Visualizing driving on Rally Estonia Track

Team-D13

Introduction

Multiple different files of both autonomous and human driving were recorded driving on Rally Estonia Track in Elva. Our main goal was to visualize the trajectory of the recorded driving on a map and color it based on different statistic values.

- Speed
- Height
- Whiteness

E	G	H	I
vehicle_speed	position_x	position_y	position_z
	-7388.5957	-3808.7156	41.276386
6.867571342	-7388.5457	-3808.0582	41.270079
6.958474532	-7388.4887	-3807.3765	41.263156
7.0286088	-7388.4271	-3806.6708	41.253828
7.099383136	-7388.364	-3805.9861	41.242606
7.0774982	-7388.2949	-3805.2688	41.232623
7.130367453	-7388.2229	-3804.5371	41.224506
7.204515647	-7388.1516	-3803.8467	41.218217
7.234488532	-7388.0743	-3803.1289	41.212451
7.29257573	-7387.9967	-3802.4115	41.204685
7.325243841	-7387.9152	-3801.6852	41.192661

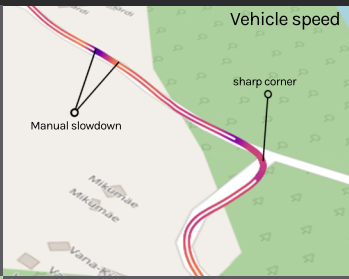
Data analysis

We were given multiple different csv files, one of which was human-only driven and others were autonomously driven if not interrupted by the human driver. Mainly used columns of the datasets were index (timestamp), vehicle_speed, position_x / y / z and steering angle. In addition to datasets we used Driving Whiteness Formula (W) to determine the smoothness of driving.

$$W = \sqrt{\frac{1}{D}\sum_{i=1}^{D}\frac{\partial P}{\partial t}}$$

Model Design

To visualize the change of the data in time combined with driving whiteness we mainly used Plotly python modules such as scatter_mapbox. The **white** line represent autonomous driving and the cuts in line showcase human driver interruptions. Colored behind it displays either Driving whiteness, height or speed. Our program is **capable** of plotting data of any given driving recording in this format.



Results

From the left plot we can see a good example of a human driver taking over in a very unstable situation and autonomous driving starting again when the car is stable.
On the top plot we can see that human driver takes over in sharp corners or to slow down the car and reactivate autonomous driving mode.