Static and Dynamic shortest path finding in Mobile Network by using Ant Colony optimization

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Abstract— In recent year access rich information using multimedia services via the internet from mobile devices. Then social application shares the information using routing algorithm. Routing means the act of moving information across an internet work from a source to a destination. In this paper, Swarm intelligence follows the behaviour of cooperative ants in order to solve hard static and dynamic optimization problems using Ant Colony Optimization (ACO) technique and an artificial ant colony capable of finding the shortest path source to connected nodes. The main goal of ACO-based search algorithm is that achieve high efficient in information retrieval & reduce load overhead.

Keywords— *Ant colony optimizatiion, AntHocNet, interactivity ,Mobile Ad hoc Network (MANET), mobile peer-to-peer, object sharing ,Virtual community.*

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I. Introduction

In recent year, it has become highly popular to access rich information using multimedia services via the internet from mobile devices with computation and communication resources. Internet is the highly evolving towards the complex systems which comprises and integrates a number of wired and wireless networks covering the needs of different community of users. Mobile multimedia is one of the mainstream systems for communications, multimedia applications and high-speed mobile data services.

Ad hoc networks consist of autonomous self-organized nodes. Nodes use a wireless medium for communication, thus two nodes can communicate directly if and only if they are within each other's transmission range. Two nodes normally communicate via other nodes in a multi- hop fashion. But the problem of finding multi constrained paths has high computational complexity, and thus there is a need to use algorithms that this difficulty. The major objectives of QoS routing are i) to find a path from source to destination satisfying user's requirements ii) To optimize network resource usage and iii) To degrade the network performance when unwanted .

The main problem to be solved by QoS routing algorithm is the multi constraint Path problem. Algorithms to solve this family of problems are known to be heuristics which can reduce the complexity of the path computation, however, at the expense of not attaining the optimal solution for the problem and finding just a feasible solution.

Ant Colony Optimization (ACO) based solutions rely on a relatively new concept which is inspired from closely observing the foraging behavior of ants. While discovering the shortest paths from the source nodes to the base node using swarm intelligence based optimization technique called ACO.

In this paper, we focus on search mechanism based on ACO for P2P network, Static & Dynamic connection established to the network and find the shorter distance according to source to destination using ACO based search algorithm. The goal of ACO-based search algorithm is that achieve high efficient in information retrieval.

The balance of the paper is as follows. In Section II we briefly review the current related works about research mechanism in adhoc network and applicability of ACO meta-heuristic to distributed environments. In Section III we represent the ACO-based search algorithm in details. In Section IV we show the experimental results of our algorithm. Finally, we conclude this paper in Section V.

II. Literature Survey

Changqiao Xu et all [1], focuses on constructing an mobile peer to peer based video content sharing solution in wireless mobile networks, which supports user interactivity and efficient management and search for resources. We used the ACO, by extracting the common characteristics from the movement behavior of community members, & an ACO-based community communication strategy which formulates the construction and regulation approaches of connection between communities to balance the maintenance cost of community connection and movement rate of members between communities.

Kang Chen et all [2], has three main components: 1) interest extraction, 2) structure construction including community structure and node role assignment, and 3) interest-oriented file searching and retrieval based on components 1 and 2.

Chia-Hung Hsu and Chia-Feng Juang,[3] , discuss on ACO, technique. The ACO technique is a multi-agent approach inspired by real ant colony observations. Discrete and continuous ACO algorithms have been proposed to solve discrete combinatorial optimization problems and continuous optimization problems, respectively. On the basis of this concept, this paper proposes the SDE-CACO for IT2FC design The SDE-CACO uses two phases to generate new solutions at a new iteration.

Ying Lin, Jun Zhang, et all [4], focus on ACO-based approach for maximizing the number of connected covers (ACO-MNCC) first transforms the search space of the problem into a construction graph.

Chun-Ying Liu [5], focus on the P2P network structure searching technology is different. The P2P search methods include the centralized search, the structured P2P and unstructured P2P search. However, unstructured P2P networks suffer from the poor performance, therefore improving searching algorithm is one important major research area for unstructured P2P network. As a swarm intelligent technology, it has strong ability of global optimization and parallelism. It can get results quickly and have obvious advantages in the dynamic network optimization, so it is more suitable for resource searching in dynamic networks.

III. REASEARCH METHODOLOGY

1. Ant colony optimization.

In this technique calculate the shortest path to source and destination. Ant colony optimization is a swarm intelligence methods and it constitutes some optimizations. Ant colony technique for solving problems which can be expressed as finding good paths through graphs & each ant tries to find a route between its nest and a food source by a process where they deposit pheromones along trails. Ants generally start out moving at random, however, when they encounter a previously laid trail, they can decide to follow it, thus reinforcing the trail with their own pheromone substance. This collective behavior is a form of autocatalytic process where the more ants follow a trail; the more attractive that trail becomes to be followed by future ant.

The searching on ACO utilizes two evaluations which consist of the static value and the dynamic one.
The static evaluation is peculiar information of the target problem. Usually, a reciprocal number of the distance is adopted as the static evaluation value.
The dynamic evaluation introduces pheromone amount.

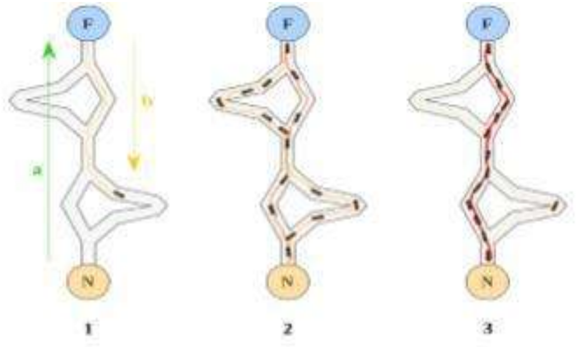

Fig 1: Ant Colony Optimization

1. The first ant search randomly until it finds the food source (F), and then it returns to the nest (N), laying a pheromone trail.
2. Other ants follow one of the random, also laying pheromone trails. Since the ants find the shortest path lay pheromone trails faster, this path gets reinforced with more pheromone, making it future ants apply the path.
3. The ants become increasingly likely to follow the shortest path since it is constantly reinforced with a larger amount of pheromones. The pheromone trails of the longer paths evaporate.

2. Ant Colony Algorithm

The algorithm presented below produces the shortest path from a source s to all possible destinations v on a directed graph G. Its implementation in networking is known as a link-state algorithm [2, 3]. Let $|G|$ denote the number of nodes in the graph. Let $D(v)$ be the total distance of the shortest path from the source s to destination v. Let $c(u,v)$ be the cost of routing from u to v. Finally, let N contain the vertices in G whose shortest paths have been determined.

Algorithm: SHORTPATH(**G,w,s**)

Input: a graph G (represented by an adjacency list), non-negative edge distance w, and source **s**.

Output: weight of shortest path from source **s** to all destinations **v**.

1. $N = \{s\}$
2. **for all destinations** $v \in G$
3. **if** v **is adjacent to** s
4. **then** $D(v) = c(s, v)$
5. **else** $D(v) = \infty$
6. **for** $i := 1$ **to** $|G| - 1$
7. Amongst all nodes $n \notin N$ adjacent to any
8. $v \in N$, **add** n **to** N **such that**
9. $D(v) + c(v, n)$ **is a minimum.**

IV. PROPOSED SYSTEM

In proposed system static connection and dynamic connection established using ant colony optimization technique. In static connection shows source to destination shortest path calculates using distance. In dynamic connection shows source to destination shortest path calculates using hope count.

A. *Static connection*

In static module shows the network according to the distance.

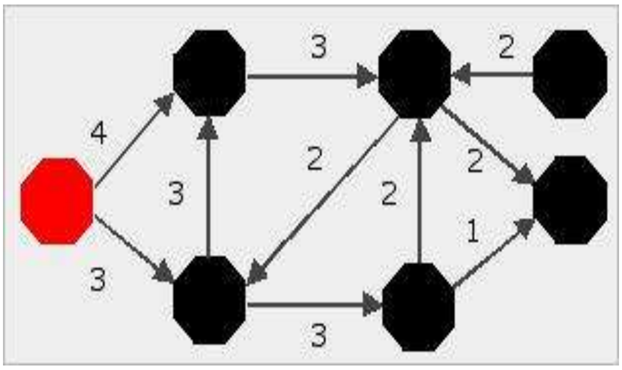

Fig 2: Static Network

In fig shows the static network, In network red node shows source node & algorithm perform shortest path to connected every node. In mobile network according to distance value difficult to manage shortest path.

B. *Dynamic connection*

In dynamic module shows the network dynamically to connect all nodes according to the peer to peer network.

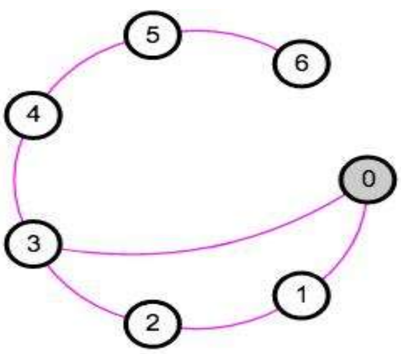

Fig 3: Dynamic Network

In fig shows the dynamic network, then algorithm perform shortest path calculate according to hop count to connected every node. Then select the shortest destination node & share the information.

V. CONCLUSIONS

Proposed system aims to social network based content of share the information in mobile network. Ant Colony Optimization (ACO) algorithm discovering the shortest paths from the source nodes to the base node using swarm intelligence based optimization technique after proposed system of static and dynamic connection established using distance and hope count to calculate shortest path.

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