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A Review on Approach for Shortest Path in Multiagent Distributed Scenario Using AOMDV and Tree Topology

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***Abstract*- The basic purpose of the work is to develop most likely shortest path for routing. Also to perform the classification task by means of a distributed data fusion based on tree topology in a multi-agent context. As tree topology better describes interaction among static sensors and cyclic structure better describes interaction among mobile units. The objective of the sensor network is to perform this classification task by means of a distributed data fusion based on tree topology.**

***Keywords*- Multiagent System, AOMDV, TBM, Tree topology, Cyclic Graph**

I. INTRODUCTION

In the framework of Multiagent, system data combination plays an important role where information approaching from multiple sources were arranged to provide useful description of the existing location. The single agent model may be insufficient when tentative logics were performed by entities of the system between which there is some distance either spatial, temporal or semantics. For such type of systems, a Multiagent system works, where each agent is an autonomous intelligent subsystem, is thus more suitable. Each agent holds its own limited information, accesses some computational resources. A Multiagent, system offers several advantages for higher value of task domain and higher flexibility.

Transferable belief model introduces an idea with open world theory in the Dempster–Shafer framework. The related information is been interchanged locally along with agents using point-to-point topology [1].We introduce a new work, which is the improved expansion of the transferable belief model to a Multiagent distributed system in this work distributed data aggregation unit is available based on tree topology. Nodes are representing agents and collects data autonomously using tree topology (graph with cycles). The cyclic structure defines better interaction among mobile units.

Two different scenarios are considered: In first one, Static scenario is introduced where agents provide data that do not change over time, While in second scenario i.e. dynamic scenario is been considered where agents produced data that change with respect to time. Characterization is been finished by methods for disseminated information combination dependent on tree topology.

A cyclic diagram calculation is been proposed to merge to fundamental conviction task dependent on the transferable conviction model. The information outline gives the plan to consolidate the information originating from various sources to course to wipe out repetition, limit number of transmission and accordinglysane energy. An efficient data transfer model with tree structure is available, transferable belief model (TBM) is used as an application in sensor networks.

II. RELATED WORK

An evidence based sensor coverage model is described based on the transferable belief model. The evidence based coverage model provides a generic mathematical abstraction of sensor coverage. Evidence combination is shown to improve significantly sensor coverage by utilizing collaboration about sensors [2]. A new framework for sensor reliability evaluation is presented in a classification problem based on evidence theory in [3]. Likewise, a technique for assessing the unwavering quality of sensor in a characterization issue is been proposed dependent on the transferable conviction model [4].

To start with, it had built up a technique for the assessment of sensors. The strategy depends on finding the limiting component decreasing the separation between the pignistic probabilities registered from the limited convictions and the genuine estimations of information. Next, it had built up a strategy for evaluating the dependability of a few sensors that should work mutually and afterward their readings are abridged. The limiting components are assessed based on limiting the separation between the pignistic probabilities figured from the consolidated limited conviction capacities and the actual values of data.

The minimum spanning tree problem has been defined in [5]. Various topology control algorithms also use minimum spanning tree to build well-connected sub graphs with provable cost relative to the optimum. Both

centralized and distributed algorithms have been proposed to construct the topology in "D. England, B. Veeravalli, J.B. Weisseman: et.al [6]. They demonstrate its effectiveness through investigation of two clauses of distributed applications: Data gathering of sensor networks and data dissemination in divisible load scheduling. Likewise top to bottom investigation of plan and examination of tattle calculation has been taken forward for averaging in a self-assertively associated number of hubs [7]. It looks at the averaging issue under the tattle imperative for self-assertive systems and finds that the averaging time of the tattle calculation relies upon the second biggest Eigen estimations of a twofold stochastic lattice portraying the calculation. An appropriated calculation has been proposed to assemble a negligible traversing tree that works on both simultaneously and noncom currently in [8].

They are helpful coming up and forward parcel exchanging PC correspondence systems where there are commonly no single wellsprings of control. The two factual models of areas is looked at in [9] and an outer information is produced using a lot of discernible irregular variable given by collection of sensors and orchestrated either in a Bayesian system or in a learning base frameworks containing the actimetric profile. They acquainted the remedy relating with a conceivable loss of the individual's synchronization with the day versus night synchronizers to stay away from false alerts.

The issue of estimating the contention between two groups of proof is been spoken to by conviction works in [10]. The system proposes to study the notion of conflict from different aspect. It starts by examining consistency and conflict. It then extends its basic scheme from basic to belief functions. It does not make any prior assumption about source independence and only consider such data.

The consensus problem with infinite time varying delays has been proposed for linearly coupled static network in [11]. At first it describes effective consensus ability index. Then by using graph theory it has been proved that under some mild conditions the network can realize consensus. The transferable belief model approach has been effectively used in target identification in [12]. It shows that the transferable belief model solution can produce different from those reached with the classical likelihood based methods. The issue of planning numerous shuttle to fly in firmly controlled developments is tended to in [13].

It presents a coordination engineering that subsumes pioneer following, social, and virtual-structure ways to deal with the Multiagent coordination issue. The inspiration driving the enthusiasm of Multiagent framework is that Multiagent approach gives a few points of interest, for example, bigger scope of assignment areas and higher adaptability. The information total issue for Multiagent framework is been examination in [14] and static situation is been viewed as where specialists changes information that don't change The relationship between Dempster – Shafer (DS) decision making systems and conventional Bayesian (centralized or distributed) detectors is been examined in [15]. It establishes theoretically that under certain intuitively pleasing DS probability mass assignments the two systems become equivalent.

Two main approaches to pattern classification have been developed: the TBM model-based classifier, relying on the General Bayesian Theorem (GBT), and the TBM case-based classifier, built on the concept of similarity of a pattern to be classified with training patterns. These two methods seemed unrelated, and their connection with standard classification methods was unclear. It shows that both methods proceed from the same underlying principle, i.e., the GBT, and that they essentially differ by the nature of the assumed available information. It also shows that both methods collapse to a kernel rule in the case of precise and categorical learning data and for certain initial assumptions, and a simple relationship between basic belief assignments produced by the two methods is exhibited in a special case. These results shed new light on the issues of classification and supervised learning in the TBM. They also suggest new research directions and may help users in selecting the most appropriate method for each particular application, depending on the nature of the information at hand in [16].

A class of simple and local distributed algorithms called Nearest Neighbor Tree (NNT) algorithms is been designed for energy-efficient construction of an approximate MST in wireless networks. It assumes that the nodes are uniformly distributed. It shows provable bounds on both the quality of the spanning tree produced and the energy needed to construct them. It shows that while NNT produces a close approximation to the MST, it consumes asymptotically less energy than the classical message-optimal distributed MST algorithm due to Humblet and Spira. Further, the NNTs is been maintained dynamically with polylogarithmic rearrangements under node insertions/deletions. They also perform extensive simulations, which show that the bounds are much better in practice. They demonstrates the first trade-off between the quality of approximation and the energy required for building spanning trees on wireless networks in [17].

A framework for the design of collective behaviours for groups of identical mobile agents is been described in [18]. The approach is based on decentralized simultaneous estimation and control, where each agent

communicates with neighbours and estimates the global performance properties of the swarm needed to make a local control decision. Challenges of the approach include designing a control law with desired convergence properties, assuming each agent has perfect global knowledge; designing an estimator that allows each agent to make correct estimates of the global properties needed to implement the controller; and possibly modifying the controller to recover desired convergence properties when using the estimates of global performance. They applied this framework to the problem of controlling the moment statistics describing the location and shape of a swarm. They derived the conditions, which guarantee that the formation statistics are driven to desired values, even in the presence of a changing network topology.

A distributed algorithm that efficiently computes all of these swap links is been proposed in [19], and it explains how to route messages across swap edges with a compact routing scheme. Finally, they considered the computation of swap edges in an arbitrary spanning tree, where swap edges are chosen to minimize the time required to adapt routing in case of a failure, and give efficient distributed algorithms for two variants of such problem.

A novel individual-based alignment/repulsion algorithm is proposed in [20] for a flock of multiple agents. Each individual repels its sufficiently close neighbours and aligns to the average velocity of its neighbours with moderate distances. In both mathematical analysis and numerical simulation, they proved that the algorithm guarantees an uncrowned flocking behavior with asymptotic velocity synchronization when sufficiently intensive communication exists within the agents. Moreover they provide the conditions for collision avoidance along the whole transient procedure. The proposed flocking model has its references in natural collective behaviours like escaping panic and traffic jam motions.

The energy efficient implementation of averaging/consensus algorithms in wireless sensor networks is been studied in [21]. For static, time-invariant topologies, we start from the recent result that a bidirectional spanning tree is preferable in terms of convergence time. They formulate the combinatorial optimization problem of selecting such a minimal energy tree as a mixed integer linear programming problem. Since the problem is NP-complete, they devise a semi-definite relaxation and establish bounds on the optimal cost. They also developed a series of graph-based algorithms that yield energy efficient bidirectional spanning trees and establish associated bounds on the optimal cost.

For dynamic, time-varying topologies, they considered a recently load-balancing algorithm, which has preferable convergence time properties. They also formulate the problem of selecting a minimal energy interconnected network over which they can run the algorithm as a sequential decision problem and cast it into a dynamic programming framework. They first considers the scenario of a large enough time horizon and show that the problem is equivalent to constructing a Minimum Spanning Tree. Then they consider the scenario of a limited time horizon and employ a "rollout" heuristic that leverages the spanning tree solution and yields efficient solutions for the original problem. The smart grid concept and technologies have been applied to construct a self-healing framework for use in smart distribution systems in [22]. The proposed Multiagent system is designed to locate and isolate faults, then decide and implement the switching operations to restore the out-of-service loads. The proposed control structure has two layers: zone and feeder. The function of zone agents in the first layer is monitoring, making simple calculations, and implementing control actions. Feeder agents in the second layer are assigned to negotiation. The constraints include voltage limits, line current limits, and radial topology. Load variation has been taken into consideration to avoid the need for further re configurations during the restoration period.

In the proposed system complex interaction between each and every node is been provided with tree topology. An efficient data transfer model using node with tree structure is provided. In the proposed system cyclic graph algorithm is been proposed to merge basic belief assignment based on the transferable belief model. Self-stabilizing distributed data fusion [33] The Theory of Belief Functions is a formal framework for reasoning with uncertainty that is well suited for representing unreliable information and weak states of knowledge. In information fusion applications, it is mainly used in a centralized way, by gathering the data on a single node before computation. In this paper, a distributed algorithm is proposed to compute the neighborhood confidence of each node, by combining all the data of its neighbours using an adaptation of the well known Dempster's rule.

Moreover, a distributed algorithm is proposed to compute the distributed confidence of each node, by combining all the data of the network using an adaptation of the cautious operator. Then, it is shown that when adding a discounting to the cautious operator, it becomes an r-operator and the distributed algorithm becomes self-stabilizing. This means that it converges in finite time despite transient faults. Using this approach, uncertain and imprecise distributed data can be processed over a network without gathering them on a central node, even on a network subject to failures, saving important

computing and networking resources. Moreover, our algorithms converge in finite time whatever is the initialization of the system and for any unknown topology.

This contribution leads to new interesting distributed applications dealing with uncertain and imprecise data. This is illustrated in the paper: an application for sensors networks is detailed all along the paper to ease the understanding of the formal approach and to show its interest. [33] Researcher present a decision support system based on belief functions and the pignistic transformation. The system was the combination of an evidential system for belief function propagation and a valuation-based system for Bayesian decision analysis. The two subsystems are associated with the pignistic transformation. The system takes as inputs the user's "gut feelings" about a situation and suggests what, if any, are to be tested and in what order, and it does so with a user friendly interface.[34]

The shell of a belief function-based decision support system has been described. The system is an integration of a VBS for Bayesian decision analysis and an evidential system for belief functions propagation, both on the context of the valuation based framework. It is based on the theory of transferable belief model. The system uses two tools: TRESBEL and VBSD (a successor of Pulcinella), and it uses the pignistic transformation to connect the two. It is designed and implemented in an interactive graphical way. A conditional belief function input facility for belief function input makes it easier for the users to construct the knowledge into the system. Furthermore, it provides a functional interface, making itself more flexible and easy-to-use.

Further work on this system is continuing. Currently, the presented procedure carries out the optimization using a classical stepwise procedure. At a given moment, the best test according to the available information is selected, and the next best test is selected based on the result of the preceding test. The global optimum could, in principle, be found, but the combinatorial explosion problem makes it infeasible when the number of tests and the sizes of their frames are large. The presented procedure is in fact a general-purpose heuristic for the problem solving. The future work will try to use other techniques of heuristic algorithms to select a better combination of tests efficiently. [35] EXfiltration Advanced Persistent Threats (XAPTs) increasingly account for incidents concerned with intelligence information gathering by malicious adversaries. This research exploits the multi-phase nature of an XAPT, mapping its phases into a cyber attack kill chain. A novel Markov Multi-Phase Transferable Belief Model (MM-TBM) is proposed and demonstrated for fusing incoming evidence from a variety of sources which takes into account conflicting information. The MM-TBM algorithm predicts a cyber attacker's actions against a computer network and provides a visual representation of their footsteps. [35]

This work provides a novel data fusion algorithm, the MM-TBM, for hypotheses assessment and managing conflict within the sources of evidence from the network. This will enable detection of XAPTs, thus enhancing cyber situational awareness and understanding cyber network operators. This paper has demonstrated that the limitations of the traditional TBM associated with managing conflicting evidence sources are overcome by employing the MM-TBM. The MM-TBM enables the reduction of the Frame of Discernment by employing strategic lock-out based on the incoming evidence. This permits a focus on specific sources of evidence, omitting the ones that are potentially uninformative hence reducing the computational effort. Future research will address the application of the MM-TBM to other domains characterised by multi-phased problems. [35]

III. PROPOSED ALGORITHM

A Cyclic graph Algorithm has been proposed to meet to basic belief assignment based on transferable belief model. The basic objective of the proposed system is to develop an efficient tree topology in a Multiagent context and to develop proper path for routing. Tree topology describes better communication in static sensors and cyclic structure improves better communication among mobile units. Figure 3.3 shows flowchart for cyclic graph algorithm. At first node will be created. With the help of these nodes it will form a graph. After that it will input source and destination and go to next node in cyclic order. If destination is reached then it will deliver data and wait for next data. If destination is not reached then it will go to next node in cyclic order.

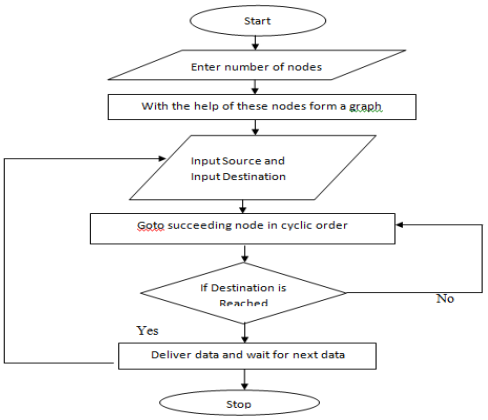

Figure 2 Cyclic Graph Algorithms.

IV. PROPOSED WORKS

The basic purpose of the proposed system is to develop most likely shortest path for routing. Also to perform the classification task by means of a distributed data fusion based on tree topology in a multiagent context. As tree topology better describes interaction among static sensors and cyclic structure better describes interaction among mobile units.

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