Reviewer's Comments to

Distributed Bayesian Filters for Multi-Robot Network by Using Latest-In-and-Full-Out Exchange Protocol of Observations

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This paper addresses the target tracking problem and proposes a distributed Bayesian filtering approach by using a set of networked binary sensors. The innovation from the existing statistics dissemination-based approaches is that, the proposed approach only requires the local robots to exchange with their neighbors a buffer consisting the latest available measurements from every robot in the network. This is achieved by the proposed Latest-In-and-Full-Out (LIFO) protocol, which intends to avoid high communication consumptions as generally required in the statistics dissemination strategies. It is shown in the paper that if the undirected communication graph is fixed and connected, the proposed LIFO protocol guarantees the intermittent dissemination of observations from all agent, with N-step delay from the N-hop neighbor(s). Based on the LIFO protocol, two algorithms are proposed to estimate the PDF for, respectively, a static target and a moving target. In the end, the paper shows the consistency (the convergence of the estimated location to the true one in probability) of the proposed algorithm for the case when the target is static, and the agents/robots are either static or moving.

In general, the paper is well organized and hence straightforward to follow. The results are well motivated, innovative and technically sound as well. The proposed algorithm is also clearly illustrated by the simulation examples. Therefore, the reviewer would suggest the publication of this paper. Meanwhile, some humbled comments/suggestions are given in the following.

- In Eq. (1), the variable S is undefined prior to the point.
- Page 2, in the end of the last paragraph, the authors mentioned $\mathcal{N}_i \subseteq \mathcal{Q}_i$. It seems to the reviewer that if the graph is fixed, undirected, and connected, as assumed in the paper, this is always the case. The authors might consider to further explain that this is for the general case or to remove otherwise.
- An implicit assumption used all through the paper is that, the self edge is always assumed. That is, the diagonal entires of the adjacency matrix M are positive. Please consider making this clear.
- The conditional independence between all measurements in $\mathbf{z}_k^i$ is used in the derivation in Eq. (5). Although this is a common assumption, it should be clarified somewhere.
- As the exchange of buffer is only with the one-hop neighbors of each agent, the resulting local PDFs are suboptimal in general. In the future work, it would be interesting and nice to look into the difference in performance, compared with the centralized estimate, as well as formulating the relation between such differences and the graph connectivities.
- The result in Proposition 1 as well Corollary 1 and 2 seem intuitive to the reviewer. If the undirected graph is connected and fixed, whether agent i is (indirectly) affected agent j in k iterations can be directed observed from the entry on the ith row and jth column of M^{k-1}. That is, whether $[M^{k-1}]_{(i,j)} > 0$ implies the effect. This also implies to the directed (even time-varying) graph. The authors can consider this tool in the future for the case of directed time-varying topology case.

- Is it required for each agent to know the total number of robots in the network? If yes, what if some robots fail during the process? If no, the authors can consider data/communication saturation for the future case.

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