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AI in Self Driving Vehicles

Self-driving / autonomous vehicles are prevalent and are on the edge of becoming reality. This article explores the main AI applications, benefits and challenges faces with this transformative technology.

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Introduction

A self-driving car is also known as autonomous car, driverless car, robotaxis, robotic car. These are operating with less or no human intervention. Driverless cars are relying on numerous technologies such as AI (Artificial intelligence), sensors, radars and lidar to navigate on the roads without human involvement.

The last decade has observed a heave in the development of self-driving technologies plunged by the developments in the Artificial intelligence (AI), machine learning (ML) and deep learning (DL).

The SAE (society of automotive engineers) has established a six level framework for driving automation, ranging from 0 to 5 levels. As the level upgrades the human intervention minimizes, from little cruise control to fully controlled by AI and zero human inaccuracy needed.

Integrating AI in self-driving cars cause numerous challenges that needs to be addressed properly for innocuous and effective placement. Addressing the challenges are essential to ensure the autonomous vehicles are trustworthy and widely acceptable by the society.

> ***"If the car is driving but not thinking it must be a self-driven car that is not self-aware."***

Technology Overview

DO you really think that the autonomous cars would be able to eliminate human errors?

Would they be error free or make more mess than the human because they are mind less, they are just machines and "**artificial"** intelligence that is not "**real"** as Human intelligence.

With the help of AI, automotive industry is struggling hard to make autonomous cars a reality. Driverless cars would help save lives by eliminating human error. For every autonomous car to work it must **"see"** the world. For this it uses sensors to gather data then AI comes to processed and analysed algorithms running on hardware so the vehicle responds to the surrounding instantaneously.

Each autonomous vehicle is viewing differently to accumulate the data. Tesla the most famous among us is relying on vision based cameras. They are of low cost, affordable and can see all around at 360° view. Other companies focus on "Light Detection and Ranging" (Lidar). Lidar creates highly accurate three dimensional picture of car's surroundings. The downside of this technology is that it is more expensive than cameras, can be deceived by the poor weather conditions and lastly the bulkier sensors make it harder to integrate.



Figure 1 *An AI computer vision system using real-time object detection to identify road signage and surrounding vehicles with high statistical certainty.*

Key Findings & Impact

AI is the key technology for robotaxis to recognize roads signs, road markings other vehicles on roads and pedestrians and predict their actions to react accordingly. While we do not have fully autonomous cars, ADAS feature found in many of the cars featuring; lane keep assist, emergency braking and adaptive cruise control depends upon the levels of autonomous.

The classification of levels based on the driver's role rather than the competences of vehicles. Although these are related in the form of driving mode/ scenario the mode is essentially determined by ODD (operational design domain) and DDR (Dynamic driving requirement)

What's Next?

Once the self-driving cars will conventional they will provide masses of benefits to society; they will save lives, reduce congestion, improve safety, reduce dependence on human. The future of self-driving cars by 2035 will be Level 3 and 4 autonomies. AI will revolutionise the driving experience that is smarter, more responsive and in all aspects better than earlier.

> ***"Rush hours would eliminate soon."***

For all these to accomplished soon, the AV industry need **people** who can solve problems to bridge hardware, software and all the operation system to mark the autonomous movement to life.

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