Project 4 report

The effect of the P, I, D component of the PID algorithm

Proportional control
It corrects the vehicle position followed by the cross track error from the lane center.
It correct vehicle position to the lane center.

Integral control
It corrects vehicle position followed by the sum of the cross track error from the lane center.
It corrects the offset from the lane center in the case vehicle components have the error from the ideal ones. (For example, steering angle works more greatly than expected.)

Differential control
It corrects vehicle position followed by the difference of the cross track error between t (recent time step) and t-1 (one time step ago).
It prevents the oscillation of the vehicle position from the proportional control.

How I chose the final hyperparameters (P, I, D coefficients).

I chose the hyperparameters as below.

Proportional coefficient	-0.1
Integral coefficient	0
Differential coeffient	-1.0

I chose this set of the hyperparameters manually.
First, I decided not to tune the coefficient supposed the vehicle has the perfect accuracy.
Second, I tuned the proportional coefficient. It seems better to choose -0.1 than -1.0. I tried both of them without tuning the the others.
There're the links the output of (P, I, D) = (-1.0, 0, 0) and (-0.1, 0, 0) respectively.
(-1.0, 0, 0)
(-0.1, 0, 0)

Finally, I tried the differential coefficient as -1.0 after I set the proportional coefficient as -0.1. And then the vehicle could keep the lane.
Here is the links to the final out put. It’s too heavy to upload once, so I devided it in four.

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