A Mobile Target Tracking and Data-Centric Sensor using Wireless Network

V.Vijayadeepa, P. Anitha

Abstract- ***In data-centric sensor networks, sensor data is not necessarily forwarded to a central sink for storage; instead, the nodes themselves serve as a distributed in-network storage, collectively storing sensor data and waiting to answer user queries. A key problem in designing such a network is how to map data and queries to their corresponding rendezvous nodes so that a query can find its matching data quickly and efficiently. Existing techniques are mostly aimed to address a certain type of queries. Both resource allocation and reactive resource allocation problems in multi- server*** *data-centric sensor(DCS)* ***to attack Poisson process. A queuing network, where multi servers at each service station are allocated, and also each activity of a project is operated at a devoted service station with only one server located at a node of the network. The problem is formulated as a multi-objective optimal control problem that involves four conflicting objective functions. The objective functions are the project direct cost (to be minimized), the mean of project completion time (min), the variance of project completion time (min), and the probability that the project completion time does not exceed a certain threshold (max). It is impossible to solve this problem, optimally. Therefore, we apply a genetic algorithm for numerical optimizations of constrained problems to solve this multi-objective problem.***

Keywords: key predistribution, mobile sink, security, unattended wireless sensor network.

I. INTRODUCTION

Some organizations are project-oriented based and operate their activities depending on projects. In such situations, the organizations may carry out the multi project concurrently, whereas, Payne revealed that up to 90% organizations execute the projects in a multi-project environment. In the literature, was mostly analyzed on static and deterministic environments and a few investigations have been focused on multi-project scheduling under uncertainty and dynamic conditions. A simulation model for multi-project resource allocation with stochastic activity, as a multi-channel queuing, was presented by Fatemi- Ghomi and Ashjari. Also, a nonlinear mixedinteger programming model for optimizing the multi project resource allocation was proposed by Nozick et al, whereas changing resource allocations affects the probability distribution of activity duration. An event-driven approach was represented by Kao et al, and also, using Critical Chain Project Management (CCPM) approach, the uncertainty in multi project system was studied commonly analysed by either connecting them together into a large single project by the addition of dummy start and end activities or considering the projects as independent and linking them by using an objective function which contains each project individually (probably with appropriate weigh factors) and the corresponding resource constraints. In many organizations, not only are the activity durations uncertain, but also, new projects dynamically arrive to the project based organizations over the time horizon. Clearly, in this condition, project scheduling procedure would be more difficult and more complex than before. This problem, considered in project-oriented applying simulation. In this investigation, the organization was presented as a "stochastic processing network" with a collection of service stations (work stations) or resources, where one or more identical "servers" for serving projects under a pre-specified discipline, has been settled at each station. In this research, for avoiding project network disruption, *"reactive resource allocation"* is suggested. Along with the project execution, a project may be disposed by considerable unforeseen disruptions, therefore, reactive scheduling (rescheduling), with revising or re-optimizing the initial baseline schedule, aims to adjust the baseline schedule and consequently, overcome the disruptions.

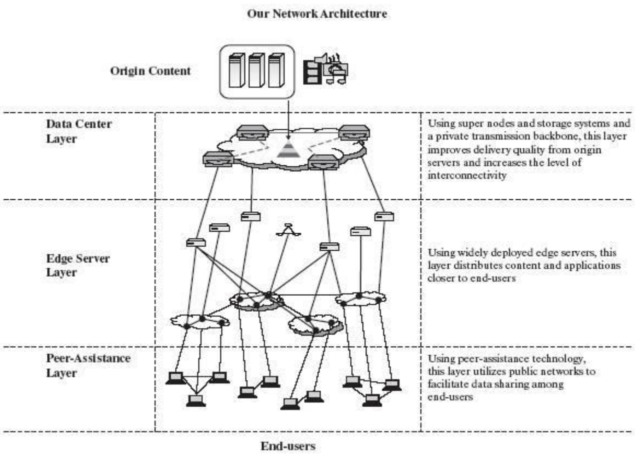

Fig 1. Architecture Diagram in DCS Network.

II. MULTI-OBJECTIVE RESOURCE ALLOCATION PROBLEM

In this section, we develop a multi-objective model to optimally control the resources allocated to by decreasing the amount of resource allocated to the activities. However, clearly it causes the project completion time to be increased, because these objectives have the confliction with each other. Consequently, an appropriate trade-off between the total direct costs, and the project completion time is required. This is a multi-objective stochastic programming problem. Therefore, we transform it into a relevant multi- objective problem with four deterministic conflicting objective functions.

Manuscript Received on November, 2012.

V.Vijayadeepa, Head of the Department /Academy of Computer Science Muthayammal College of Arts and Science, TamilNadu India.

P. Anitha, M.Phil Scholar Muthayammal College of Arts and Science, TamilNadu India.

The objective functions are the project direct cost (to be minimized), the mean of project completion time (min), the variance of project completion time (min), and the probability that the project completion time does not exceed a certain threshold, u, (max).

III. BACKGROUND

There have been several approaches to the data retrieval problem in sensor networks. The simplest solution, but very inefficient, is to pull the data from every sensor node to the sink where the query is centrally executed. Instead, as in TinyDB [6] and Cougar [7], the query can be pushed throughout the network so that each node can set up aggregation and filtering rules based on the query's constraints to ignore the data that do not contribute to the answer set, thus lessening the traffic incurred by the data pull. For approximate queries, i.e., those that would be fulfilled with approximate results, better efficiency can be achieved by taking advantage of the spatial correlation property of the sensor data. For example, since a sensor node's readings are similar to some extent, they can be approximated by a Gaussian distribution model and so, as proposed in [8], t he sensor data models can be summarized and propagated upstream towards the sink to serve as guidelines directing the query's traversal in the network. The query will not be sent down a branch of the network if the model summarizing this branch suggests with a high

probability that no data downstream will satisfy the query. Most existing techniques are aimed at certain query types and not easily extensible to support others. For example, some techniques are designed for top-k queries [9], [10] but not range queries, and vice versa [11]. Some techniques can address any query no matter its type, however at a cost that would be too expensive for large-scale networks. Many techniques require knowledge of geographic location information about the sensor nodes, which is not always possible for a typical sensor network. Therefore, it remains an unsolved challenge to design a search technique that is capable to address any type of queries and work with a wide range of data-centric sensor networks, including those not equipped with geographic location information.

In this section, the multi-server Data-Centric Sensor is modeled to optimally control the resources allocated to the corresponding activities. Also, an analytical method to compute the approximate distribution function of project completion and a multi-objective model in a multiserver Data-Centric Sensor are presented.

IV. GENETIC ALGORITHM

A Genetic Algorithm (GA) is a randomized search method modeled on evolution GAs are being applied to a variety of problems and becoming an important tool in combinatorial optimization problems GAs are search procedures based on the mechanics of natural selection and natural genetics.

Step 1. Compute the density function of the sojourn time (waiting time plus activity duration) in each service station.

Step 2. If $m=1$, then the queueing system would be an $M/M/1$ queue, and the density function of time spent at the service station a (w (t)).

Step 3. Convert the Data-Centric Sensor as an Activity-on-Node (AoN) structure into a substitute classical ERT network represented as an Activityon-Arc (AoA) graph.

Step 4. Determine a continuous-time s Genetic Algorithm with finite states.

Step 5. Determine the states space of system. For this purpose, let be the wireless network, obtained in with a single source and a single sink, in which represents the set of nodes and represents the set of arcs of the network in the network.

V. PROPOSED SYSTEM

A multi-objective model to optimally control the servers allocated (as resources) to the service stations in a Data-Centric Sensor. we decrease the amount of resource allocated (servers) to the service stations, the project direct cost will therefore be decreased. The last objective that should also be considered is the probability that the project completion time does not exceed a certain threshold for on-time delivery performance. The direct cost of each activity is a non-decreasing function and the mean service time in each service station is a nonincreasing function of the amount of resource allocated to it.

A. Initialization

A multi-objective model to optimally control the resources allocated to the service stations in a multi-server Data-Centric Sensor for both approaches, namely resources as servers and resources affecting servers, using Genetic algorithm and multi objective programming.

Algorithm: The GA for Petri nets

Step1: generate initial population.
Step2: evaluate Process N(0).
Step3: for each process from the set n do
Step4: Select process N(i)
Step5: identify the transition path to visit all processes.
Step6: divide path into disjoint paths Ni.
Step7: perform crossover on Ni.
Step8: apply deletion mutation I to N(i).
Step9: apply deletion mutation II to N(i).
Step10: apply insertion mutation III to N(i).
Step11. Evaluate N(i).
end
End.

B. Crossover Operation

This Data-Centric Sensor was represented as a network of queues, where several servers are in each service station and the capacity of the system is infinite.

C. Mutation

The probability that the project completion time does not exceed a certain threshold was considered as the last objective. Finally, the goal attainment method was employed to solve a discrete-time approximation of the primary multi-objective problem.

VI. RESULTS AND DISCUSSION

To demonstrate the feasibility of the proposed genetic algorithm method we solve the different cases, shown in Fig.1, respectively, for the following 5 sets of optimal solutions in each case.

Project Time duration using DCS

Distance	431	499	510	537	587
Normal time	4.906	5.219	5.609	5.625	6.031
DCS Time	1.588	1.95	2.356	2.339	2.746

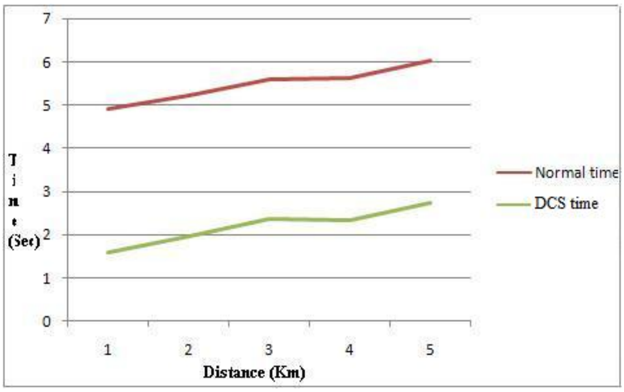

Fig 2: Using DCS network.

The analysis of variance according to the computational time as the proper responses are shown in Tables1. Therefore, comparing the xxxxxx results against the discrete-time approximation results shows the efficiency of the xxxxxx method for the time-cost trade-off in Wireless networks.

VII. CONCLUSION

The problem considered in this paper has continuous decision variables and involves nonlinearity. After the reformulation of the problem, we applied a genetic algorithm for of constrained problems. The limitation of this paper is that the state space can grow exponentially with the network size. The model can be extended to the general Wireless networks, where general activity durations are allowed. In general networks, the activity distribution can be approximated by an appropriate generalized.

REFERENCES

1. S. RatNasamy, B. karp, L. Yin, F. Yu, D. Estrin, R. Govindan, and S. Shenker, "GHT: A Geographic Hash Table for Data-Centric Storage," ACM International Workshop on Wireless Sensor Networks and Applications, September 2002.
2. S. Shenker, S. Ratnasamy, B. Karp, R. Govindan, and D. Estrin, "Datacentric storage in sensornets," ACM SIGCOMM Computer Communication Review archive, vol. 33, no. 1, pp. 137–142, 2003.
3. D. Ganesan, B. Greenstein, D. Perelyubskiy, D. Estrin and J. Heidemann, "Multi-resolution Storage and Search in Sensor Networks," ACM Transactions on Storage, August 2005.
4. W. Zhang, G. Cao, and T. La Porta, "Data Dissemination with Ring-Based Index for Wireless Sensor Networks," IEEE International Conference on Network Protocols (ICNP), pp. 305–314, November 2003.
5. B. Karp and H. Kung, "GPSR: Greedy Perimeter Stateless Routing for Wireless Networks," ACM Mobicom, 2000.
6. A. Perrig, J. Stan kovic, and D. Wagner, "Security in Wireless Sensor Networks," Communications of the ACM, vol. 47, no. 6, June 2004.
7. J. Deng, C. Hartung, R. Han, and S. Mishra, "A practical study of transitory master key establishment for wireless sensor networks," in IEEE/Create Net Conference on Security and Privacy for Emerging Areas in Communication Networks (Secure Comm), 2005, pp. 289–299.
8. A. Perrig, R. Szewczyk, V. Wen, D. Culler, and J. Tygar, "Spins: security protocols for sensor netowrks," in ACM Mobicom, 2001.
9. W. Du, J. Deng, Y. Han, and P. Varshney, "A pairwise key pre-distribution scheme for wireless sensor networks," in Proceedings of the 10th ACM Conference on Computer and Communications Security (CCS'03), 2003, pp. 42–51.
10. D. Liu and P. Ning, "Establishing pairwise keys in distributed sensor networks," in ACM CCS, 2003.
11. S. Zhu, S. Setia, and S. Jajodia, "Leap: Efficient security mechanisms for large-scale distributed sensor networks," in ACM CCS, 2003.
12. Y. Zhang,W. Liu, W. Lou, and Y. Fang, "Location-based compromisetolerant security mechanisms for wireless sensor networks," IEEE Journal on Selected Areas in Communications, Feb. 2006.

AUTHORS PROFILE

V. Vijayadeepa, received her B.Sc degree from university of Madras and M.Sc degree and MCA degree from Periyar University. She has completed her M.Phil at Bharathidasan University. She is having 10 years of experience in collegiate teaching and She is the Associate Professor and head of department of computer science and applications in Muthayammal college of Arts and Science,Rasipuram affiliated by Periyar University. Her main research interests include personalized Web search, Web information retrieval, data mining, data warehousing and information systems.

P. Anitha, received her B.Sc., degree in Trinity College of arts & Science from Periyar University, Salem (2002-2005) Tamil Nadu (India). B.A., degree in Trinity College of arts & Science from Periyar University, Salem (2002-2005) TamilNadu (India). B.Ed., degree in Esther College of Education, Periyar University, Salem (2006-2007) TamilNadu (India). Then Finished M.Sc., degree in Annamalai University, (2007-2009). TamilNadu (India). Her Area of interest is Wireless Networking.