Ant Colony Optimization in Mobile Ad Hoc Networks Routing Protocol

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Outline

1. Problem Definition
2. Terms and Concepts
3. Related Work
4. Analysis of existing schemes
5. Open Issues
Problem Definition

Problem Statement

- To develop Routing Algorithm for Mobile Ad Hoc Network using Ant Colony Optimization.

Assumptions

1. Every node has unique unforgeable identity.
2. All the links are bidirectional.
3. Nodes may be mobile and network topology may change dynamically.
4. Nodes can have different traffic patterns and different energy constraints.
Objectives
1. Analyze ant colony optimization for Ad Hoc network routing.
2. To achieve efficient algorithm considering all issues of routing algorithm of ad hoc network.

Outcomes
1. Algorithm Design.
2. Simulation results comparing the proposed algorithm with an existing one.
3. Estimation of algorithm parameters.
Mobile Ad Hoc Routing related issues

- Algorithm should adaptive of mobility.
- The routing overhead should be less.
- Scalable with respect to network size.
Ant colony Optimization related concepts

- **Ant Colony Optimization Concepts**
  - **Pheromone**: When an ant walking to and from food source, it leaves some chemicals on the ground. When they have to choose a way out of other then they choose this with probability. But this probability depends on Pheromone.
  - **Optimal Path**: Due to Shorter Path, ant covers it in less time and due to this, Phermone update frequently on this path. Therefore, this path attracts more ants.
Ant colony Optimization related concepts

- **Simple-ACO [6]**
  - Forward ant probabilistic construct solution.
  - Backward ant update pheromone by following same path as forward ant follows.

![Network Diagram]

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Related Work

- ARA [3]
  Reduce overhead by reducing ant size.

- AntHocNet [2]
  Try to give efficient ant adaptive algorithm.

- ARAMA [4]
  Localy recover link breaks.

- HOPNET [5]
  Try to improve scalability by applying zone system.
Analysis

- ACO is an iterative algorithm. Due to mobility, links get broken, so there is a majority of chance to not get an optimal path.
- Memory requirement is high, and processing at every node gets increase.
- Reactive algorithms get success only in the presence of multipath.
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- **Pheromone**: Value may be update according network path condition, battery power of nodes, link states, cost of the path.

- **Probability**: If probability more depends on pheromone value, it amplifies the problem of initial random fluctuations.
Open Issues

- Reduce overhead for Ant routing algorithm.
- Control optimization in Mobility.
- Improve scalability.
Thank You
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