

Assignment 1 - Octave Tutorial Framework

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Course - Robotic Mapping

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1 Summary

Exercise 1:

Went through the basic Octave in-built Commands via help and the given cheatsheet.

Exercise 2:

Implemented the Odometry model in the *motion_command.m* file. Obtained the plots of the robot position from the depicted odometry model at every time step (figure 1) debugging the errors in the code. Video attached with this file.

Exercise 3:

- (a) Two octave functions *v2t.m* and *t2v.m* are implemented and tested few transformations.
- (b) The relative transformation can be written as

$$p_2 = \begin{bmatrix} R_1^2 & t_1^2 \\ 0_{1 \times 3} & 1 \end{bmatrix} p_1 \quad (1)$$

where R_1^2 and t_1^2 are the rotation and translation of the relative frame 2 with respect to the frame 1.

- (c) The location of the landmark L in the world frame represented in homogenous co-ordinates are

$$L = \begin{bmatrix} \cos(\theta_R) & -\sin(\theta_R) & t_x \\ \sin(\theta_R) & \cos(\theta_R) & t_y \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} L_x^{p1} \\ L_y^{p1} \\ 1 \end{bmatrix} = \begin{bmatrix} \cos(\pi/2) & -\sin(\pi/2) & 1 \\ \sin(\pi/2) & \cos(\pi/2) & 1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix} \quad (2)$$

where R_1^2 and t_1^2 are taken from the robot's rotation and translation in the x_t vector. The x and y position of landmark with respect to robot pose p1 is given z vector as observation and it is multiplied by 3×3 robot represented matrix with the 3×1 vector that are scaled to zero.

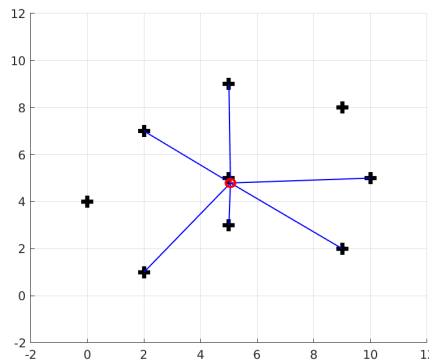


Figure 1: Robot position at timestep (t=330)