Chapter 6

Conclusion

In this paper, we exploited the partial result sharing to optimize in-network queries so as to reduce the total number of messages. Given a set of queries, we shall determine backbones with the purpose of minimizing the total number of messages. Explicitly, we first formulated the problem of selecting backbones and transform this problem into Max-Cut problem. Specifically, given a set of queries, we derived a graph, where each vertex represents one query and the corresponding weight edge denotes the number of messages reduced by sharing the partial results. According to the graph derived, we developed heuristic algorithm SB to derive a cut in which both backbones and non-backbones are determined. In order to evaluate the solution quality obtained by algorithm SB and compare its resulting backbone set with the optimal one, we devised an algorithm OOB to obtain the optimal solution. Performance of these algorithms was comparatively analyzed and sensitivity analysis on several parameters, including the number of queries and the distribution of data sources for queries, was conducted. Experimental results show that by sharing the partial results, algorithm SB is able to significantly reduce the total number of messages, thereby saving a considerable amount of energy. Moreover, the solution obtained by heuristic algorithm SB is very close to the one of algorithm OOB, showing the very high solution quality of algorithm SB. Through the optimization of in-network aggregate queries, wireless sensor networks are able to save a significant amount of energy, thereby extending the life time of wireless sensor networks.