ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

Particle Swarm Optimization with QOS for Mobile Tethered Network Clustering

Preeti Devi[1], Gaurav Garg[2]

P.G. Student, Department of CSE, AITM at Palwal, Haryana, India[1]

Assistant Professor, Department of CSE, AITM at Palwal, Haryana, India[2]

ABSTRACT: The proposed scheme is to improve the performance of mobile ad-hoc tethered network using particle swarm optimisation. However, the performance is based on rule induction algorithms could be enhanced through various means time, distance and velocity. It could be in the form of predictive accuracy, comprehensibility, speed, and scalability thus forming Quality of Service (QOS). This research concentrates on the performance enhancement of rule induction algorithm through the swarm intelligence techniques and implements it by using cooperative convolution framework for mobile tethered network ensuring availability, maintainability, reliability and scalability.

KEYWORDS: Machine Learning, Linear Regression, K-Nearest Neighbour, Confusion Matrix, Sales Forecasting

I. INTRODUCTION

Optimization is a ubiquitous and spontaneous process that forms an integral part of our day-to-day life. In the most basic sense, it can be defined as an art of selecting the best alternative among a given set of options. Swarm Intelligence, an artificial intelligence discipline has become an interesting and exciting development in the computer industry. Inspired by the collective behaviours of social insects and animal societies, swarm intelligent techniques are used to solve complex real-world optimization problems. Colonies mechanism of social insects have is fascinating and it remains unknown for a long time. Complex tasks can be achieved through cooperation. Each cluster is similar among themselves and dissimilar to objects of other groups. Homogeneity, locality, collision avoidance, velocity matching, and flock cantering are some of the main properties of collective behaviour. It has a decentralized way of working. That is the flock moves without any leader. The movement of each bird is influenced by the nearest block mates. For flock organization, vision is an important sense. Collision should be avoided with the nearest flock mates and also speed should match with them. They should stay close to each other without collision. There is limited communication and has no explicit model of the environment. They have a perception of the environment (that is sensing) and has the ability to react to environmental changes. Swarm intelligence techniques are robust and relatively simple. This paper analyses the most successful methods of optimization techniques inspired by Swarm Intelligence (SI) with QOS for Mobile Tethered Network Clustering.

Mobile Ad hoc or Tethered Networks are used to provide wireless communication without a predefined infrastructure or centralized administration. The absence of infrastructure in mobile ad hoc network and the dynamic movement of its nodes present real challenges to routing and security algorithms in such networks. Nodes between the source and the destination nodes act as routers and forward packets according to the routing algorithm. A number of algorithms have been proposed to address routing problems in ad hoc networks. The rapid growth and development of wireless mobile devices have led to a tremendous increase in research and enhancements on routing protocols for wireless mobile ad hoc networks. The sharing media and the movement of mobile nodes in wireless networks add many restrictions to these networks such as the limitation of bandwidth, distance limitation, security issues, and others. In spite of these limitations, Mobile Ad hoc or Tethered Networks paradigms provide the only means of mobile communication for decentralized and infrastructure-less networks. Mobile Ad hoc or Tethered Networks are autonomous self-organized infrastructure-less networks where any node can move freely in the network and can communicate with other nodes in the network directly or indirectly. Nodes within the transmission range of the node are connected directly to the node. Other nodes that are out of range will communicate through intermediate nodes

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

which act as routers. Mobile Ad hoc or Tethered Networks permit the instantaneous deployment of decentralized networks without pre-existing infrastructure. Mobile Ad hoc or Tethered Networks offer a suitable solution for any resource sharing situation such as flooding and earthquakes as they require minimal configuration and could be deployed rapidly. Mobile Ad hoc or Tethered Networks find its way in military and battlefield application where the application environments are highly dynamic in nature, below figure 1 shows an example for a mobile ad hoc network.

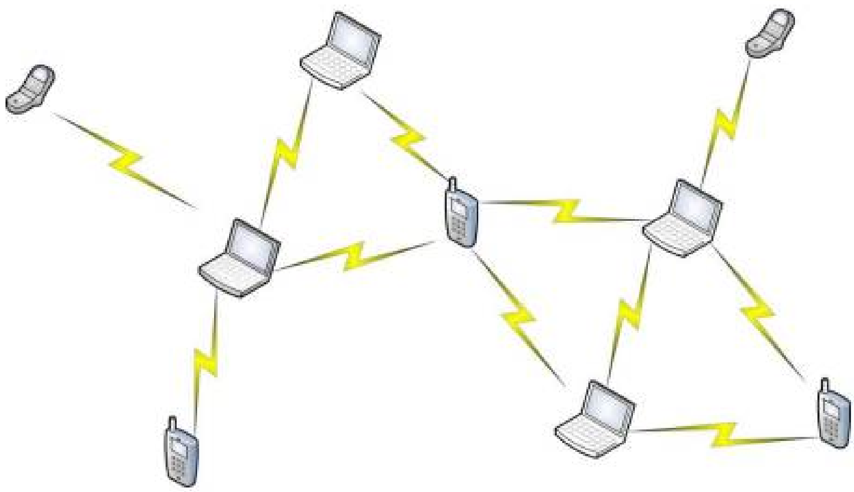

Figure 1: Mobile Ad Hoc or Tethered Networks

The main goal of routing algorithms is to find the best available path from the source node/s to the destination/s to meet the given Quality of Service (QoS) requirements using PSO. Routing algorithm faces enormous challenges in mobile ad hoc networks, as the variation of the network topology of Mobile Ad Hoc or Tethered Networks s caused by the movement of the nodes adds extra complexity to the optimization method. Due to this mobility of the nodes, link qualities may vary over time. This requires certain updates to cope with the quality of service. Routing algorithms could be categorized according to different criteria such as the method of route establishment to collect topology information (reactive, proactive or hybrid), or on which type of route information is carried by a packet which effects the method of routing packets in routers (source routing or distance vector routing), or the kind of information that is used to route packets (geographic routing or link state routing) or the entity which is responsible for making route decisions (ordinary routing protocols or cognitive routing protocols). Therefore using Route Discovery Protocol and Route Reply Protocol algorithm and inculcating the shortest path the results the effective relay and resource sharing will be achieved.

II. RELATED WORK

S. Mahalakshmi, Dr. R. Vadivel [1] depicts that, versatile Ad-hoc NETwork (Mobile Ad Hoc Or Tethered Networks) has turned out to be incredibly well known due to its dynamic and foundation less character. Mobile Ad Hoc or Tethered Networks contains the incalculable number of versatile hubs which impart each other in remote mode. The portability of hubs in Mobile Ad Hoc Or Tethered Networks is high when contrasted with another system, where it doesn't depend on a fixed foundation. Mobile Ad Hoc or Tethered Networks is often changing its topologies to exchange the information rapidly, on the grounds that hubs in this system are moving dependably (versatility) and information exchange has been finished by finding the productive directing way among source and goal. These kinds of assaults influence the steering way and it thus it is important to verify directing. The ready convention is developed which is Distinguished by its minimal effort because of the randomized directing component and secrecy security for

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

sources, goals, and courses. PSO is a populace based streamlining procedure use for discovering ideal arrangement. PSO system is started from social conduct fledgling rushing. In PSO ideal arrangement is gotten from the conduct of fledgling. Since PSO utilizes for system driven restriction reason, this methodology produces organize navigational choices by deterring concentrated control consequently lessening both the clog and deferral.

Abhishek Toofani [2] depicts that in a graph there are such a large number of ways can exist from a source to a goal hub. Among them finding the ideal way is an exceptionally troublesome issue. It is a NP difficult issue to discover a way in a chart. In this paper, a swarm knowledge method called Particle Swarm Optimization is utilized to take care of steering issue which gives ideal way from the diagram. Here discrete science is utilized to encode molecule in PSO, which break look space in little inquiry space and explain this discrete streamlining.

Hongyan Cui, Jian Li, Xiang Liu, Yunlong Cai [3] depicts that our investigation, the QoS steering is the improvement issue under the fulfilment of numerous QoS limitations. The Particles Swarm Optimization (PSO) is a streamlining calculation which has been connected to finding most brief way in the system. In any case, it may fall into neighbourhood ideal arrangement, and can't explain the directing dependent on numerous imperatives. To handle this issue, we propose another strategy for settling the different requirements steering. This paper initially sets up a multi obliged QoS directing model and builds the wellness esteem work by changing the QoS requirements with a punishment work. Furthermore, the iterative equations of the first PSO are improved to tailor to non-persistent hunt space of the directing issue. At long last, the normal choice and change thoughts of the Genetic Algorithm (GA) are connected to the PSO to improve the merged execution. The re-enactment results demonstrate that the proposed GA-PSO calculation can not just effectively comprehend the multi-compelled QoS directing issue, yet in addition accomplishes a superior impact in the achievement rate of the seeking ideal way.

Alireza Sajedi Nasab,Vali Derhamia,Leyli Mohammad Khanlib,Ali Mohammad,Zareha Bidokia [4] depicts that, versatile ad-hoc led Mobile ad hoc is an independent system whose nodes can move. Multicast is a component in the system that a hub sends information to a lot of nodes in the system. Finding a multicast tree which fulfills the issue requirements is a NP-Complete issue. This paper proposes a novel multicast steering in versatile Ad Hoc systems dependent on molecule swarm enhancement calculation. The reproduction and trial results demonstrate that the proposed calculation has better speed, execution, and productivity than multicast steering dependent on a hereditary calculation.

III. PROPOSED ALGORITHM

On the purpose of establishing a route to meet the Route Conservative requirements using PSO, we can employ the route discovery protocol as shown in Fig.2. As for the on-demand routing protocols, there are some with PSO Route Conservative requirements and no complete route information can be used for routing. Thus, a route discovery packet (RDP) is flooded into the network to find the destination. Upon re¬ceiving the first RDP, the destination sends a route reply packet (RRP) back to the source along the route. While the source receives the first RRP, it knows that this is the shortest route. And accompanying with the feedback of the RRP, point-to-point Tethering links are created to connect the devices along the new route and at the same time the routing tables of these devices are filled in with the information about the new discovered route. When the RRP arrives at the source device, the tethered network route is also ready for transmitting data packets from the source to the destination.

With proper packet broadcast mechanism, the source, as well as all the relay devices, is able to send the RDP out quickly and efficiently based on distance matrix created by PSO. Before the rebroadcast of the new received RDP, the relay device needs to check if it's not being visited and creates an item in the routing table to record the new route request. We use Table 1 as an example for describing how the RDP works. Firstly, the source D0 is trying to send a data packet to destination D5. D0 then sends the RDP out to find the device D5.

The next device that is in the radio range will compare the BD_ADDR with the corresponding field in its connection table. If it is not the destination, it will record the Power Conservative information into its routing table and goes to the next hop. We use the min (bandwidth) and delay=delay+next_hop_delay to update the Route Conservative information, to ensure that the bandwidth on the route is available and the total delay of the route is less than the delay requirements.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

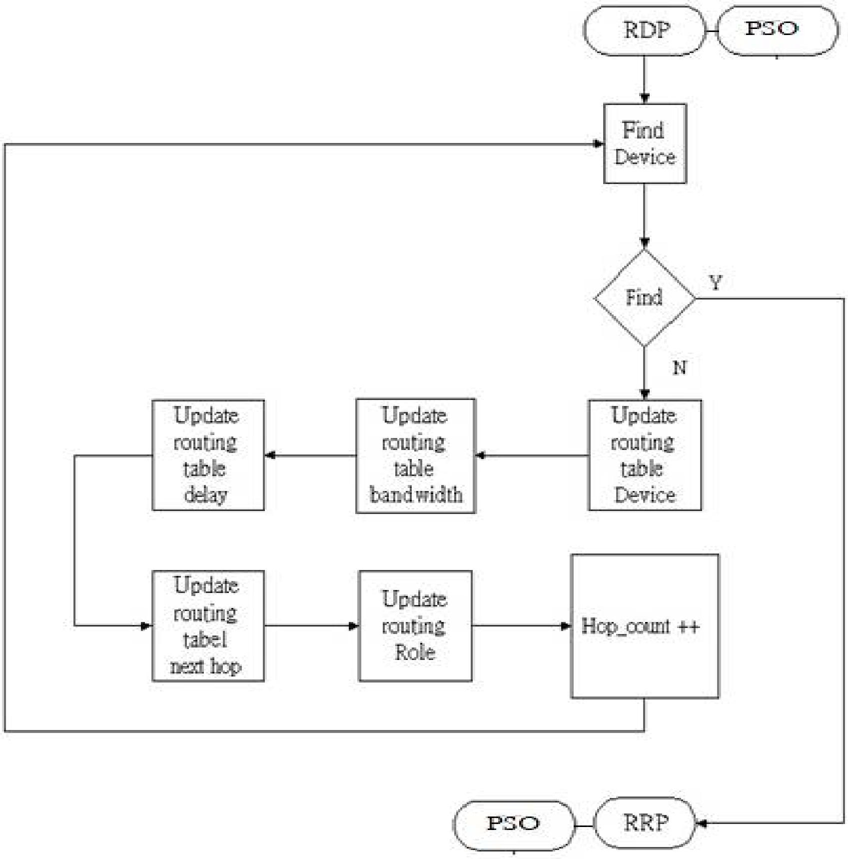

Fig.2 Route Discovery Protocol with PSO

find_device	Router Conservative using PSO		Hop_Count	next_hop
	bandwidth	Delay		
D5	30K	0.2ms	1	D1
	30K	1.2ms	2	D2
	30K	2.2ms	3	D3
	25K	3.2ms	4	D4
	25K	5.2ms	5	D5

Table.1 Route Discovery Protocol using PSO

IV. PSEUDO CODE

The Algorithm's pseudo-code

Steps in Particle Swarm Optimization algorithm can be briefed as below:

1. Initialize the swarm by conveying a arbitrary location.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

2. Calculate approximately the robustness based fitness function for each element or particle.

3. For each entity element, node, particle compare the particle's fitness value with its pbest. If the current value is better than the pbest value, then set this as pbest and the current particle's position

4. Identify the particle that has the best fitness value. This fitness function identified as gbest,

5. Revise the velocities and positions of all the particles using (1) and (2).

6. Repeat steps 2–5 until a sufficiently good fitness value is achieved.

Considering a exploration of liberty of d-dimension and n particles/elements, whose ith particle/element at a particular position Xi (x_{i1}, xi_2,……. x_{id}) is moving with a velocity Vi (v_{i1}, v_{i2},……. vi_d). Each particle is associated with its particular best, Pi (p_{i1}, p_{i2},……. p_{id}) which is defined by its own best performance in the swarm. Similarly, an overall best performance of the particle with respect to the swarm defined global best is gbest.
Every particle endeavors to alter its position utilizing the accompanying data: Current positions, Current speeds, Distance between the present position and pbest, Distance between the present position and gbest. The development of the molecule is represented by refreshing its speed and position characteristics.

The PSO algorithm depends on its implementation in the following two relations [Shi04]: The velocity of particle *i* is updated using the following equation:

$$v_{id}(t+1) = wv_{id}(t) + c_1r_1(t)(p_{id}(t) - x_{id}(t)) + c_2r_2(t)(p_{gd}(t) - x_{id}(t))$$

$$v_{id} \in (-V_{max}, +V_{max})$$

The position of particle *i*, x_i is then updated using the following equation: $x_{id}(t+1) = x_{id}(t) + v_{id}(t+1)$

(B) Procedure: RRP

After comparing the roles of a device on the two routes, the device that is a slave or a double-role device will start the crank-back procedure.

```
L01:  if the back hop node is a slave
L02:      set role=1←slave=odd
L03:      t_count=1
L04:  else if the back hop node is a master
L05:      set role=0←master=even
L06:  endif
L07:  while a new route is not established
L08:      if t_count=100
L09:        break
L10:      endif
L11:      scan_master(i)
L12:      t_count ++
L13:  end while
L14:  if a new route is not established
L15:      keep the old route connected
L16:  elseif the new route is established
L17:      abandon the double-role route keep the new route connected
L18:  endif
```

(C) Procedure: Scan_master( )

This procedure is executed by a back hop slave device to find a master that resides on the existing route. This procedure uses the RDP packet to resolve the double-role issue.

```
Scan_master(i)
L1: node i performs INQUIRY SCAN
L2: if node i is contacted by a master N_{i+1}
L3:     then node i sendRDP and wait for RRP
L4: when node i received RRP
L5:     node iwaits for N_{i+1} that send RRP in PSO
```

(D) Procedure: Seek_slave( )

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

This procedure is executed at a back-hop master device to find a slave that resides on the existing route.
Seek_slave(i)
L1: node i performs INQUIRY
L2: if a slave N_{i+1} is found
L3: then node i send RDP and wait for RRP
L4: when node i received RRP
L5: node iconnects to slave N_{i+1} that send RRP integrated with PSO

V. SIMULATION RESULTS

We proposed the Route Conservative Routing using PSO. For the Route Conservative routing, we will design a shortest route table using Particle Swarm Optimization and a routing table to store the routing information and the Shortest Route Conservative parameters. We also evaluate the performance of different routing tables and proposed the Router Discovery protocol and Route Reply Protocol with integration of Particle Swarm Optimization routing mechanism and the switching method to resolve the shortest path issue. The advantages of establishing a Route Conservative route for data transmission include:

(1) Meet the application Route Conservative requirements.
(2) Reduce the power consumption since it does not need to maintain the tethered network.
(3) Increase the flexibility for routing in a tethered network
(4) Adapt the scheduling algorithm easily to meet the Shortest Route Conservative requirements.

Finally, below is the screen shots of working scenarios.

Minute of Arc	0.0166667				
Result 1					
6	2.998891339	0.4998722	9.48948E-07	4	2.48771E-23
9	3.000000041	0.5	6.81E-16	4	3.65849E-21
1	2.676826664	0.4440125	6.78E-02	4	2.60692E-21
3	2.999995562	0.5000004	5.70E-11	4	5.98497E-16
7	2.999995658	0.4999931	6.86E-10	4	3.90735E-13
5	2.999996265	0.4999998	1.62E-11	4	1.78701E-05
10	3.000000378	0.5000001	9.44953E-14	4	4.32435E-12
2	3.000002311	0.5000005	2.3249E-12	4	8.90675E-22
4	3.001171017	0.5003719	6.29E-07	4	4.16977E-21
8	2.999998786	0.4999996	6.63E-13	4	8.50675E-16
Sequence	PBEST	GBEST	Velocity	Distance	46.27

Figure 3 with GBest and PBest based on Distance with Value 46.27

VI. CONCLUSION AND FUTURE WORK

Conclusions, which have been derived during the design and analysis of the proposed model for routing control in Mobile Ad hoc tethered networks. The results of the simulations were analyzed and discussed. The different scenarios based in route conservation model developed using PSO and Route Discovery Protocol and Result Relay Protocol is able to find the shortest path to connect with cluster and establish the connection between child node and master node. In the first set of experimentation, the performance of the RDP/RRP routing protocols with different mobility models were analyzed using different metrics like media access delay, network load, retransmission time and their throughputs. All the simulation scenarios were aimed for the monitoring of critical conditions. The participated nodes in all the scenarios were assumed using HTTP keeping the packet size to 512 bytes and the packet rate 4packets/sec. In another set of experiments, the impact of TCP nodes connected together. To avoid congestion, it was tested and experimentally shown that Routing protocols with appropriate TCP variants lead to congestion free link in tethered network.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 7, Issue 6, June 2019

Simulation results have indicated that there may be variability in achieving of routing protocols using PSO as a factor of dependency on mobility models. From the above illustration and tables it has been concluded that PSO and RDP/RRP protocols show lots of variations in the effective results to deliver the data and are very less prone to the mobility of the nodes and shows very less variations in the results using PSO. PSO with RDP/RRP outperforms all the protocols in almost all the mobility models. However the shortest path routing based on mobility model out performs the effective mobility model in transmission/retransmission time and media access delay. PSO, RDP/RRP based mobility model shows the least media access delay, highest throughput and highest network load whereas retransmission time is least for shortest path between client node and master nodes model is achieved For future the same scheme can be integrated with Wireless Sensor Networks or Persistent Wireless Networks

REFERENCES

1. S. Mahalakshmi, Dr. R. Vadivel Particle Swarm Optimization Algorithm (Pso) Used For Security Enhancement In Manet, International Journal Of Advanced Research In Computer Science, Volume 9, No. 2, March-April 2018
2. Abhishek Toofani, Solving Routing Problem using Particle Swarm Optimization, International Journal of Computer Applications (0975 – 8887) Volume 52– No.18, August 2012
3. Hongyan Cui, Jian Li, Xiang Liu, Yunlong Cai, Particle Swarm Optimization for Multi-constrained Routing in Telecommunication Networks ,I.J.Computer Network and Information Security, 2011, 4, 10-17 Published Online June 2011 in MECS (http://www.mecs-press.org/)
4. Alireza Sajedi Nasab,Vali Derhamia,Leyli Mohammad Khanlib,Ali Mohammad,Zareha Bidokia Energy-aware multicast routing in manet based on particle swarm optimization, SciVerse ScienceDirect, Procedia Technology 1 (2012) 434 – 438, 2212-0173 2012 Published by Elsevier Ltd. doi: 10.1016/j.protcy.2012.02.097
5. Liang, J.J., Qin, A.K., Suganthan, P.N., Baskar, S. “Comprehensive Learning Particle Swarm Optimizer for Global Optimization of Multimodal Functions”. IEEE Trans. Evol. Comput., Vol. 10, No. 3 pp. 281-295. (2006).
6. Ji, C., Zhang, Y., Gao, S., Yuan, P., Li, Z. “Particle Swarm Optimization for Mobile Ad Hoc Networks Clustering”. Proceedings of the 2004 IEEE International Conference on Networking, Sensing & Control, Taipei. Taiwan. March 21-23. (2004)
7. Chatterjee, M.,Das, S.K., Turgut, D. “WCA: A Weighted Clustering Algorithm for Mobile Ad Hoc Networks” , Cluster Computing 5, 193-204 (2004)
8. Gerla, M. and Tsai, J.T.C. “Multicluster, Mobile, Multimedia Radio Network”. Wireless networks. Vol. 1, No. 3, 255-265 (1995)
9. Baker, D.J., and Ephremides, A. “The Architectural Organization of a Mobile Radio Network via a Distributed Algorithm”. IEEE Transactions on Communications, 1694-1701(1981)
10. Er, I.I., Seah, W.K. G. “Mobility-based D-hop Clustering Algorithm for Mobile Ad hoc Networks” , IEEE WCNC, Atlanta, USA (2004)
11. G.S. Sharvani, N.K. Cauvery and T.M. Rangaswamy, '"Different Types of Swarm Intelligence Algorithm for Routing," Advances in Recent Technologies in Communication and Computing, 2009. ARTCom '09. International Conference on, 2009, pp. 604-609.
12. P. Rabanal and I. Rodriguez, '"Hybridizing River Formation Dynamics and Ant Colony Optimization,"in Advances in Artificial Life. Darwin Meets von Neumann, vol. 5778. George Kampis, et al. , Springer Berlin Heidelberg, 2011, pp.424-431.
13. P. Rabanal, I. Rodr gue and F. Rubio, '"Applying River Formation Dynamics to the Steiner Tree Problem," Cognitive Informatics (ICCI), 2010 9th IEEE International Conference on, 2010, pp. 704-711.
14. P. Rabanal, I. Rodriguez and F. Rubio, '"Finding Minimum Spanning/Distances Trees by Using River Formation Dynamics,"in Ant Colony Optimization and Swarm Intelligence, vol. 5217. Marco Dorigo, et al. , Springer Berlin Heidelberg, 2008, pp.60-71.
15. E.M. Royer, P.M. Melliar-Smith and L.E. Moser, '"An analysis of the optimum node density for ad hoc mobile networks," Communications, 2001. ICC 2001. IEEE International Conference on, vol. 3, 2001, pp. 857-861.