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AN INTELLIGENT OPTIMIZATION TECHNIQUE FOR MANET USING GENETIC ALGORITHM

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Abstract- In wireless communication, Mobile Ad Hoc network (MANET) is a group of mobile nodes that are dynamically and randomly located in such a way that the wireless link among nodes are often change due to MANET dynamic features. In this MANET environment, if a device wants to connect to Internet, it must establish a communication with an Internet Gateway. The performance of system is evaluated using simulation. In this paper we propose approximated solutions and new algorithm that helps in QoS routing which can be adaptive, flexible, and intelligent.

Keywords- MANET, Genetic Algorithm, Optimization.

I. INTRODUCTION

Genetic algorithms (GAs) are a relatively new paradigm for a search, based on principles of natural selection. GAs are proven to be the most powerful optimization technique in a large solution space. This explains the increasing popularity of GAs applications in image processing and other fields. These GAs are used where exhaustive search for solution is expensive in terms of computation time. Applications of GAs for image processing extend from evolving filters or detecting edges to making complex decisions or classifying detected features.

A. GENETIC ALGORITHM

Genetic algorithms are based on natural selection discovered by Charles Darwin. They employ natural selection of fittest individuals as optimization problem solver. Optimization is performed through naturally exchanging the genetic material between parents. Off-springs are formed from parent genes. Fitness of off-springs is evaluated. The fittest individuals are allowed to breed only. In computer world, genetic material is replaced by strings of bits and natural selection replaced by fitness function. Mating of parents is represented by cross-over and mutation operations.

Segmentation is an essential step in image processing since it conditions the quality of the resulting image interpretation. There are lots of approaches that have been proposed and a dense literature is available. In order to extract as much information as possible from an environment, multi-components images can be used. In the last decade, multi-components images segmentation has received a great deal of attention for remote sensing and industrial applications because it significantly improves the discrimination and the recognition capabilities compared with gray-levels images segmentation methods. To process these images, there are two types of segmentation methods: the scalar and the vectorial approaches. The first one consists in merging the segmentation result of each band. The second one tries to generalize the classical segmentation process of one-component images.

II. PROPOSED METHOD

The developed method consists in looking for the optimal combination of segmentation results by taking into account an evaluation criterion and by using a genetic algorithm.

A. Fitness Algorithm

The objective function is of two fields, first chromosomes of new generations, and second solutions obtained from off-springs should be feasible in the total bandwidth allocated flows through each link should not exceed its capacity.

Procedure computing_fitness(chromosome i)

Begin

set the weight of each link according to the gene values in

chromosome i;

for each link in the cluster g

Compute the shortest path T_g rooted to all nodes in the

cluster g;

```

for each link (u,v) in Tg
    update link load Luv according to bandwidth
    demand Dg
    of cluster g;
end for
Load1 =0; load 2 = 0;
for each link (u ,v) in the network
    Load1= load1 + Luv;
If Luv > Cuv
    Load2 = load2+(Luv- Cuv);
end for
return fitness =f(load1load2);
end

```

B. Cross-Over and Mutation

The basic principle of Genetic algorithms explains that, the chromosomes with better fitness value have higher probability of being inherited into the next generation. To achieve this, first we arrange all the chromosomes in descending order to their fitness, so the chromosomes with high fitness (lower overall load) are placed on the top of arranged list. Then we partition this list into two different disjoint sets, with the top 50 chromosomes belonging to the upper class (UC) and the bottom 50 chromosomes to the lower class(LC). During the crossover procedure, we select one parent chromosome 'C_u', from UC and other parent 'C_v', from LC in generation "i" for creating the child Cⁱ⁺¹ in generation i+1.

We use a crossover probability threshold $K_c \in (0, 0.5)$ to decide the genes of which parent to be inherited into the child chromosome in the next generation. We introduce a mutation probability threshold K_m to randomly replace some old genes with new ones.

```

Procedure crossover (Cui, Cvj)
Begin
for all genes j=1...(E)
    Generate r= Random(MAX_WEIGHT);
if r>Kc
    C(i+1)(j)=Cui(j);
else if r>Km
    C(i+1)(j)=Cvj(j);
else
    Ci+1 =random[1,MAX_WEIGHT];

end for
return Ci+1;

```

III. EXPERIMENTAL RESULTS

The reaffiliations per unit time with the transmission range before and after using optimization, respectively. For low transmission ranges, the nodes in a cluster are relatively close to the clusterhead. There is an optimal transmission range for which the reaffiliations are maximal. Further increase in transmission range decreases the reaffiliations since

the nodes tend to stay inside the large area covered by the cluster head irregardless of the movement of the nodes.

Table1: Performance

Nodes	Rank	Gen	Ref
10	2.64	1.00	10.00
20	5.62	8.00	26.30
30	6.44	42.30	80.84
35	5.38	28.72	65.62

Table2: Time needed for one generation (ms)

Nodes	Average	Max	Min
10	4.20	16	*
20	4.80	20	*
30	6.41	30	*
35	10.70	50	*

IV. CONCLUSION

In this paper we introduced a new approach for MANET. By using small population size of nodes are involved in route computation. Through a optimization process using a genetic algorithm, the best parameters of this controller are calculated. The Genetic Algorithm search different routes and they sort them according to their rank. So the first route is the best route, but the other routes acts as the back-up routes. This algorithm can be applied for small and medium scale networks. For future work we would like to extend this work on parallel GA.

REFERENCES

- [1]. Abolhasan, M., Wysocki, T., & Dutkiewicz, B. (2004). "A Review of Routing Protocols for Mobile Ad hoc Networks.", VOL 2, ISSUE 1, 1-22.
- [2]. G. Pei et al., "wireless Hierarchical Routing Protocol with Group Mobility," proc. IEEE WCNC'99, New Orleans, LA, Sept.(1999).
- [3]. C.E. Perkins and E.M.Rayer, "Ad-Hoc On Demand Distance Vector Routing," Proc. (IEEE) WMCSA '99 New Orleans, LA, Feb. (1999), pp.90- 100.
- [4]. G.S. Ahn, A.T. Campbell, A. Veres, L.H. Sun, "Supporting Service Differentiation for Real-Time and Best-Effort Traffic in Stateless Wireless Ad Hoc Networks (SWAN)", IEEE Transactions on Mobile Computing, Vol.1, No.3, pp.192-207, 2002.
- [5]. Special Issue on Computational Intelligence in Telecommunication Networks, Computer Communications, Vol.25, No.16, 2002.

- [6]. Andrew S. Tanenbaum, Computer Networks. Fourth Edition, Prentice Hall.
- [7]. F.D. Trujillo Aguilera, A.J. Yuste Delgado, A. Trivino Cabrera, E.Casilari Perez and A. Diaz Estrella: "Interconnecting MANET and the Internet. A mobility approach". In: The 33rd Annual IEEE Conference on Local Computer Networks (LCN08). Montreal, Canada (October 2008)
- [8]. B.L. Su, M.S. Wang and Y.M. Huang: "Fuzzy logic weighted multicriteria of dynamic route lifetime for reliable multicast routing in ad hoc networks", in Expert Systems With Applications, vol. 35, n° 1-2, pp. 476-484, Elsevier, 2008
- [9]. Rakeshkumar and M. Misra: "An Efficient Mechanism for Connecting MANET and Internet through Complete Adaptive Gateway Discovery." In: First International Conference on Communication System Software and Middleware (COMSWARE2006). pp. 1-5, New Delhi, India (January 2006)