

SC42050 Literature Assignment

Active Sensing for Robotics

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The design of intelligent robots is one of the goal of the future. Giving them the capability of deciding which action to perform to increase the information they can get from the environment is a fundamental step in this direction. Imagine, for example, a robotic cook which has to determine whether the box of mozzarella it has in its hands is expired or not; it has to turn the little box and find the expiration date, or in other words, it has to active sense the box. After reading (Mihaylova et al., 2002) answer the following questions:

1. Starting from the formulation of the problem, eq. (1), (2) and (3), discuss shortly the performance criteria selection pointing out advantages and disadvantages. (A table here could be sufficient).
2. Perform a short literature survey on optimization algorithms for active sensing, expanding section 3 of the paper. Explain in details one of the surveyed methods.
3. Let us assume that we have different robots which are cooperating. The problem will be formulated as before, with many eq. (1) and (2) as the number of robots or sensors. However, the value function, eq. (3), will still be one, since we want the robots to cooperate to find the best strategy for the group. Formulate this new problem pointing out how the dimension grows increasing the number of robots, N . Is the method previously chosen suitable for $N \gg 1$? Could you think to any distributed methods to decompose the optimization problem among the robots?

References

Mihaylova, L., Lefebvre, T., Bruyninckx, H., Gadeyne, K., and Schutter, J. D. (2002). Active sensing for robotics - a survey. In *Proceedings of the 5th International Conference On Numerical Methods and Applications*, pages 316–324.