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ARTIFICIAL INTELLIGENCE IN AUTONOMOUS VEHICLES: BENEFITS AND CHALLENGES

Autonomous driving is one of the key application areas of artificial intelligence (AI). Autonomous vehicles are equipped with multiple sensors, such as cameras, radars and lidar, which help them better understand the surroundings and in path planning. These sensors generate a massive amount of data. To make sense of the data produced by these sensors, AVs need supercomputer-like, nearly instant processing capabilities. Companies developing AV systems rely heavily on AI, in the form of machine learning and deep learning, to process the vast amount of data efficiently and to train and validate their autonomous driving systems.

Autonomous vehicles can be classified in the main categories of artificial intelligence. The classification of these categories is still controversial - the definition of artificial intelligence is an ongoing discussion. In some cases, it is defined as the

ability to solve problems independently, in some as the ability to imitate human intelligence or human behavior and in others by the ability of ethical judgement equivalent to those of humans. Artificial intelligence can be classified into the following three sub-areas:

1. Weak Artificial Narrow Intelligence (ANI): Artificial intelligence that is on a par with human intelligence in specific areas or exceeds it. It is also referred to as weak AI.

2. Artificial General Intelligence (AGI): AGI is the term used to describe an artificial intelligence that is equal to human intelligence in all areas. It is also referred to as strong AI.

3. Artificial Super Intelligence (ASI): Artificial intelligence that exceeds human intelligence in all areas.

4. AI that is used in the self-driven cars belongs to the ANI.

The autonomous vehicle is projected to contain more lines of code than any other software platform that has been created to date. By 2020, the typical vehicle is expected to contain more than 300 million lines of code and will contain more than 1 TB (terabytes) of storage and will require memory bandwidth of more than 1 TB per second to support the compute performance necessary for autonomous driving platforms. A self-driving car's AI system requires a continuous, uninterrupted stream of data and instructions in order to make real-time decisions based on complex data sets.

Successful self-driving vehicles are present on the road today, however the success of many early vehicles is the result of repeatedly driving the same route consistently over many days, where they learn every detail of the route and generate high-resolution maps that are then used as a key part of the self-navigation system. With less reliance on the need to recognize the route, the attention of the autonomous computer can be paid to traffic, pedestrians and the other potential real-time hazards. This means that high-speed memory is the essential component of autopilot systems.

Despite all its benefits, this technology is still far from perfect or even complete. As an example of already existing autopilot systems there is Waymo company. They are using simulations to train their AI systems. Even with all gained experience, their autonomous vehicles are cannot be considered safer than a common car because Waymo's cars had been driven only 20 million miles and, according to statistics, there is 1 fatal accident for 100 million miles driven. Another example – Uber didn't even reach 20 million miles and already caused a lethal incident.

Thus, this technology still has a long way to go and careful consideration should be given to minimizing the risks that are still there when using AI in autonomous vehicles.