**International Conference on Machine Learning**

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The state of art will be covered on a Tesla Motors conference in Tesla autopilot and multi-tasking learning for perception and prediction. This international conference covers everything there is about the autopilot of the electric cars. It starts right away by letting clients know that the multi-tasking takes care of the traffic lights, overhead signs, road signs, road markings, moving objects, static objects, and lane lines. But it is way more than just these that have been listed, more than 50 tasks that have to be covered, and those tasks have sub-tasks that make predictions sometimes harder. These independent predictions must be done on every single car, and every prediction must have its own data engine. It all starts with the architectural considerations, there is a large design space that goes into each independent network. Next struggle given is the loss function consideration, which states the evaluation on how well the algorithms model the datasets. If predictions are totally off, the loss function will output a higher number. This practically measures the magnitude of error without considering their direction. Third, the training dynamics. Lastly what is being covered is the team flow, which basically makes it possible for team members to own and manage a flow together, and, if someone leaves that organization, the flow created can continue to run. Simple, users can now collectively author and maintain a flow.

How does these electric cars “view” the objects? So, tesla motors have cameras and sensors, so it’s a network made up of many different tasks and subtasks that does forwards, backwards and side predictions. These do share a lot of similar features and derivations in order to create appropriate predictions in propagation. This goes back to the level of losses, because some tasks are more important than others, for example the “moving objects” task is much more important than “wood markings” task, some tasks they cannot afford because they use too many parameters in it, or maybe it is a very strict task. Loss function consideration is extremely important and it includes the following:

1. Some tasks have loss functions on different scales.
2. Some tasks are more important than other tasks.
3. Some tasks are much easier than other present tasks.
4. Some tasks have more data than others.
5. Some tasks have more noise in their data than other tasks.

According to Karpathy, most other autonomy systems use LIDAR to build high-definition maps, whereas Tesla’s Autopilot uses neither of those things. Like mentioned above, Tesla relies primarily on eight cameras that provide a 360-degree view around the car. The system parses the video inputs using neural networks to create an image of the surrounding scene. Karpathy uses the perfect example for safety regarding the multi-tasking piloting of the electric cars, he mentions “As safety is the prime goal, nothing less than 99.999% accuracy will do. Like a student determined to earn a scholarship, the system must study and study, constantly building on what it is already learned.”. So, having said that, it is an iterative multistep process for safety measures on a network:

1. Build a dataset
2. Train your network
3. Deploy the network and test it

Karpathy also explains a lot on how to break down the numbers and varieties of “data points” that good human drivers effortlessly process. He states “It’s not just ones and zeroes. Humans have to do a certain amount of “massaging” of the data to ensure that the system is building a useful map of the real driving environment.” I feel this is a very important statement due to the fact that the end result is a system that is already transforming the way Tesla owners drive, and it is growing exponentially and more capable by the day.

**References**

[**https://insideevs.com/news/362906/tesla-autopilot-lead-andrej-karpathy-presents/**](https://insideevs.com/news/362906/tesla-autopilot-lead-andrej-karpathy-presents/)

**https://www.youtube.com/watch?v=IHH47nZ7FZU**