iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** VI **Month of publication:** June 2017

DOI:

Volume 5 Issue VI, June 2017
ISSN: 2321-9653

Mobility and QOS Aware Any Cast Routing in Mobile Ad Hoc Networks

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Abstract: ***A wireless sensor network is an infrastructure device capable of computation, communication and sensing. Wsn consist a number of sensors. A base station links the one sensor network to another network to transmit the data and also each sensor contain several parameters. Several research efforts have been prepared based on the genetic algorithms for the development of the different data routing techniques for wsn. As a result, genetically encouraged research in wireless sensor networks is a rapidly growing field. This survey paper begins by exploring why genetics and wsn research are such a accepted match. We then present a broad overview of genetically inspired research in manets. We provide both an explanation of common ga models and construction and provided a broad ranging survey of ga techniques in wireless networks. We also indicate open research issues and define possible future work.***

I. INTRODUCTION

Wireless sensor network (WSN) is the group of these homogenous, self-organized nodes called sensor nodes. These nodes have the abilities of sensing, processing

and communication of data with each other wireless using radio frequency channel. WSNs are resource controlled distributed systems with low energy, low bandwidth and short communication range. The controlled resource nature and indictable network structure to assume the several design and communication challenges for WSNs.

In multi-hop networks, routing is one of the important problems that has a momentous effect on the network's performance .In a MANET, each MH is a router and forwards packets on substitute of other nodes .Multi-hop forwarding paths are established for nodes away from the direct wireless communication series. Routing protocols for MANETs must find out such paths and sustain connectivity when links in these paths split due to effects such as the node motion, battery drainage, radio propagation, and wireless interference.

Quality of Service (QoS) is the performance level of a service existing by the network to the user.[7] Most of the multimedia applications have inflexible QoS requirements that must be fulfilled. The goal of QoS provisioning is to achieve a more deterministic network actions, so that information agreed by the network can be better delivered and network resources can be superior utilized. However, there still remains a important challenge to give QoS solutions and maintain end-to-end QoS with user mobility.

Most of the predictable routing protocols are designed either to minimize the data traffic in the network or to minimize the usual hops for delivering a packet.[5] Even some protocols such as Ad-hoc On demand Distance Vector, Dynamic Source Routing and On-demand Multicast Routing Protocol are designed without explicitly considering QoS. When QoS is considered, some protocols may be substandard or unfeasible due to the lack of resources and the excessive subtraction overhead. QoS routing regularly involves two tasks: collecting and maintaining up-to-date state information with reference to the network and finding realistic paths for a connection based on its QoS requirements. To support QoS, a service can be characterized by a set of assessable individual service desires such as minimum bandwidth, maximum delay, maximum delay variance and maximum packet loss rate.

In recent years, studying evolutionary algorithms (EAs) for Dynamic Optimization Problem has attracted a on the rise interest due to its importance in EA's real world applications.[4] Over the years, a number of approaches have been developed for Genetic Algorithms to address dynamic environments, such as maintaining range during the run via random immigrants and increasing mixture after a change. In this paper, we consider several genetic algorithms that are developed to pact with general DOPs to solve the dynamic rout innovation problem in MANETs.

II. GENETIC ALGORITHM

The genetic algorithm is a method for solving the constrained and unconstrained optimization problems. [1] The genetic algorithm to solve the problem is based on natural selection. The genetic algorithm frequently modifies a population of individual solutions.

The genetic algorithm is randomly select the parents from the current population and uses to produce the children for the next generation. The genetic algorithm uses three rules at each step to create the next generation from the current population: Selection rules means to select the parents is to have a say to the population at the next generation

Genetic algorithms are dissimilar from other heuristic methods. The main variation is that:[8]

1) A genetic algorithm works on a population of promising solutions, while other heuristic methods use a single solution in their iterations.

2) Moreover, the genetic algorithm is stochastic, non deterministic. Each individual in the genetic algorithm population represents a achievable solution. Some individuals are selected based on the fitness value. And then, genetic algorithm imitates the nature genetic process, crossover, to exchange some of these individual genetic data randomly to generate the offspring.

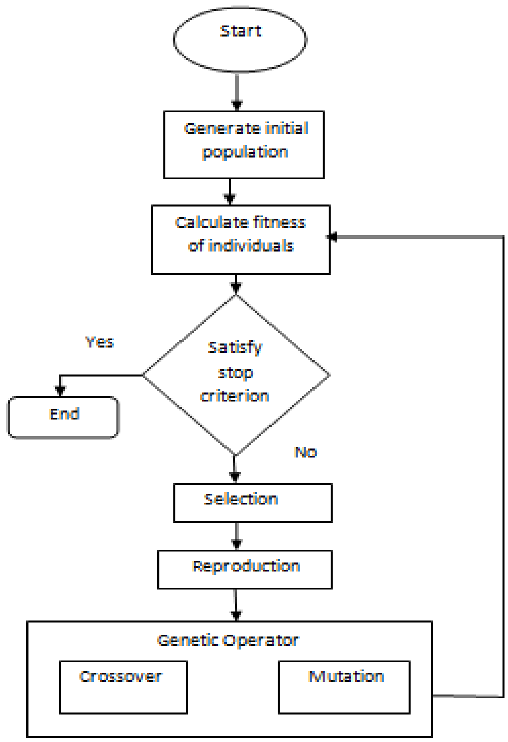

Fig: 1. A flowchart of a typical genetic algorithm

By repeating these processes until the greatest genes, which have the fittest facility, are obtained. Each individual may represent one or more chromosomes with an related fitness rate and population. Genetic algorithm is also a thorough algorithm that employs the ideas of natural selection and the genetic operators of crossover and mutation.

In each generation, a new resident of solutions is created by exchanging and combining the in sequence obtained from the solutions of the earlier generation. In genetic algorithm, the variables of the problem are like the genes in a chromosome.[9] A perspective in each bit of string is called chromosome. One gene of a chromosome represents one feasible solution. In general, the major operations of genetic algorithm are encoding, primary population, and evaluating fitness value, reproduction, crossover and mutation.

The selection is an evolutional operator in the genetic algorithm.[10] It is also the strategy for selecting the fittest individuals from the population. It will need a technique to calculate this fitness. The best is selected for more iteration. There are two major genetic operators in genetic algorithm.

The first intersect and the other is the alteration. These two genetic operators permit the chromosomes to search for the overall optimum through an evolutionary approach The intersect is the method for combining those selected individuals into new individuals. The intersect splits up the ‘‘parent’’ individuals and recombines them.[2] It is also one of the genetic operators in which genes of two chromosomes are change and the genotypes of two exact parents are shared to defer two new offspring. Two chromosomes with high fitness values are selected from the chromosomes group. The starting point and duration of the portion to be exchanged are accidentally selected. The two new offspring are created and locate back into the chromosomes group. The alteration simply adds ‘‘genes’’ to the individuals. Mutation introduces new genetic structures in the population by chance modifying some of the genes, such that the search algorithm can flight from the narrow optimum and avoid the genetic algorithm from converging too fast. In mutation operation gives genetic algorithm an prospect to search for new and extra feasible chromosomes in new areas of the solution spaces. After the mutation operation, the multicast tree will be adapted because of mutation operator can demolish the tree structure and retiring degree constraints. A genetic algorithm has a amount of advantages. It can rapidly scan a massive solution set. It works by its individual internal policy. This is very useful for difficult or freely defined problems.

III. APPLICATIONS OF GENETIC ALGORITHM IN QoS ROUTING PROTOCOL DESIGN IN MANETS

In the last few years there are different GA based protocols propose techniques have been recommended and implemented by the research area some of the proposed techniques are discussed below:[6][11]

A. Multi Constrained QoS Routing based on Genetic Algorithm (MQMGA)

Generally multiple quality of service (QoS) guarantees are required in many multicast applications.[3] The proposed algorithm is a new adaptation of multiple constraints QoS multicast routing optimization algorithm in MANET based on genetic algorithm, The MQMGA can optimize the highest bond utilization, the cost of the multicast tree, the choice of the long-life path, the typical delay and the most end-to-end delay. The source node is to a separation of destination nodes in a computer network. Multicasting can decrease the communication charge for sending the same data to many recipients. Instead of sending through multiple unicast, multicast reduces the channel bandwidth, sender and router processing and delivery delay.

In addition, multicast gives forceful communication, still if the receiver address is unfamiliar or adjustable without the knowledge of the source within the wireless location. In the multicast routing trouble, a fine routing algorithm finds low-cost tree connecting all of the routers that have attached crowd members of multicast cluster and then routes packet along this tree from a source to multiple destinations according to the multicast routing tree.

These approaches can be confidential into two categories: group-shared tree, where only a single routing tree is constructed for the whole multicasting group, and source based tree, where a tree is constructed for each entity sender in the group.

B. Agent-Based Energy-Efficient Routing in Sensor Networks using Parallel Genetic Algorithm (PGA)

Finding a Agent-Based Energy-Efficient Routing in Sensor Networks using Parallel Genetic Algorithm. A new method is to find an energy efficient data routing scheme in sensor networks. They have used parallel genetic algorithm to find the optimum parameters of the new scheme. Simulation results show that the proposed scheme has improved the load balancing and traffic spreading over the network, through the usage of proposed scheme with optimum parameters. Data centric protocol has been used in which the sink sends queries to certain regions and waits for data from the sensors located in the selected region. A sensor that is located in central part of the region is considered as source. Sink can run GA without any problem because it normally does not have any limitations on power and memory.

C. A Multi-Objective Genetic Algorithm based Approach for Energy Efficient QoS Routing in Two-tiered Wireless Sensor Networks (EEQSRT)

A Multi-Objective Genetic Algorithm based Approach for Energy resourceful QoS Routing in Two-tiered Wireless Sensor considers a two-tiered wireless sensor network, with transmit nodes acting as cluster heads and one base station [14]. It is held that each sensor node belongs to accurate one cluster and the routing schedule is computed by some federal entity, which is not power constrained. Sensor nodes transmit their data directly to their own cluster head nodes, then cluster head nodes achieve the initial combination of the received data and send them to the sink by the routing tree. According to the energy engaged in the node, the requested setback and the consistency, the sink node determines a routing hierarchy in order to optimize QoS parameters and energy consumptions of wireless sensor network. The proposed protocol efficiently optimizes the QoS parameters, reliability and end to end delay, reduces average power consumption of nodes and in effect extends the lifetime of the network.

D. A Genetic Algorithm based on Extended Sequence and Topology Encoding for the Multicast Protocol in Two-Tiered WSN (GAEST)

A genetic algorithm based on complete sequence and topology encoding for the multicast protocol in two-tiered WSN scaffold in

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two tiered WSN for both global and local topology sighting of shared multicast trees that selects the best yield authority and determines the finest transmitting distance for all cluster head nodes, which can maximize the overall network duration.

E. Genetic Optimization Approach

Genetic algorithms are based on the technicalities of natural evolution. During their mock evolution, successive generation each consisting of a population of potential solutions, called folks, search for valuable adaptations to solve the given problem. Mobile ad hoc networks are typically calculated and evaluated in generic imitation environments. Genetic algorithms are forceful and resourceful for global optimization search in intricate legroom.

F. Genetic Coding for Spanning Trees

Encoding trees is dreadfully important in genetic algorithms for solving tree graph optimization inconvenience because each code should represent a tree. The chromosomes of genetic algorithms are poised of a progression of essential queuing and the encoding technique based on routing illustration, which is the most accepted and simplest representing technique.

G. Crossover and Mutation Operator

The genetic algorithm explores all the search space shifting the selected mechanism of genetic operators (crossover, mutation) that form new components to be evaluated. MQMGA uses predictable one-point intersect to exchange the chromosomes of the parents. The mutation in MQMGA is performed by selecting a gene at arbitrary and replacing with another arbitrary integer.

Chromosomes after these operations remain permissible numbers. The crossover operation is governed by intersect possibility pm and the alteration operation by mutation probability pm. In the proposed scheme, two chromosomes select for crossover should have at least one frequent gene (node), but there is no requirement that they be located at the same place. The crossover does not depend on the location of nodes in routing paths.

Generally, crossover operation yields illegal offspring on permutation representation. Then repairing procedure is to resolve the illegitimacy of the off spring.

Application of GA	Protocols	No of objectives	Technique used	Merits	Demerits
Multi Constrained QoS Routing based on Genetic Algorithm	MQMGA	Multi objective genetic algorithm	GA for non-linear objectives	The Multi-constrained optimize the highest bond utilization, the cost of the multicast tree , to reduce the delay and the most end-to-end delay and also it decrease the communication and it reduces the channel bandwidth, sender and router processing and delivery delay.	It create only a single routing tree for the whole multicasting group, to transmitting the data
Agent-Based Energy-Efficient Routing in Sensor Networks using Parallel Genetic Algorithm (PGA)	Data centric	Single objective genetic algorithm	GAs coupled with WSN	This protocol has been used in which the sink sends queries and waits for data from the sensors located region.. sensor run normally ,does not have any limitations on power and memory.	Data can be sent within a particular time or else the server want to retransmitted nd also it send the data for only selected node.

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A Multi-objective Genetic Algorithm based Approach for Energy Efficient QoS Routing in Two-tiered Wireless Sensor Networks	Two-tiered	Multi objective genetic algorithm	GA based dynamic channel allocation	A sensor node is belongs to one cluster and routing .The protocol efficiently optimizes the QoS parameters, reliability and end to end delay, reduces average power consumption of nodes and in effect extends the lifetime of the network.	It is not power constrained.
A Genetic Algorithm based on Extended Sequence and Topology Encoding for the Multicast Protocol in Two-Tiered WSN (GAEST)	Multicast protocol in two tire	Single objective genetic algorithm	GA with local search Heuristics	It is based on complete sequence and topology encoding for the multicast protocol in two-tiered WSN gallows in two tiered WSN for both global and local topology sighting of shared for all cluster head nodes,	It can maximize the overall network duration.

IV. OPEN ISSUES AND CHALLENGES OF GA IN QOS ROUTING

GAs have become a controlling tool for solving almost any kind of an optimization problem subject to proper modelling and encoding of chromosome.[12] GAs is contributing in military, failure management, spectrum exploitation, and network optimization. There are frequent challenges in devising a suitable GA based solution including fit definitions of population size and evaluation function.

A. New architectures of evolutionary algorithms are constantly proposed such as co evolutionary algorithms and similar evolutionary algorithms.[13] Since evolutionary algorithms require high computational resources, the parallelization of the tasks linked to the evolution procedure will tolerate executing genetic algorithms using multiple processors and cores, dropping the computation time.

B. Another open challenge is the application of evolutionary algorithms in actual test beds so the replication results obtained can be corroborated and validated

C. Genetic programming has also some disadvantages such as the computation time or the excessive growth of its individuals.

D. The use of entirely distributed implementation of evolutionary algorithms also causes a major issue.

V. CONCLUSION

We have provided a survey of the application of genetic algorithms (GAs) in wireless networking. In addition to providing a independent introduction to general models and configurations of GAs, we have also provided a in depth survey of applications of GAs in wireless networking. We have considered the applications of GAs in wireless networking mutually according to the wireless networking configuration, and according to the dissimilar kinds of GA techniques. We have also dyed pitfalls and challenges in effectively implementing GAs in wireless networks. At last, we have highlighted a number of open issues and have recognized potential guidelines for future work.

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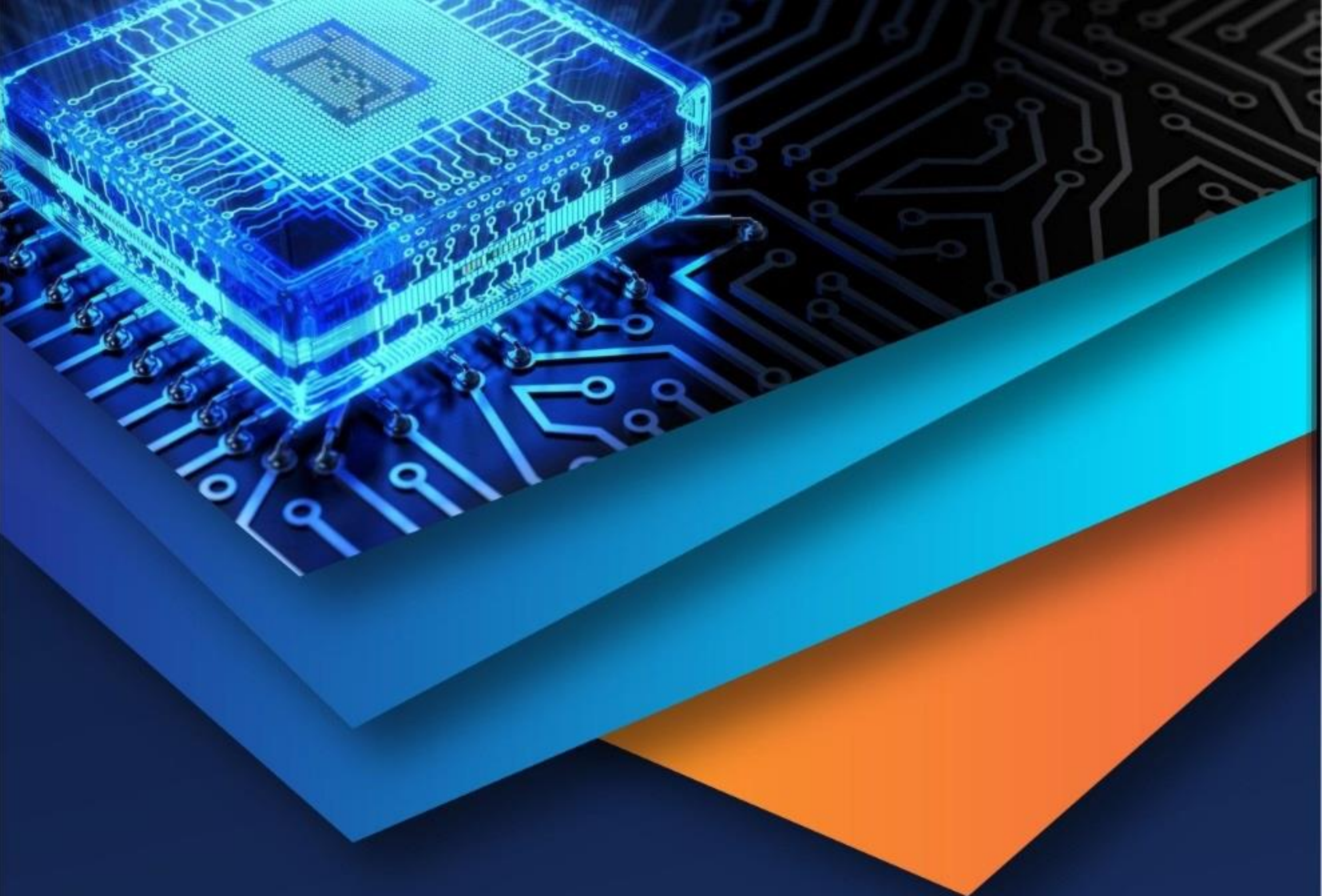

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