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Sensor Scheduling Algorithms Requiring Limited Computation

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In this paper, we consider the scenario where many sensors co-operate to estimate a process. Only one sensor can take a measurement at any time step. We wish to come up with optimal sensor scheduling algorithms. The problem is motivated by the use of sonar range-finders used by the vehicles on the Caltech Multi-Vehicle Wireless Testbed. We see that this problem involves searching a tree in general and propose and analyze two strategies for pruning the tree to keep the computation limited. The first is a sliding window strategy motivated by the Viterbi algorithm, and the second one uses thresholding. We also study a technique that employs choosing the sensors randomly from a probability distribution which can then be optimized. The performance of the algorithms are illustrated with the help of numerical examples.

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