

EECS 270 LAB4

QUESTION1

Measure the average of Running Time and RMS Error of X, Y, theta that I estimate with my particle filter by running Lab4_1 (Average of 30 results).

Table1 is the result for the RMS Error and Running Time.

Table1: Result of RMS Error and Running Time				
Number of Particles (M)	*Average Running Time (sec)	*Average RMS Error		
		X	Y	Theta (rad)
500	0.59846622	0.215328462	0.201994771	0.47501203
1000	1.321896102	0.204203863	0.182558965	0.49288311
1500	2.133969844	0.200014342	0.180862722	0.50754887
2000	3.062772212	0.18878698	0.169824986	0.505590877
2500	4.109822035	0.167168007	0.148405154	0.504657984
3000	5.261405776	0.164173606	0.147770246	0.504831274
3500	6.536973051	0.182316397	0.15720252	0.519135214
4000	7.853449238	0.152375955	0.135190146	0.508341794
4500	9.271731423	0.143460145	0.131892325	0.522575485
5000	10.88075172	0.157833841	0.143349007	0.527289897
5500	12.05287179	0.141667967	0.131715158	0.489294723
6000	13.99006724	0.147413234	0.135981938	0.500528601
*Average of 30 times				

• Comment about Result

By looking at the Table 1, I notice that if you use more particles, running time will be bigger and Theta RMS Error will also increase a little. Additionally, most of the time X and Y coordinates will improve by using more particles.

I think the reason why only the theta parameter didn't get improve in RMS Error is because in the sensor it only can get the distance and didn't get the angle, that was making an estimate of angle a little bit bad.

QUESTION2

By looking at Table1, I think 4500 is the best value to use.

Because, by comparing result of 4500 particles and 5000 particles, all parameters got bad by increasing the number of particles. Also, from 5000, it will take more than 10 seconds to get just one result of estimation so still it improve the estimate for X and Y coordinates by increasing the number of particles, but I considered running time is not good enough to use as the best number of particles.

Therefore, I chose 4500 as a best value of M to get the high quality of estimate of final pose of robot.

By using 4500 particles and estimate the final pose of robot,

average result was (-1.882346, -0.1942762, 2.354649).

(Average result of 30 times, by using Lab4_2)

QUESTION3

Figure produced by running Lab4_3.

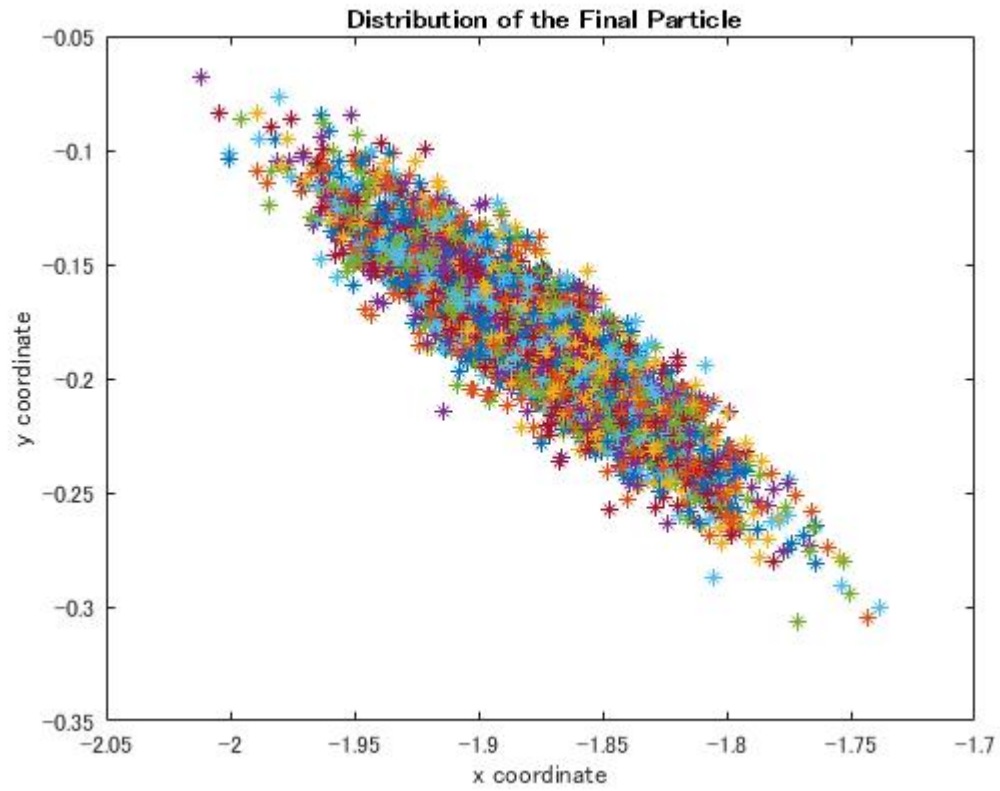


Figure2: Distribution of the Final Particle