Efficient Minimizing Movement for TCOV and Ncon In Mobile Sensor Networks

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Abstract— In wireless sensor network, high coverage area and network connectivity are two major issues. To minimizing the mobile sensor movement, above indication problem can be accomplished. As sensors are usually powered by energy limited batteries and thus extremely power-constrained, Energy consumption should be the top consideration in mobile sensor networks. Specially, movement of sensors should be reduced to prolong the network lifetime because sensor movement consumes much more energy than sensing. This problem is considered as NP hardness problem which is formulated as the mobile sensor deployment problem. The aim of our project to deploy the sensor in correct position which covers the large area and minimizing the network connection problem. Three algorithms can be implemented to avoid MSD problem. The algorithms are greedy algorithm, simulated annealing algorithm and particle swarm optimization algorithm. Hungarian method is used for solving the optimization problem.

Keywords— ***Mobile sensor arrangement (MSD), Greedy algorithm, simulated annealing algorithm***

INTRODUCTION

A wireless sensor system (WSN) various times called a wireless sensor and actor system (WSAN) are spatially scattered independent sensors to scrutinize substantial or environmental situation, such as temperature, sound, pressure, etc. and to considerately exceed their information during the system to a major point. The extra modern systems are bi-directional, besides permit manages of sensor movement. The expansion of wireless sensor systems was provoked by military applications such as battlefield observation; today such systems are applied in several ingrimerial and purchaser applications, such as ingrimerial process scrutinizing and manage, machine health scrutinizing, and so on. The WSN is compose of "nodes" – from a few to several hundreds or even thousands, what the time every node is linked to one (or various times several) sensors. Every such sensor system node has classically several parts: a radio transceiver amid an interior antenna or link to an outer antenna, a micro manage, an electronic circuit for interfacing amid the sensors and an power source, frequently a string or an embedded form of power yield. A sensor node capacity differ in dimension from that of a shoebox down to the dimension of a element of grime, while functioning "motes" of authentic microscopic dimensions enclose yet to be created. The rate of sensor nodes is likewise amend clever, series from a few to hundreds of dollars, depending on the difficulty of the entity sensor nodes. Dimension and rate restriction on sensor nodes result in corresponding restriction on wealth such as power, memory, computational rapidity and transportation bandwidth. The topology of the WSNs can differ from a easy star system to an advanced multi-hop wireless mesh system. The propagation technique between the hops of the system can be routing or flooding. Mobile wireless sensor systems (MWSNs) can basically be distinct as a wireless sensor system (WSN) in which the sensor nodes are movclever. MWSNs are a lesser, rising field of investigate in dissimilarity to their entrenched ancestor. MWSNs are a great deal extra flexible than still sensor systems as they can be arrange in various situations and handle amid rapid topology amends. However, several of their applications are alike, such as environment scrutinizing or observation frequently the nodes consist of a broadcasting transceiver and a micromanage powered by a string. As fit as various type of sensor for perceive light, humidity and etc., hardware and environment. The major hardware restrictions are partial string power and low rate requirements. The partial power means that it's significant for the nodes to be power cap clever. Price restrictions often demand low difficulty algorithms for easier micromanager and use of only a easy radio. The major environmental factors are the joint medium and conflicting topology. The communal medium utter that channel contact must be in time in unusual procedure. Protocols calculated for MWSNs are frequently corroborate amid the use of either systematic, recreation or unstrained results. Meticulous systematic results are algebraic in scenery and can afford good approximations of practice behavior. Mock-up preserve be performed amid software such as OPNET, NetSim and Net facility Simulation2 (NS2) and is the most general procedure of justification. Recreation can provide close approximations to the real behavior of a etiquette under a variety of situations. Significant conduct test are the most pricey to perform and, unlike the other two methods, no sup point require to be prepared. . These create them the majority depend clever form of in order, when a important how a method will achieve under confident condition.

RELATED FACILITY

R.Huang, W.Z. Song, M. Xu, N. Peterson, and B. Shirazi

Deployment and evaluation of a real-world sensor network system for long-term volcano hazard monitoring. Sensor network has been deployed, as part of the Optimized Autonomous Space In-situ Sensor web (OASIS) system. The OASIS is a prototype system that provides scientists and decision-makers with a tool composed of a smart ground sensor network integrated with smart space-borne remote sensing assets to enable prompt assessments of rapidly evolving geophysical events in a volcanic environment. The module describes the design and deployment of ground sensor networks. Conducted a trial deployment with 5 stations as a proof-of-concept with basic functions including UTCtime synchronized data acquisition, agile data collection routing, and reliable command dissemination. Learning lessons from that deployment, we have significantly improved the system functions and intelligence, .In this system, comprehensively review our system design and deployment experience and lessons, especially after trial deployment.

B. Liu, O. Dousse, P. Nain, and D. Towsley

The detection time depends on the mobility strategies of both sensors and intruder. Take a game theoretic approach and study the optimal mobility strategies of sensors and intruder. Given the sensor mobility pattern, assume that an intruder can choose its mobility strategy so as to maximize its detection time (its lifetime before being detected). On the other hand, sensors choose a mobility strategy that minimizes the maximum detection time resulting from the intruder's mobility strategy. This can be viewed as a zero-sum mini max game between the collection of mobile sensors and the intruder. Prove that the optimal sensor mobility strategy is for sensors to choose their directions uniformly at random between $[0,2\pi)$. The corresponding intruder mobility strategy is to remain stationary to maximize its detection time. This solution represents a mixed strategy which is Nash equilibrium of the game between mobile sensors and intruders. If sensors choose to move in any fixed direction (a pure strategy), it can be exploited by an intruder by moving in the same direction as sensors to maximize its detection time. The optimal sensor strategy is to choose a mixture of available pure strategies (move in a fixed direction between $[0,2\pi)$). The proportion of the mix should be such that the intruder cannot exploit the choice by pursuing any particular pure strategy (move in the same direction as sensors), resulting in a uniformly random distribution for sensor's movement. When sensors and intruders follow their respective optimal strategies, neither side can achieve better performance by deviating from this behavior.

Greedy Algorithm

Elucidations that estimated a global optimal explanation in a practical time. . For example, a greedy approach for the roaming salesman trouble (which is of a high computational difficulty) is the next heuristic: "At every juncture trip an unvisited city adjoining to the current city" This heuristic require not wrap a premium elucidation, but cease in a rational numeral of steps; verdict an optimal declaration typical demand foolishly some ladder. Greedy algorithms habitually (but not always) be unsuccessful to wrap the internationally the majority pick elucidation, since they frequently do not drive intensely on all the in arrange. They be clever to compose assurance to confident option too untimely which avert them from warp the best generally answer afterward compose a graph of targets. Fining target of port clever sensors by amid circle screen .Targets belong the same clique, to transmit only one mobile sensor to wrap them. Extensive Hungarian algorithm is second-hand to decide which antenna ought to be dispatch to wrap the targets in every clique.

Advantage:

- Greedy algorithm is that answer to lesser occurrence of the trouble can be undemanding and simple to appreciate.

Disadvantage:

- The majority best short-term elucidations may guide to the most terrible possible long-term ending.

Simulated Annealing Algorithm

A characteristic instance is the itinerant salesman trouble, which fit in to the NP-complete division of harms. For these harms, present is a extremely effectual rational algorithm called imitation annealing (tat this time fore named since it mimic the process undergone by absent atoms in a metal when its frenzied and then bit by bit cooled).Localization phase applied to estimate correct organize vectors. Alteration phase to amplify the precision of the point judgment of all non-uniquely localized clever nodes.

Advantages:

- Container contract amid random scheme and rate functions
- statistically assurances wrapping an optimal elucidation
- is relatively easy to code, even for complex troubles
- generally gives a ``good" elucidation

Disadvantages:

- Repeatedly annealing amid a 1/logk schedule is very slow, especially if the rate function is expensive to compute.

- For troubles time the power landscape is smooth, or that this time are few local minima, SA is overkill easy, faster methods (e.g., gradient descent) will facility better.

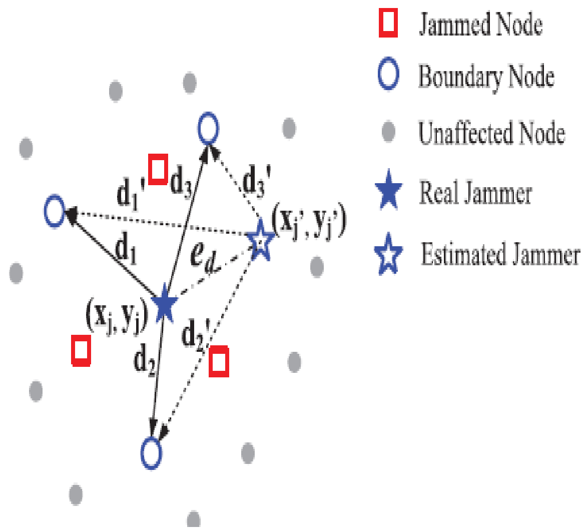

Fig.1. Illustration of jammer localization basis Generalized Pattern Search

A GPS algorithm facility likewise to the gradient descent algorithm. However, at every iteration, instead of making a step toward the steepest gradient, a GPS checks a set of elucidations (called a mesh) approximately the current elucidation, looking for the one whose corresponding function value is lesser than the one at the current elucidation. If a GPS warps such a elucidation, the new elucidation becomes the current elucidation at the next step of the algorithm. Searching for a mesh of elucidations, a GPS is likely to warp a sequence of elucidations that approach an optimal one amid converging to a local minimum.

Advantage:

- Easy convergence analysis
- To warp a sequence of elucidations that approach an optimal one amid out converging to a local minimum

Disadvantage:

- GPS algorithm for general restriction based not on a single objective

EXISTING SYSTEM

Wireless mobile sensor network is the collection of autonomous and distributed sensor with additional capacity of mobility. Mobility of sensor nodes adds additional functionality to the wireless sensor network of self deployment and relocation of sensors. Sensors find their own position and placed themselves over the target area after initial sensor distribution. Different approaches have been proposed for the deployment of mobile sensor by considering different issues. Coverage and Connectivity is the main issue of deployment. Some additional issues have to be considered while deploying mobile sensors like sensor relocation, energy efficient movements of sensors, obstacle adaptability, lifetime of network, fault tolerance etc. This system basically presents the study of different mobile sensor network deployment approaches with their features and drawbacks. The issues of mobile sensor network deployment are investigated in detail. It further discusses the distinct types of algorithms and different ways of deployment such as deterministic, random and incremental deployment along with the self deployment. Wireless Sensor Network (WSN) has emerged as an efficient technology for wide variety of applications such as home automation, military application, environmental monitoring, habitat monitoring etc. Use of mobile sensors adds more applications to above list. The wireless mobile sensor network is the collection of autonomous and distributed sensor with additional capacity of mobility that can sense or monitor physical or environmental conditions cooperatively. WSNs consist of a large number of small, inexpensive, disposable and distributed autonomous sensor nodes that are generally deployed in vast geographical areas. Sensor nodes are severely constrained in terms of storage, resources, computational capabilities, communication bandwidth and power supply. WSN face many challenges due to these many constraints such as lifespan of network, efficiency and the performance of network. An efficient deployment technique handles can these challenges. Deployment of the sensors over the target field to form the wireless network is an important criterion to be considered in most of the applications. It is a critical issue because it affects cost and detection capability of wireless sensor network.

Localization:

For placing the sensors we should get the target position of the sensor. For finding the position different techniques are used. Some deployment work is done only on system when the target area is simple and plane. But for complex area, map of the field is needed to get the position or location information. GPS enabled sensors are used for getting the position of the sensors when the position of sensors is needed at each point of time. Various localization techniques with or without GPS are discussed. GPS inclusion is too expensive to enable in sensor node so different location information gathering scheme must be proposed. Different localization algorithms are discussed. Sensor can find position of other sensor by local communication. Mobility would appear to make localization more difficult, so for getting neighborhood sensor node information node discover is needed. Three algorithms for getting neighborhood information are proposed. Self localization is proposed.

Methodology:

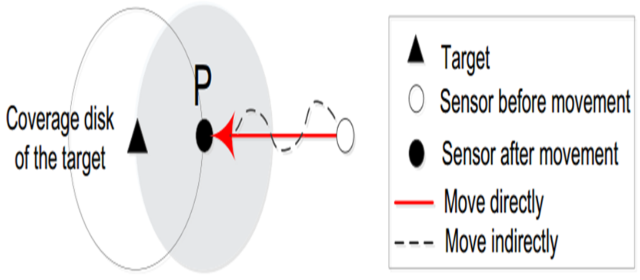

Fig 2: Methodology

Deployment Algorithm:

Due to energy constraint sensor node lose their energy and fail, resulting in degradation of performance of the network. For this reason the WSN should be fault tolerance means though any node in the network fails the proposed approach would stabilize the network with no loss. Different techniques are used for fault tolerance like new node deployment, load balancing, sensor relocation and incremental deployment. Mobility of sensor is highly used for handling the issue of fault tolerance. Deterministic deployment, random deployment and incremental deployment. Random deployments are typically used when the mission deployment area is physically inaccessible (e.g., volcanoes, seismic zones, etc.). On the other hand, deterministic deployments are more likely (and even preferable) used in missions when the deployment area is physically accessible. Deterministic deployment is preplanned deployment where the position of the sensors is calculated before deployment and then the sensors are placed on their respective position. Random deployment does not always lead to effective coverage and also there is a problem of clustering. To increase the lifetime of the network, new nodes can be deployed called as incremental deployment. The nodes are iteratively deployed depending on the application requirement in case of incremental deployment. Sensors are static or mobile. Mobility can significantly increase the capability of a sensor network by making it resilient to failures, react to events, and ability to support disparate missions with a common set of sensors. Mobility ensures self deployment of the wireless sensor network. The actual type of deployment affects important properties such as the expected node density, node locations, regular patterns in node locations, and the expected degree of network dynamics. Centralized algorithm runs on a single node in the system, it may be a sink node or cluster head node. The sink node controls the functioning of the nodes in the network by communicating them over a period of time. Distributed algorithm runs on each of the sensor node in the network, performing their task at their own. The sensor node sometimes called as intelligent node means they take their own decisions.

PROPOSED SYSTEM

In recent years, Wireless Sensor Network (WSN) has arisen as efficient technology for wide range of applications. The applications of wireless sensor network include environmental monitoring, object tracking, traffic management, emergency navigation, etc. A wireless sensor network is a set of physically distributed sensor nodes. Sensor node is a small wireless device with limited battery life, radio transmission range and storage size. A sensor node performs the task of collecting important data, processing the data, monitoring the environment, etc. Sensor nodes in the network communicate with each other using radio transmitter and receiver. Generally sensor nodes have three units: Sensing unit, Communication unit and processing unit. Sensor node collects relevant data from the environment send it to the sink node or base station via single hop or multi hop communication. Base station is the central authority in the network. Base station has ability to monitor the sensor nodes. At the base station data is aggregated. Sensor nodes can be mobile or static. Mobile Sensor network is the group of moving sensor nodes. Mobile sensor networks have additional capacity of Mobility. Mobility consists of different functions in sensor network like better network lifetime, better use of resources, relocation, etc. In the mobile sensor networks, Sensor nodes may change their location after initial deployment. Mobility can apply to all nodes or only to subgroups of nodes. Mobility can be active or passive. In active mobility the sensors are able to find their path and move while in passive sensors they may be moved by human or environmental assistance. Mobility of the sensor nodes can affect the overall performance of the network. Sensor Deployment is another issue in mobile sensor networks, because it not only determines the cost of constructing the network but also affects how well a location is monitored by a sensor node. Sensor deployment can affect the quality of coverage and connectivity. Target coverage and Network connectivity are two major issues of Mobile sensor networks. Target coverage covers a set of interested points in deployment area of mobile sensor networks. It guarantees that every target is covered by at least one mobile sensor. Network Connectivity guarantees that there must be sufficient routing paths between sensors. Target Coverage is affected by a sensors sensing range, whereas Network Connectivity is decided by a sensors communication range. Target coverage and Network connectivity may also affects the performance of Network. In this work, to solve target coverage problem two algorithms are used: basic algorithm and TV-greedy algorithm. Basic algorithm uses minimum number of sensors to be moved but that may increase the total movement of sensors. To minimize sensors movement TV-Greedy algorithm is used. TV-Greedy algorithm selects sensor which is very close to target to cover that target. In this system the issues of target coverage and network Connectivity in mobile sensor network are taken into consideration. Target coverage covers a set of interested point in the deployment area of mobile sensor networks. Network connectivity is necessary for sensors to communicate with sink node. To solve the Target Coverage problem two algorithms are proposed: Basic algorithm based on clique partitions and TV-Greedy algorithm based on Voronoi diagrams. Sensors „movement is minimized. TV Greedy algorithm achieves less movement than basic algorithm because it selects the sensor which is very close to target to achieve that target. LZW compression algorithm is applied while sending data from sensor node to sink node, hence the computation speed of transmission is maximized. Simulation result obtained validates the performance of the proposed algorithm. Hence, the proposed scheme successfully overcomes the issues of Target coverage and Network Connectivity in Mobile Sensor Networks and increases the network lifetime.

SYSTEM ARCHITECTURE:

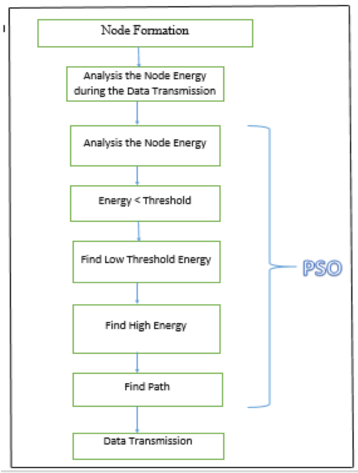

Fig:3 System Architecture

Node Formation:

Sensor network composed of a large set of directional sensor nodes N to cover a set of M targets in a two-dimensional plane. The sensors are deployed with random distribution. The DSN has a sink node, to which all sensor devices send their sensed data in multi-hop fashion. Each sensor Si has a fixed and known location (xi, yi), determined by GPS or any other localization method. Each sensor device is uniquely identified by its ID. We also assume that all the directional sensor nodes are homogeneous in terms of the number of sensing sectors, the sensing and communication radius, and the initial energy E0. A sensor node can be in the active or sleeping state. When in the sleeping state, a sensor node periodically wakes up and communicates with its cluster head to check the neighbor communication and sensing coverage.

Movement Tracking:

The free mobility model is adopted. In this model, sensors are able to move continuously in any direction and stop anywhere. The distance that a sensor moves is used to present the sensor's energy consumption incurred in the movement. The movement distance of sensor s to cover target t is dist(s, t) − rs, where dist(s, t) is the Euclidean distance between s and t. Similarly, the movement distance of sensor si to connect with sensor sj is dist (si, sj) − rc, where dist (si, sj) is the distance between si and sj . In the obstacle free scenario, in order to minimize the movement distance of a sensor to a target, the sensor should move along the straight line from its initial position to the target until it reaches the target's coverage circle.

The Basic Algorithm:

The Basic algorithm minimizes the number of sensors to move, it may increase the total movement distance of sensors. For example, targets A and B could be covered by one single sensor. According to the Basic algorithm, s1 should be moved to cover them because it is closest to the intersection of the coverage disks of A and B among the three sensors. However, if we move two sensors s2 and s3 to cover tA and tB respectively, can further reduce the total movement distance, although the number of moved sensors is not minimized.

PSO:

When WSNs are initially organized, proper deployment of mobile nodes is desirable to achieve energy-efficient coverage. Also, the environment may cause changes in WSNs, such as the appearance of node failures. Therefore, position adjusting of mobile nodes is necessary for resource re-allocation. With the proposed coverage and energy metrics, deployment optimization should be implemented to provide adaptability for WSNs in these cases. Then, the optimization results are broadcasted over the network so that WSNs can be self-organized. Following the previous assumption, there are n stationary nodes and m mobile nodes available in the deployment problem. The coordinates of mobile nodes are taken as non-integral input vectors for optimization. Certain coverage ratio C0, namely the optimized coverage metric, is demanded under the detection reliability requirement. Thus, the objective of optimization is to decrease the energy consumption level of WSNs in target tracking applications under the condition that the required coverage metric is satisfied. PSO has a strong ability for finding the most optimal result. However, it has a disadvantage in local minima. Thus, simulated annealing which has a strong ability for finding the local optimal result is introduced to avoid the problem of local minima. SA mainly consists of the repeating of two steps: a generation mechanism and an acceptance criterion. It starts off at an initial random state with a high temperature, and then a sequence of iterations is generated. A perturbation mechanism transforms the current state into a next state selected from the neighborhood of the current state. If this neighboring state has better fitness, the neighboring state is accepted as the current state. If this neighboring state has worse fitness, the neighboring state is accepted with a certain probability determined by the acceptance criterion. After sufficient times of acceptance, the temperature is decreased. This process is repeated until the final temperature is reached.

CONCLUSION:

In this project, we are using the software system to filter unwanted messages from social network walls. The GUI contains several views and user defined applications. Then our implementation tool able to automatically recommend trust values for those contacts user does not personally know. We do believe that such a tool should suggest trust value based on users actions, behaviors, and reputation in OSN, which might imply to enhance OSN with audit mechanisms. We can extend the Machine Learning (ML) text categorization techniques to automatically assign with each short text message a set of categories based on its content. Then exploiting a flexible language to specify Filtering Rules (FRs), by which users can state what contents, should not be displayed on their walls. FRs can support a variety of different filtering criteria that can be combined and customized according to the user needs. Establishment of pair wise keys between sensor nodes in a sensor network is a difficult problem due to resource limitations of sensor nodes as well as vulnerability to physical captures of sensor nodes by the enemy. Public-key cryptosystems are not much suited for most resource-constrained sensor networks. Recently, elliptic curve cryptographic techniques show that public key cryptosystem is also feasible for resource-constrained sensor networks. However, most researchers accept that the symmetric key cryptosystems are viable options for resource-constrained sensor networks. In this system, first develop a basic principle to address the key pre-distribution problem in mobile sensor networks. Then, using this developed basic principle, we propose a scheme which takes the advantage of the post-deployment knowledge. Scheme is a modified version of the key prioritization technique proposed. Improved scheme provides reasonable network connectivity and security. Moreover, the proposed scheme works for any deployment topology.

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