The algorithm was built according to the reference: *A Sequential Two-Step Algorithm for Fast Generation of Vehicle Racing Trajectories*

The convex solver is CVX based on Matlab.

The official website is: <http://cvxr.com/cvx/>

Please install the cvx according to the operating system.

Function Framework:

|  |  |  |
| --- | --- | --- |
| Num | Name | Function (cite in the reference) |
| 1 | Main | Iteratively implement the algorithm and call every other function. (5.1 algorithm) |
| 2 | Get\_velocity | Get velocity profile (part 3) |
| 3 | Get\_trajectory | Get optimal trajectory (formula 15) |
| 4 | Initialize\_centerline | Generate the centerline and curvature |
| 5 | get\_kapnew | Calculate new curvature and distance s (Formula 17) |
| 6 | plot\_fun | Plot every state, time, target optimal value |
| 7 | regenerate\_path | Show new designed path |

Parameters

|  |  |  |
| --- | --- | --- |
| Num | Sign | Meaning |
| 1 | kap | curvature |
| 2 | pos | position with (phi is yaw angle, X, Y, s) |
| 3 | edge | edge information |
| 4 | Xl,Yl,Xr,Yr | accurate inertial position of edge |
| 5 | wl,wr | length of left and right edge |
| 6 | x or xout | 5 states of vehicle model (ey, dphi, r, beta, phi) |
| 7 | delta | steering angle |

Track design

Function initialize\_centerline could run directly. Change the initial curvature kap and track width wl, wr or sample interval (m) to adjust the track condition.