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Design an improved path selection algorithm that is inspired from particle swarm optimization

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***Abstract*— One of the most key problems in wireless sensor networks is finding optimal algorithms for sending packets from source node to destination node. Several algorithms exist in literature, since some are in vital role other may not. Since WSN focus on low power consumption during packet transmission and receiving, finally we adopt by merging swarm particle based algorithm with genetic approach. Initially we order the nodes based on their energy criterion and then focusing towards node path; this can be done using Proactive route algorithm for finding optimal path between Source-Destination nodes. Fast processing and pre traversal can be done using selective flooding approach and results are in genetic.**

Keywords*— *Swarm Intelligence, Optimization Techniques, Combinatorial, Multi-objective, Multimodal, Matlab..

I. INTRODUCTION

One of the most vital problems in wireless sensor networks is finding optimal routes for transmitting data between sources to destination. Generally WSN node pairs in a multi-hop fashion. Several algorithms have been proposed for routing in WSN. A new family of algorithms inspired by Swarm Intelligence which provides a novel approach to distributed optimization problems. The expression swarm intelligence defines any attempt to design algorithms enthused by the collective behavior of social insect colonies and another animal societies. Swarm intelligence provides a basis with which, it is possible to explore distributed optimization problems without exploring centralized control or provision of a global model in WSN routing strategy. Initial research has unveiled a great deal of matching properties between the routing requirements of sensor networks and certain feature of SI. There are some notable routing algorithms in WSN which uses ant like mobile agents to maintain routing and topology to discover optimal path for Wireless Sensor Network. In this study we order the nodes based on their energy competence and its focus towards node path.

1. Scalability: Population of the agents can be adapted consistently based on the network size. Scalability is also promoted by local and scattered agent interactions
2. Fault tolerance: Swarm intelligence processes do not rely on a centralized control mechanism. Therefore the loss of a few nodes or links does not result in shattering failure, but rather leads to graceful, scalable degradation.
3. Adaptation: Agents can alter, expire or replicate, according to network changes
4. Speed: Changes in the network can be propagated very fast, in contrast with the Bellman-Ford algorithm.
5. Modularity: Agents act independently of other network layers.
6. Autonomy: Little or no human supervision is required.

II. PARTICLE SWARM OPTIMIZATION

The PSO algorithm is an adaptive algorithm based on a social-psychological metaphor; a population of individuals adapts by returning stochastically toward previously successful regions. Particle Swarm has two primary operators: Velocity update and Position update. During each generation each particle is accelerated toward the particles previous best position and the global best position. The new velocity value is then used to calculate the next position of the particle in the search space. PSO is a flexible, robust population-based stochastic search or optimization technique with implicit parallelism, which can easily handle with non-differential objective functions, unlike traditional optimization methods. PSO is less susceptible to getting trapped on local optima unlike GA, Simulated Annealing etc. Eberhart and Shi developed

PSO concept similar to the behavior of a swarm of birds. PSO is developed through simulation of bird flocking in multidimensional space. Bird flocking optimizes a certain objective function. Each agent knows its best value so far (pbest). This information corresponds to personal experiences of each agent. Moreover, each agent knows the best value so far in the group (gbest) among pbests. Namely, each agent tries to modify its position using the following information:

A. The distance between the current position and pbest.
B. The distance between the current position and gbest.

The particle swarm algorithm is used here in terms of social cognitive behavior. It is widely used for problem solving method in engineering. In PSO, each potential solution is assigned a randomized velocity, are "flown" through the problem space. Each particle adjusts its flying according to its own flying experience and its companions' flying experience. The ith particle is represented as Xi = (xi1, xi2, -------xid). Each particle is treated as a point in a D-dimensional space. The best previous position (the best fitness value is called

pBest) of any particle is recorded and represented as Pi = (pi1, pi2------pid).Anther "best" value (called gBest) is recorded by all the particles in the population. This location is represented as Pg = (pg1, pg2------pgd). A t each time step, the rate of the position changing velocity (accelerating) for particle i is represented as Vi = (vi1, vi2-----vid). Each particle moves toward its pBest and gBest locations. The performance of each particle is measured according to a fitness function, which is related to the problem to be solved [3]. We have differing variants of optimizer among which one is binary swarm optimizer and another is standard swarm optimizer. The probability of an individual deciding Yes or No relates with Binary swarm optimizer while in real number space the parameter of a function can be conceptualized as a point in space. A number of particles can be evaluated and there is presumed to be some kind of preference for better region of search space.

III. MATERIALS AND METHODS

Evolutionary optimization schemes like Genetic Algorithms and PSO have successfully been used in the past decade to solve many NP-hard optimization problems and global routing issues. GA and PSO are similar in the way that both techniques are population based search schemes that mimic the natural biological evolution the social behavior of species Tanese and Kennedy. Each member in the population represents a candidate solution to the problem addressed and over time they evolve to represent some other candidate solution. One advantage of PSO over GA is that PSO is more computationally efficient .Some performance comparison between GA and PSO have been reported in a novel GA based scheme is proposed to solve dynamic RWA problem in wavelength routed optical networks. Genetic algorithms with swarm intelligence inspired search schemes based on the idea of natural selection and natural genetics. Goldberg a member of the population represents a route from source to destination node i.e., a candidate solution to the routing sub-problem for DRWA. Genetic operators like crossover, mutation and then selection are applied to create a new population of genes. Mussetta have proposed a novel hybrid algorithm based on PSO and noising meta-heuristic for computing shortest paths in the WS network. The hybrid PSO based scheme shows better performance as compared to GA-based search algorithms for optimal shortest path computation, GA algorithms are proposed for solving DRWA in all-optical WDM networks. The GA based schemes proposed in Alfassio Grimaldi and Goldberg are merged and selected as the schemes for performance comparison purposes with our novel PSO-based algorithm.

IV. RESULTS

Magnitude response of acoustic path is shown in Fig.1.The SNR levels of the input noisy signal for babble and factory type noise is set at -10, 0 and 5dB. Time domain waveforms of noisy speech, clean speech and the speech signals enhanced by APSO and SPSO are shown in Fig.2. From these waveforms it can be clearly noticed that the signal enhanced using APSO algorithm resembles close to the clean speech compared to the signal enhanced by SPSO.

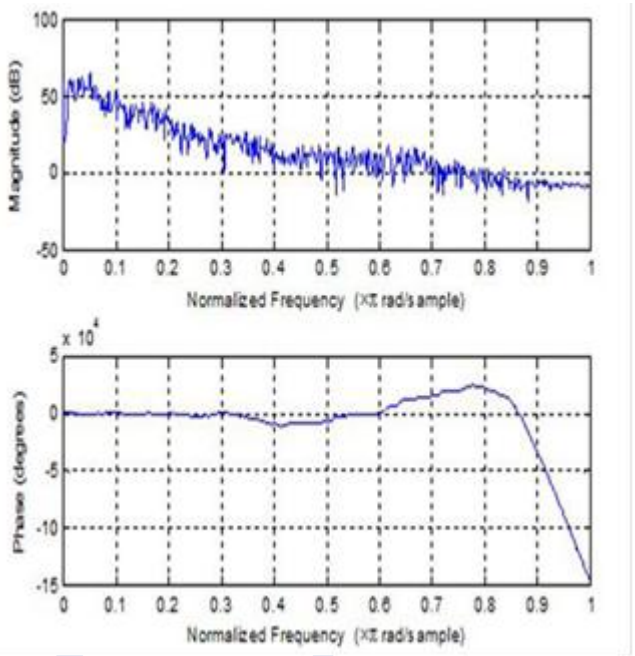

Fig. 1. Magnitude and frequency response of acoustic path

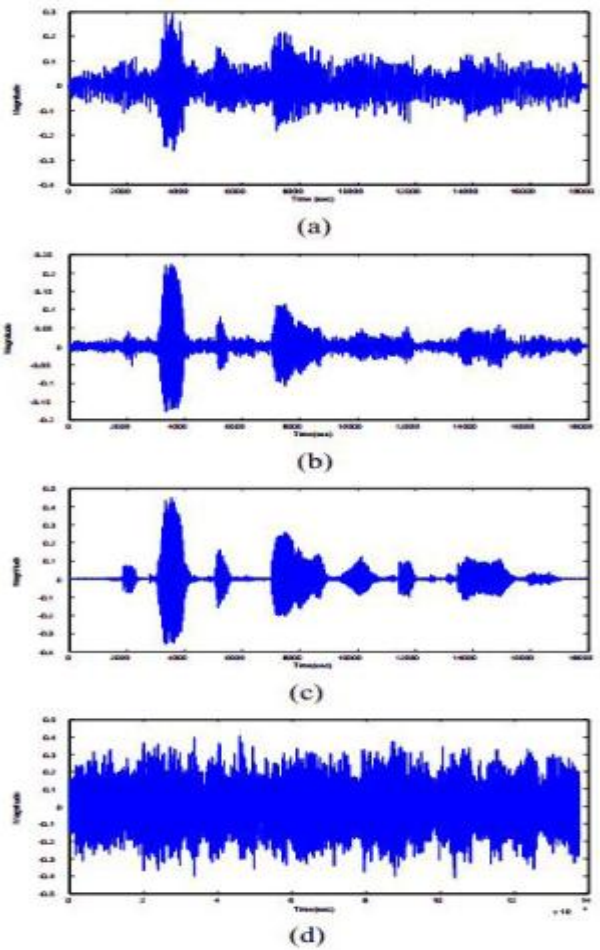

Fig. 2. (a) speech enhanced by SPSO (b) APSO enhanced signal (c) clean speech and (d) babble noise reference

V. CONCLUSION

In this study, a particle swarm optimization for optimizing the route based on PSO-GA algorithm for wireless sensor network has been proposed. The localization problems are optimized by using the presented method and have been evaluated, validated with extensive simulation study which consistently promises superior performance and is easy to implement; as compared with MR and exhaustive searching localization methods. From the study, the results have demonstrated that the proposed approach has higher precision and lower computational complexity in source localization for the wireless sensor network. Results show that the proposed algorithm is better than general PSO and GA.

REFERENCES

[1]. Channakrishnaraju, Dr.M.Siddappa: A Study on Efficient Methods Used to Enhance Coverage in Wireless Sensor Networks, voL 13, IJAIST, 2013, ISSN: 2319:2682

[2]. B. K. Panigrahi, Y. Shi, and M.-H. Lim (eds.): Handbook of Swarm Intelligence. Series: Adaptation, Learning,and Optimization, Vol 7, Springer-Verlag Berlin Heidelberg, 2011.ISBN 978-3-642-17389-9.

[3]. C. Blum and D. Merkle (eds.). "Swarm Intelligence – Introduction and Applications. Natural Computing".Springer, Berlin, 2008.

[4]. V.Selvi, Dr.R.Umarani, "Comparative Analysis of Ant Colony and Particle Swarm Optimization Techniques", Volume 5– No.4, August 2010, International Journal of Computer Applications.

[5]. Qinghai Bai, "Analysis of Particle Swarm Optimization Algorithm", Vol. 3, No. 1, Febraury 2010.

[6]. Gopakumlar.A , Lillykutty Jacob," Localization in Wireless Sensor Networks using Particle Swarm Optimization",2011.

[7]. Divya P. L, Raghavendra V,Kulkarni, Rekha Manoj, "A Swarm Intelligence based distributed localization technique for Wireless Sensor Network".ICACCI,pag 367-373.ACM(2012).

[8]. Mandeep Kaur Bedi, Sheena Singh, "Comparative Study of Two Natural Phenomena Based OptimizationTechniques" International Journal of Scientific & Engineering Research, Volume 4, Issue3, March-2011.

[9]. Shweta Singhal, Shivangi Goyal, Shubhra Goyal and Divya Bhatt," A Comparative, Study of a Class of Nature Inspired Algorithm" in Proc. of the 5th National Conference; INDIACom-2011.

