Note for running Julia on ROS:

Installation:

1. Install Julia terminal
2. Cd to current work folder: /Users/changliu/Documents/Git/Autonomous\_agent\_search/single\_agent\_search/exp\_julia/scripts
3. Start Julia: /Applications/Julia-0.4.3.app/Contents/Resources/julia/bin/Julia (on Mac)
4. Install packages that are used in script using Pkg.add(“package\_name”) (JuMP, RobotOS, MAT, Interpolations, Ipopt, Polynomials, etc.)
5. It’s a good habit to test packages after installing them using Pkg.text(“package\_name”)
6. Can use Pkg.update() to update packages after installation
7. Run a script in Julia:
   1. Method 1 (when Julia is not started): /Applications/Julia-0.4.3.app/Contents/Resources/julia/bin/julia testController.jl
   2. Method 2 (when Julia is on): include("testController.jl")

Note: after modifying a file, we need to run “workspace()” in julia terminal to clean previous workspace. Otherwise, new edits will not be used unless quitting and restarting Julia terminal.

Install Jupyter sometime for better development environment.

Usage:

1. After writing the code in Julia, follow the “ROS integration” section at <https://github.com/phobon/RobotOS.jl> , especially including #!/usr/bin/env julia in the file (e.g. example.jl)that are used as rosrun file.
2. chmod +x example.jl (make the example.jl an executable)
3. if there are some modifications in example.jl, may need to catkin\_make (not sure if this is a must, but highly recommended)
4. several ways of running:
   1. rosrun mpc\_ros example.jl
   2. (in /mpc\_ros/src) julia example.jl
   3. launch julia terminal first, then

include (“/Users/changliu/Documents/Git/Single\_agent\_search/experiment/matlab\_julia/CarMpc\_standalone.jl”)

Tips:

1. Ipopt works better when objective and constraints are twice differentiable. So when there’s absolute value function in obj or constraint, use epigraph variable to remove absolute value functions.

Sensor model:

Correct reading:

Missing reading:

out-of-FOV reading:

fake reading:

Remaining issues:

1. Conversion of different coordinates (camera, robot, global) is needed, e.g. fovModel is affected.

Files:

1. testController.jl is similar to the code in controller.jl but without connecting with ROS
2. map\_julia.jl is a previous version for running with ROS
3. controller.jl contain codes for connecting with ROS

Termination check

CarMpcUtils

CarMpc

Solve MPC

Update map

Controller.jl