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Computer Science > Information Theory

On the Performance Limits of Map-**Aware Localization**

Francesco Montorsi, Santiago Mazuelas, Giorgio M. Vitetta, Moe Z. Win

(Submitted on 10 Mar 2013)

Establishing bounds on the accuracy achievable by localization techniques represents a fundamental technical issue. Bounds on localization accuracy have been derived for cases in which the position of an agent is estimated on the basis of a set of observations and, possibly, of some a priori information related to them (e.g., information about anchor positions and properties of the communication channel). In this manuscript new bounds are derived under the assumption that the localization system is map-aware, i.e., it can benefit not only from the availability of observations, but also from the a priori knowledge provided by the map of the environment where it operates. Our results show that: a) map-aware estimation accuracy can be related to some features of the map (e.g., its shape and area) even though, in general, the relation is complicated; b) maps are really useful in the presence of some combination of low signal-to-noise ratios and specific geometrical features of the map (e.g., the size of obstructions); c) in most cases, there is no need of refined maps since additional details do not improve estimation accuracy.

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