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MILP for Maximization of Network quality

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Abstract: The Mixed Integer Linear Programming (MILP) - based techniques and the approximation algorithms with computation time polynomial in the number of regular nodes and the number of mobile backbone nodes were described. Maximum number of regular nodes can be assigned to mobile backbone nodes at a given level throughput. The MILP based approach provides a considerable computational advantage over existing techniques for mobile backbone network optimization. This approach has been successfully applied to a problem in which a maximum number of regular nodes are to be assigned to mobile backbone nodes at a given level of throughput, and to a related problem in which all regular nodes are to be assigned to a mobile backbone node such that the minimum throughput achieved by any regular node is maximized.

Keywords: MILP, Wireless Sensor Networks, Utility-based Asynchronous Flow Control, Non Linear Programming

I. Introduction

The challenges in the hierarchy of: detecting the relevant quantities, monitoring and collecting the data, assessing and evaluating the information, formulating meaningful user displays, and performing decision-making and alarm functions are enormous. The information needed by smart environments is provided by Distributed Wireless Sensor Networks, which are responsible for sensing as well as for the first stages of the processing hierarchy. The importance of sensor networks is highlighted by the number of recent funding initiatives, including the DARPA SENSIT program, military programs, and NSF Program Announcements. The study of wireless sensor networks is challenging in that it requires an enormous breadth of knowledge from an enormous variety of disciplines. In this chapter we outline Communication networks, wireless sensor networks and smart sensors, physical transduction principles, commercially available wireless sensor systems, self-organization, signal processing and decision-making, and finally some concepts for home automation. There are many situations where one would like to track the location of valuable assets or personnel. Current inventory control systems attempt to track objects by recording the last checkpoint that an object passed through. However, with these systems it is not possible to determine the current location of an object. For example, UPS tracks every shipment by scanning it with a barcode whenever it passes through a routing center. The system breaks down when objects do not flow from checkpoint to checkpoint. In typical work environments it is impractical to expect objects to be continually passed through checkpoints.

II. RELATED METHODS

In [1], new algorithms for throughput optimization in a mobile backbone Network were discussed. This hierarchical communication framework combines mobile backbone nodes, which have superior mobility and communication capability, with regular nodes, which are constrained in mobility and communication capability. An important quantity of interest in mobile backbone networks is the number of regular nodes that can be successfully assigned to mobile backbone nodes at a given throughput level This paper focuses on a hierarchical network architecture called a mobile backbone network, in which mobile agents are deployed to provide long-term communication support for other agents in the form of a fixed backbone over which end-to-end communication can take place. Mobile backbone networks can be used to model a variety of multi agent systems. The MILP-based algorithm provides a significant reduction in computation time compared to existing methods and is computationally tractable for problems of moderate size. The MILP approach provides a considerable computational advantage over existing techniques for mobile backbone network optimization.

In [2], Distributed power control is of special interest, since the alternative of centrally orchestrated control involves added infrastructure, latency and network vulnerability. The local per channel power measurements,

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made at each user's site and relayed to the corresponding base, include that of the intended signal as well as the combined interference from other users. Distributed algorithms can be defined by the dynamics of a simple class of power control algorithms and analyzing convergence properties. By using the distributed algorithms
the channel reuse is maximized. Since instability is a risk, the issue of pacing the power control evolution is concern.

In [3], The minimization of the total transmitted uplink power subject to maintaining an individual target CIR for each mobile. This minimization occurs over the set of power vectors and base station assignments. The problem has a special structure and identifies synchronous and asynchronous distributed algorithms to find the optimal power vector and base station assignment. The Minimum Transmitted Power(MTP) problem in which the total transmitted uplink power is minimized subject to maintaining an individual target Carrier to Interference Ratio(CIR)for each mobile.

[4] provides an algorithm for controlling mobiles' transmitter power levels and for selecting their base station assignments. The algorithm finds the optimal base station assignment and transmitter power levels, in the sense that interference is minimized. This paper can be viewed as a definition of network capacity on the uplink. The network provides a spread spectrum bandwidth and a set of base station receivers, and the task is to allocate these resources as efficiently as possible amongst the users.

III. Proposed System

MILP-based techniques and the first known approximation algorithms with computation time polynomial in the number of regular nodes and the number of mobile backbone nodes were described. The MILP based approach provides a considerable computational advantage over existing techniques for mobile backbone network optimization. This approach has been successfully applied to a problem in which a maximum number of regular nodes are to be assigned to mobile backbone nodes at a given level of throughput, and to a related problem from the literature in which all regular nodes are to be assigned to a mobile backbone node such that the minimum throughput achieved by any regular node is maximized.

MILP approach is impractical due to constraints on computation time, the greedy approximation algorithms developed in this project present viable alternative. The approximation algorithms carry the benefit of a theoretical performance guarantee, and simulation results indicate that they perform very well for the problem of assigning a maximum number of regular nodes such that each assigned regular node achieves a minimum throughput level.

IV. Results and Discussion

Optimization can reduce readability and add code that is used only to improve the performance. This may complicate programs or systems, making them harder to maintain and debug. As a result, optimization or performance tuning is often performed at the end of the development stage. In this the nodes are forming as groups. First to select the node and then the nearby nodes are selected and forming as group. Now the group increases the throughput level.

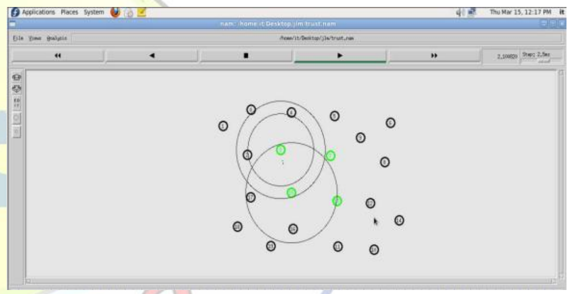

Fig.1.Formation Of Groups

In this, the nodes are selected as groups. From this the each group in the network increases the throughput. Here each and every node in the network increases its performance.

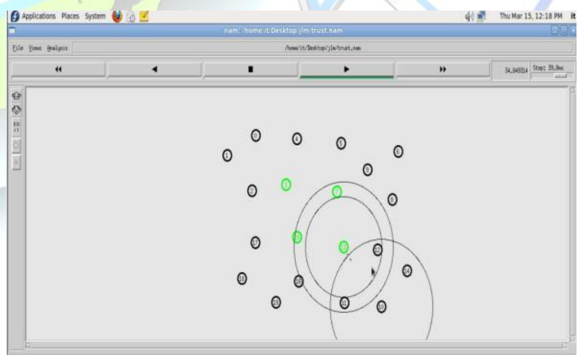

Fig.2. Improving Throughput of Each Node

V. Conclusion

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