Effect of velocity parameter on tracking for radio-frequency tomography experiments

Nannuru Santosh, Yunpeng Li, Mark Coates and Bo Yang

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This technical report serves as a supplementary document for the paper [1], detailing the effect of changing the velocity parameter m on overall tracking performance.

The Experiments 2 and 5, performed at Setup 2 are used for the analysis. Various values of the parameter m are used with number of particles set to 500 and $\sigma_v = 0.2$ (in [1] results are shown for $\sigma_v = 0.1$). The noise variance has been increased for this analysis because there is considerable uncertainty about the speed of the target. The result of the analysis for single target experiments (Exp. 2) and the two target experiments (Exp. 5) are presented in table 1 and 2 respectively.

m	SIR
0.05	0.44
0.10	0.43
0.15	0.42
0.20	0.41

Table 1: Average error (meters) for single target experiments, Exp. 2 as a function of changing velocity parameter m.

	Average error (meters)			
m	SIR	MPF	MCMC	ALM
0.05	0.72	0.74	0.71	0.91
0.10	0.78	0.77	0.71	0.91
0.15	0.91	0.84	0.72	0.94
0.20	0.96	0.90	0.72	0.95

Table 2: Effect of changing velocity parameter m on tracking performance for Exp. 5.

As is evident from the table, there is a small impact on performance when there is a mismatch between the motion of the targets and the model, but it is not substantial. If there are major discrepancies between the model and the actual motion, for example, running targets, then the model is not appropriate and should be revised.

References

[1] S. Nannuru, Y. Li, Y. Zeng, M. Coates, and B. Yang, "Radio frequency tomography for passive indoor multi-target tracking," 2012, submitted to IEEE Trans. Mobile Computing.