decision.py











drive\_rover.py

!"rocks\_angles

rocks\_dists#

!$%!&

'&(

percepon.py

color\_thresh!

)!"rock\_thresh#

"obstacle\_thresh#\*!

!obstacle\_thresh !

rock\_thresh rgb\_thresh

percepon\_step!

!

!

decision.py











drive\_rover.py

!"rocks\_angles

rocks\_dists#

!$%!&

'&(

percepon.py

color\_thresh!

)!"rock\_thresh#

"obstacle\_thresh#\*!

!obstacle\_thresh !

rock\_thresh rgb\_thresh

percepon\_step!

!

!

Image

The points 1,2,3 are the same what were used in the perception\_step function.

point 4 is the point 5 in perception, only instead of xpix\_terrain, ypix\_terrain variables are used here the variables: xpix, ypix,

and instead of variables pix\_rocks, ypix\_rocks are used here variables xpix\_rock, ypix\_rock

The point 5 here is similar to the point 6 in perception, only for the Rover position and angle (yaw) are  used the last elements of arrays data.xpos[], data.ypos[], data.yaw[]; and the scale value is directly set to 10.

the point 6 differs from the point 7 in the perception. Here the data.worldmap coordinates are set directly to special values.

I think, the value of the scale in the point 5, and the valuses in the point 6 can be changed, if you want to do this.

In the point 7th of the last file the line (41) is removed:

if data.count < len(data.images) - 1:

The data.count += 1 is changed uncondicianally.

Drive Rover

For the rock detection there were added two variable to the Rover state (lines 54,55)

The threshold values for the stop\_forward, go\_forward and max\_vel were increased. You can set back these to them original values (50, 500, 2). (lines 64, 65, 66)

in the line 77 the samples\_located was renamed to samples\_found. Suggested to use the new name.

line 78 was removed.

To the lines 120,121 were added commands to the rover, wich rover was updated by calls in lines 113 and 114.

            commands = (Rover.throttle, Rover.brake, Rover.steer)

            send\_control(commands, out\_image\_string1, out\_image\_string2)

NO OTHER CHANGES. there not too much what to modify

Decision

What was added?

Check if there are rocks. Move towards the rock slowly with speed/3 [was speed/2].

Checks the distance from the rock. If it is not to close, sreeing

   Steering with angle diapason -20/20 [was -15/15]

but if it is to close, stops the car.

A new mode was added ‘stuck’ when the speed  is to low, and gas is not 0

Rover.vel < 0.01 and Rover.throttle != 0

in this case the steering angle is -20, and try to move forward [was -15]

Perception:

The original color\_tresh function finds the points which RGB are above the given rgb\_thresh. [the local name thresh is changed back to above\_trash]

There was added two more thresh functions for obstacles with the name obstacle\_thresh, which finds the points with RGB below the given value. [the local name thresh is changed to below\_trash]

The 3rd thresh function is for the rocks. rock\_thresh. There is no rgb\_thresh parameter, the two threshold values are defined inside. . [the local name thresh is changed to between\_trash]

If you want, you can change the threshold values: (in line 42,43) in pairs

threshold\_low = (100, 100, 20) 30 or 10

threshold\_high = (255, 255, 30) 50 or 20

In the rover\_coords function the calculation of the rover-centric coordinates was changed (lines 62, 63)

original

x\_pixel = -(ypos - binary\_img.shape[0]).astype(np.float)

y\_pixel = -(xpos - binary\_img.shape[1]/2 ).astype(np.float)

changed to

x\_pixel = np.absolute(ypos - binary\_img.shape[0]).astype(np.float)

y\_pixel = -(xpos - binary\_img.shape[0]).astype(np.float)

In the rotate\_pix function the local variable yaw\_rad was renamed to yaw. This is optimized change, but if you want, you can use original function.

In the translate\_pix function [I have changed the addition to the original]

The perception\_step function is filled with the needed operations, similar what have I added ysternday.

step1 – no changes, the names are the same, what were used in the examples

step2 – -see above

step3 - for terrain, obstacle and rocks there are called different thresh functions, the used names are speaking names.

Step4 – see point 1

step5 – see point 3

step6 – see point 3. If you want, you can change the scale value in the line 161. (for example from 30 to 10 or 20).

step7: here you can change the angle values, make 2.0 higher, and 358 lower, but sum of them should be 360. In the lines 171 and 172 you can define different intervals.

step8: originally only the distance and angle were calculated for terrain. For detecting rocks, dist\_rocks and angles\_rocks were added here. And the Rover state variable were updated here. Not too much to change here.