Project Writeup

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1. Effects of P, I and D components on steering angle

1.1. Model Architecture

The model pretty much follows the quiz and draws the neat code from the solution of the mpc-quizz. The equations are:-

- $x_{t+1} = x_t + v_t * cos(\psi_t) * dt$
- $y_{t+1} = y_t + v_t * sin(\psi_t) * dt$
- $\psi_{t+1} = \psi_t + \frac{v_t}{L_f} * \delta_t * dt$
- $v_{t+1} = v_t + a_t * dt$
- $cte_{t+1} = f(x_t - y_t + (v_t * sin(e\psi_t) * dt$
- $e\psi_{t+1} = \psi_t - \psi des_t + (\frac{v_t}{L_f} * \delta_t * dt)$

1.2. Update Equations

- $\psi_{t+1} = \psi_t - \frac{v_t}{L_f}\delta_t dt$ This is the update equation suggested in the udacity classroom.

1.3. The Horizon

According to the Q&A for this project the corresponding values for N and dt were chosen as suggested. Tried increasing N , the simulation was slower as explained in the lesson, this does indeed show that the computation becomes slower in each time-step. We can clearly see the effect of a large N in computation.

1.4. Polynomial fitting to the waypoints

As discussed by everyone in the slack channel, the points were initially transformed to the vehicles perspective (x, y, ψ) are zero. No additional preprocessing.

1.5. Latency

A fellow student provided a great explanation for dealing with latency. Which is, apply the actuator values the previous time step. Worked magic.
100 ms with the given N and dt values chosen is the time step interval, so the latecy causes the actuation to reflect only 1 step after the target time step. Thus we apply the actuation for the current time-step to the previous time-step.

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