基于 CVaR 子模效益模型的传感器布局优化

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摘　要： 针对在不确定情况下如何保证传感器布局取得最优效果问题，本文在初始部署节点时考虑节点存在的不确定性，采用基于 CVaR 的子模效益模型来最小化这种不确定性对传感器网络布局效果的影响，为了快速有效获得该模型下的最优传感器布局，对传统贪婪算法进行改进，根据模型中存在的参数 τ 对全局最优解进行有序搜索，同时引入 lazy evuluation 减少算法的时间复杂度.仿真实验表明，在不确定情况下对传感器进行布局时，CVaR 模型可以有效提高网络布局的鲁棒性，与改进的贪婪算法相结合，可以快速获得保证较高信息增益下的布局点集.

关键词： 传感器布局；CVaR；子模函数；有序搜索；lazy evaluation

Sensor deployment optimization based on CVaR submodular utility maximization model

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Abstract： In order to ensure the optimal effect of sensor layout under uncertain conditions, this paper considers the uncertainty of nodes in the initial deployment of nodes, and adopts CVaR submodular utility maximization model to minimize the uncertainty of sensor network layout. In order to quickly and effectively obtain the optimal sensor layout under the model, the traditional greedy algorithm is improved, and the global optimal solution is searched according to the parameter τ existing in the model. At the same time, the lazy evaluation is introduced to decrease time complexity. Simulation experiments show that the CVaR model can effectively improve the robustness of the sensor deployment network when the sensor is laid out under uncertainty. Combined with the improved greedy algorithm, the layout point set can be quickly obtained with high information gain.

Key words： sensor deployment；CVAR；submodular function；ordered search；lazy evaluation

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