Machine Learning allows the cars to navigate complex and delicate situations such as operating through construction zones, relenting for emergency vehicles, and offering room to cars for parallel parking.

1. Adopting the Tensor Flow ecosystem

Waymo makes use of the TensorFlow ecosystem and the data centers of Google such as TPUs for training its neural networks. TPUs (tensor processing units) allows the platform to train their nets up to 15 times with higher efficiency. Waymo also tests its ML models in simulation. Their rigorous testing and training cycle allows the platform to enhance its ML models and swiftly make use of the latest nets on its self-driving cars.

2. Operate in challenging weather conditions

We are already aware of how strenuous the task of driving in heavy rain and snow is, both in the case of self and manual driving, owing to the lack of visibility. Waymo has trained its cars to operate in challenging weather conditions.

Since snowflakes and raindrops can generate a great deal of noise in sensor data for self-driving vehicles, machine learning plays a part in filtering out the noise and also in properly detecting pedestrians, vehicles, and other objects.

3. Simulate autonomous vehicle camera data - SurfelGAN

Recently the platform has announced its initiative of leveraging AI for generating camera images to simulate through sensor data gathered through its self-driving vehicles.

In a recent paper that was co-authored by Waymo researchers including Research Head Dragomir Anguelov, the technique - SurfelGAN, has been described and elaborated in detail. SurfelGAN makes use of texture-mapped surface elements for reconstructing scenes and camera viewpoints to handle positions and orientations. The technique preserves sensor information while also saving considerable computational efficiency.

Waymo and similar platforms make use of simulation environments with the purpose of training, testing, and validating their systems prior to them being deployed for real-world cars. Waymo’s CarCraft is more computationally demanding since the programme attempts to model materials with a high degree of accuracy in order to ensure that the sensors such as lidars and radars operate authentically.

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Through SurfelGAN, Waymo has put forth an easier and more data-driven path to simulate sensor data. Through feeds gained from real-world lidar sensors and cameras, the AI generates and preserves exclusive data regarding the semantics, 3D geometry, and object appearances on the scene. Through the reconstruction, the simulated scene is rendered by SurfelGAN through varying distances as well as viewing angles.

Alongside AI, Waymo makes use of a range of technologies to enhance the exclusive experience offered by their vehicles. It remains to be seen how the autonomous vehicle sector will shape up in the future.

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