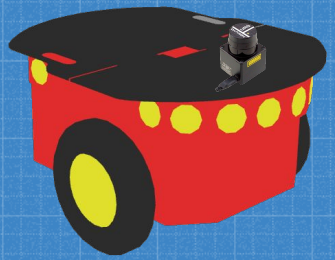


TÉCNICO LISBOA

Week 7

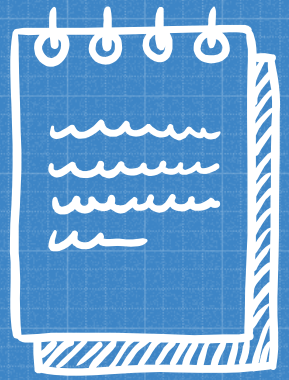
Pioneer 3DX - SLAM

(Group 17)

Eufémio Marques
Ivan Figueiredo
Miguel Roldão
Pedro Matos

Plans last week:

1. Solve some bugs on the landmark detection;
2. Finish the implementation and testing the update step.



Adding noise to the simulation

In real life, the resulting prediction from odometry has errors due to:

- Drag (mostly)
- But also:
  Floor irregularities
  Model imperfections

Adding noise to the simulation

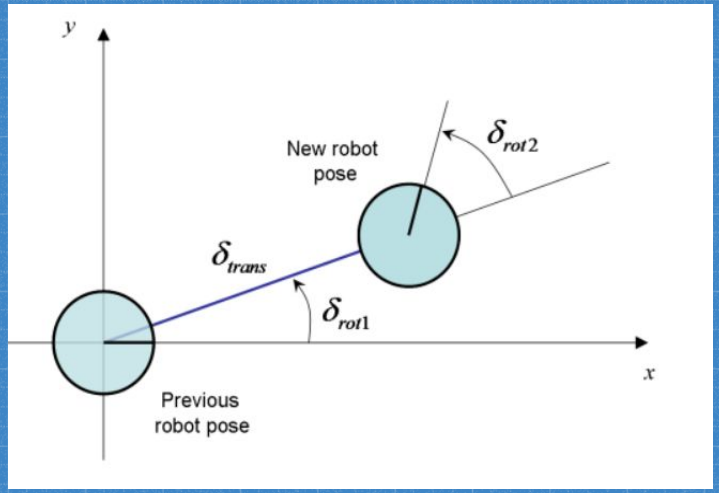
In real life, the resulting prediction from odometry has errors due to:

- Drag (mostly)
- But also:
  Floor irregularities
  Model imperfections

We can take this into account introducing <u>Noise</u>!

Adding noise to the simulation

The robot motion model:



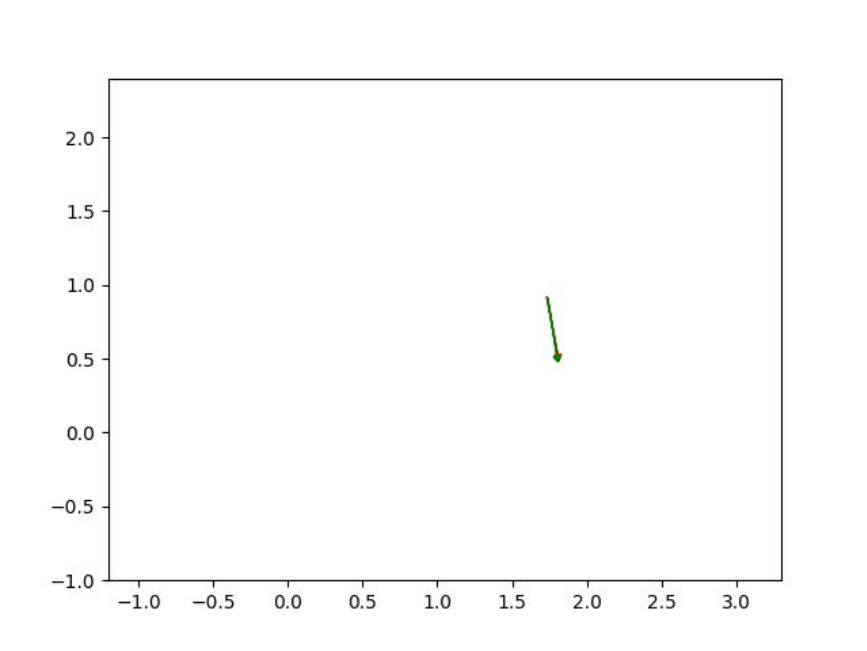
$\alpha_1, \alpha_2, \alpha_3, \alpha_4$: adjustment parameters that show how noise could affect the motion

$$\sigma_{rot1} = \alpha_1 |\delta_{rot1}| + \alpha_2 \delta_{trans}$$

$$\sigma_{rot2} = \alpha_1 |\delta_{rot2}| + \alpha_2 \delta_{trans}$$

$$\sigma_{trans} = \alpha_3 \delta_{trans} + \alpha_4 (|\delta_{rot1}| + |\delta_{rot2}|)$$

Adding noise to the simulation

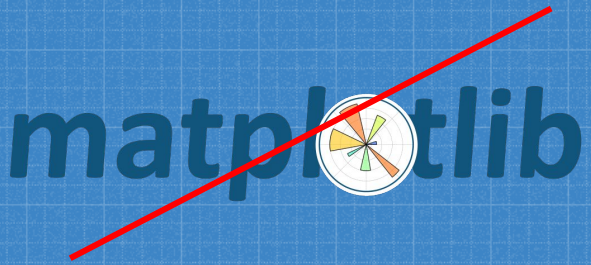


Real trajectory

Predicted trajectory

Hough transform

We managed to remove the dependance on the plotting library



Decreased Complexity of the Algorithm

```
cv2.HoughLinesP(edges,
    1,1*np.pi/180,25,minLineLength= 20,maxLineGap = 28)
```

Pixel resolution

Angle resolution

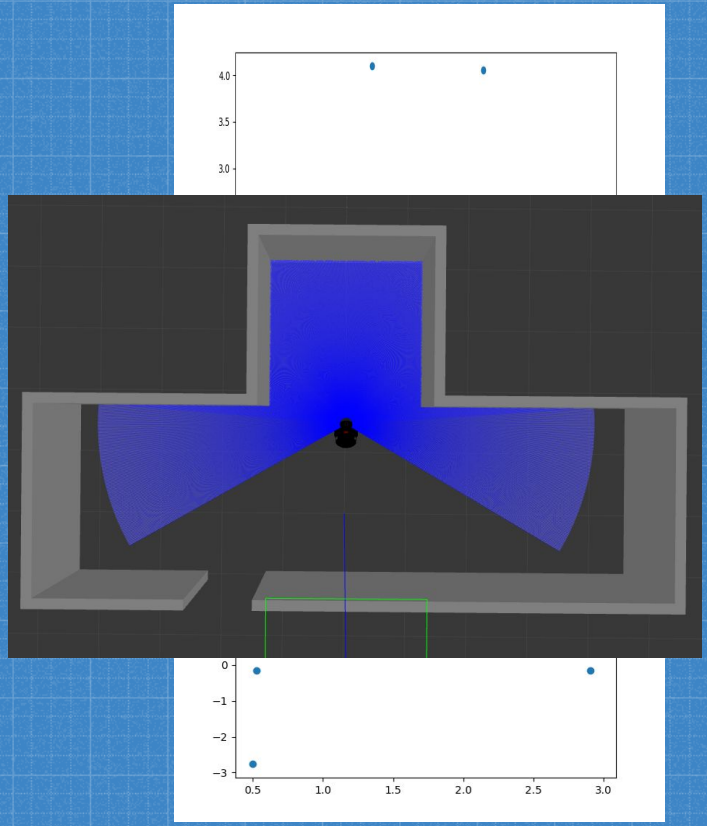
Threshold

Update step

Implemented the EKF code, but there are still some issues to solve:

- Parameters to insert in matrixes Qt, threshold of the Mahalanobis/probabilistic distance, initialization values of a new landmark observed

- Compatibility with the prediction node



The red dot represents the robot, and the blue ones the landmarks

Thank you!

ANY COMMENTS/QUESTIONS/Suggestions (please)?

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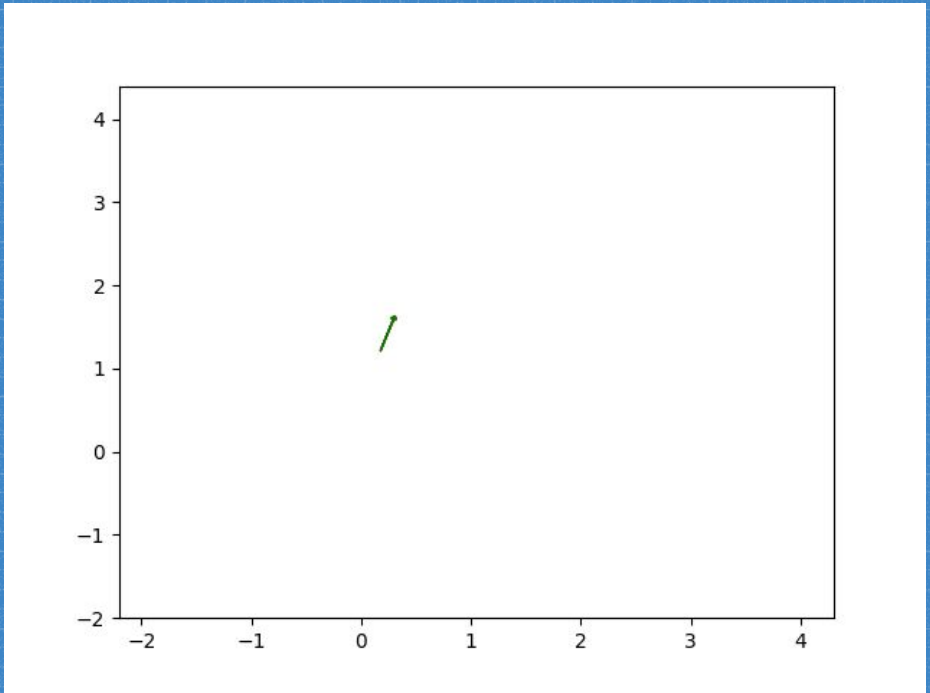
4
3
2
1
0
−1
−2
−2
−1
0
1
2
3
4