

1 Description

For this assignment, I wrote the Kalman filter to predict the robot path. I plotted the image of predict path data by using `cmd_vel` and `scan`, `pose` and `scan`, `cmd_vel` and `camera_scan`, and `pose` and `camera_scan`. The result is shown in the next section. In general, I wrote two scripts and two launch files for each task. The `kalman_filter` scripts contain the Kalman filter I wrote. `Initial_node.py` provides the initial pose. `Kalman_filter.launch` will launch two scripts and `tf` while `depth_scan.launch` will launch `depthimage_to_laserscan` package

2 Result

In result of task one, footprint and base link will move together. I use `tf` for `odom_kf` and `base_footprint`. The plot of path by kalman filter using `cmd_vel` and `scan` is exactly same as using `cmd_vel` and `camera_scan`. I don't know why this happen. It is may because of the warning show in figure 3. Same thing happend for predicted path by kalman filter using (`pose`, `scan`) and (`pose`, `camera_scan`). I tried to fixed it by I didn't figure it out. The other thing is the plot of path using `pose` looks very weird. I think this is because I got the wrong data. However, I couldn't fix it.

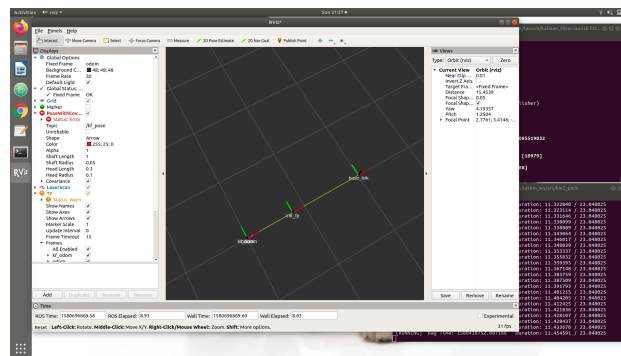


Figure 1: Task one shown in rviz

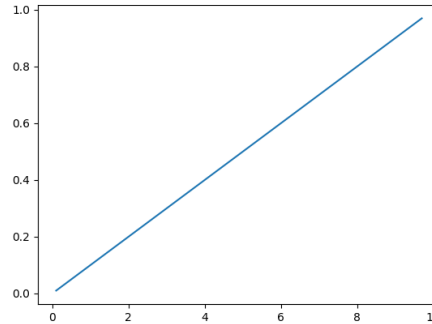


Figure 2: Result of predicted path is same for camera_scan and scan with cmd_vel (x-axis is t, y-axis is position)

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/home/violet-chang/cosc169-RoboKatkin_ws/src/hw2_pack/launch/depth_scan.launch http...
File Edit View Search Terminal Help
/
depthimage_to_laserscan (depthimage_to_laserscan/depthimage_to_laserscan)
republish (image_transport/republish)
ROS_MASTER_URI=http://localhost:11311
process[depthimage_to_laserscan-1]: started with pid [16389]
process[republish-2]: started with pid [16390]
[WARN] [1580783587.64692222]: [image_transport] Topics '/depth_image' and '/ca
mera/depth/camera_info' do not appear to be synchronized. In the last 10s:
  Image messages received: 2
  CameraInfo messages received: 0
  Synchronized pairs: 0
[WARN] [1580783588.647369222]: [image_transport] Topics '/depth_image' and '/ca
mera/depth/camera_info' do not appear to be synchronized. In the last 10s:
  Image messages received: 3
  CameraInfo messages received: 0
  Synchronized pairs: 0
[WARN] [1580783590.64855937]: [image_transport] Topics '/depth_image' and '/ca
mera/depth/camera_info' do not appear to be synchronized. In the last 10s:
  Image messages received: 2
  CameraInfo messages received: 0
  Synchronized pairs: 0

```

Figure 3: Warning message about depth image launch file

3 Evaluation

For this assignment, I didn't finish it well. The result is not what I expect. First, the predicted path using the camera and laser should be very different, but there are no differences in my results. I know something goes wrong, but I don't know how to find them. The next thing is that I don't get the right data from pose topics. It should be more normal if I get it from the right time. I guess I'm able to work on that but I don't have enough time. The only thing I finished successfully is the first question and the prediction using cmd_vel and scan. It looks nice in rviz and the plot looks correct.

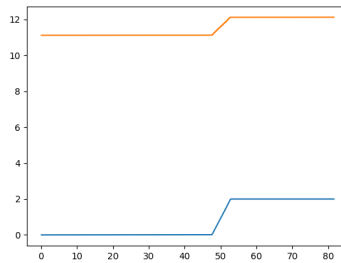


Figure 4: Result of predicted path of scan and pose (x-axis is t, y-axis is position; red line is pose, blue line is predicted path)

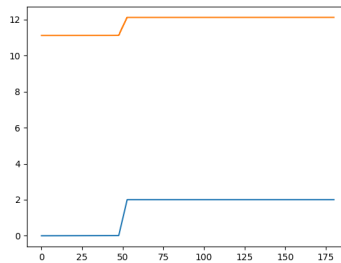


Figure 5: Result of predicted path of camera_scan and pose (x-axis is t, y-axis is position; red line is pose, blue line is predicted path)

4 Allocation of effort

Because this is an individual homework, I did everything on my own. Writing Kalman filter didn't take me a lot of time, the most difficult part is how to use it with the data that subscribed from topics. It took me lots of time and in the end, I couldn't figure it out.