifier for better decision-making.



4.3 TextonBoost for Object Recognition

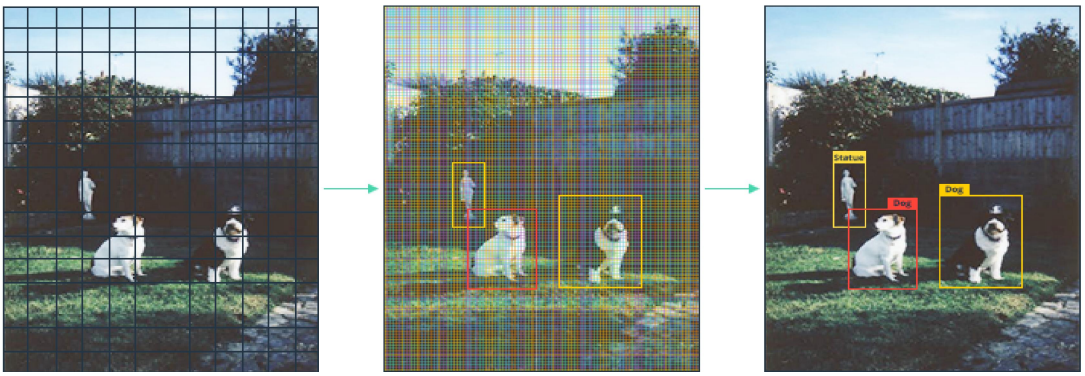
The TextonBoost algorithm does a similar job to AdaBoost, only it receives data from shape, context, and appearance to increase learning with textons (micro-structures in images). It aggregates visual data with common features.

4.4 Histogram of Oriented Gradients (HOG)

HOG facilitates the analysis of an object's location, called a cell, to find out how the object changes or moves.

4.5 YOLO (You Only Look Once)

This algorithm detects and groups objects like humans, trees, and vehicles. It assigns specific features to each class of object that it groups to help the car easily identify them. YOLO is best for identifying and grouping objects.



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4.6 Wrap-up

Machine learning algorithms make it possible for self-driving cars to exist. They allow a car to collect data on its surroundings from cameras and other sensors, interpret it, and decide what actions to take. Machine learning even allows cars to learn how to perform these tasks as good as (or even better than) humans.

V. ADVANTAGES

1. **Decreased the Number of Accidents:** Autonomous cars prevent human errors from happening as the system controls the vehicle. It leaves no opportunity for distraction, not just like humans who are prone to interruptions. It also uses complicated algorithms that determine the correct stopping distance from one vehicle to another. Thereby, lessening the chances of accidents dramatically.
2. **Lessens Traffic Jams:** Driverless cars in a group participate in platooning. This allows the vehicles to brake or accelerates simultaneously. Platoon system allows automated highway system which may significantly reduce congestion and improve traffic by increasing up the lane capacity. Autonomous cars communicate well with one another. They help in identifying traffic problems early on. It detects road fixing and detours instantly. It also picks up hand signals from the motorists and reacts to it accordingly.
3. **Stress-Free Parking:** Autonomous cars drop you off at your destination and directly heads to a detected vacant parking spot. This eliminates the wasting of time and gas looking for a vacant one.
4. **Time-Saving Vehicle:** As the system takes over the control, the driver has a spare time to continue work or spend this time catching up with their loved ones without the having the fear about road safety.
5. **Accessibility to Transportation:** Senior citizens and disabled personnel are having difficulty driving. Autonomous vehicles assist them towards safe and accessible transportation.

VI. DISADVANTAGES

1. **Expensive:** High-technology vehicles and equipment are expensive. They prepare a large amount of money for research and development as well as in choosing the finest and most functional materials needed such as the software, modified vehicle parts, and sensors. Thus, the cost of having Autonomous cars is initially higher. However, this may lower down after 10 years giving way for the average earner people to have one.
2. **Safety and Security Concerns:** Though it has been successfully programmed, there will still be the possible unexpected glitch that may happen. Technologies are continuously updating and almost all of this equipment may have a faulty code when the update was not properly and successfully done.
3. **Prone to Hacking:** Autonomous vehicles could be the next major target of the hackers as this vehicle continuously tracks and monitors details of the owner. This may lead to the possible collection of personal data.
4. **Fewer Job Opportunities for Others:** As the artificial intelligence continues to overcome the roles and responsibilities of humans, taxi, trucks, or even co-pilots may be laid off as their services will no longer be needed. This may significantly impact the employment rate and economic growth of a certain country.
5. **Non-Functional Sensors:** Sensors failures often happened during drastic weather conditions. This may not work during a blizzard or a heavy snowfall. Our technology still continues to develop and to be tested. Autonomous cars may provide a significant comfort we needed. However, we need to bear in mind that there are still disadvantages affiliated with it.

VII. CONCLUSION

In this Research paper Some methodologies were examined and is an advanced step for autonomous driving vehicles. With the help of these algorithms, vehicles can be set to automatically navigate to the destination location by continuously receiving the direction from another vehicle moving ahead to the same destination. The robotic vehicle routes itself with the guidance of another vehicle moving ahead to the same destination, therefore, deviations in time can occur. The goal of navigation process for a robotic vehicle is to move the robot to a known destination in an unknown environment. The navigation planning is one of the vital aspects of autonomous systems.

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REFERENCES

[1]. M. Frutiger and C. Kim, "Digital Autopilot Test Platform with Reference Design and Implementation of a 2-Axis Autopilot for Small Airplanes," Department of Electrical and, pp. 1–24, 2003.

[2]. M. Weber, "Where to? A History of Autonomous Vehicles," 2014. [Online]. Available: http://www.computerhistory.org/atchm/where-to-a history-of-autonomous-vehicles/

[3]. D. Helbing, "Traffific and related self-driven many-particle systems," Reviews of Modern Physics, vol. 73, no. 4, pp. 1067–1141, dec 2001.

[4]. P. Rau, "Target Crash Population of Automated Vehicles," in In 24th International Technical Conference on the Enhanced Safety of Vehicles (ESV), 2015, pp. 1–11.

[5]. "Details - google car," http://googlecarjames.weebly.com/details.html, (Visited on 09/08/2016).

[6]. A. Fisher, "Inside Google's Quest to Popularize Self Driving Cars," Popular Science, 2013. [Online]. Available:

[7]. http://www.popsci.com/cars/article/2013-09/google-self-driving-car

[8]. "Official google blog: Green lights for our self-driving vehicle Prototypeshttps://googleblog. blogspot.nl/2015/05/self-driving-vehicle prototypes-on-road.html