

Implementing Ant Algorithm in Unstructured-But-Enterprise P2P System

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Abstract - This paper will explain an implementation of agent based P2P system derived from Ant Algorithm in an enterprise unstructured P2P network. Ant Algorithm in this paper will compliant with novel Ant Colony Optimization (ACO) founded by Marco Dorigo with adoption of Traveling Salesman Problem (TSP). The applicability of algorithm within a P2P network when different level of nodes installed also reveal and measured. Ant algorithm used will employ 2 strategies; Exploring Strategy and Exploiting Strategy. 2 type of ant will be implemented; Managing Ant and Exploiting Ant. In order to emulate enterprise environment within P2P network, 2 type of nodes will be installed; Enterprise Node that belong to a service provider and Regular Node, known as normal peers. At the end of this paper, the costs for each route taken by every peer will be calculated based on deposited pheromone value on each path and a number of hit experiences.

Keywords: P2P, P2P Algorithm, Ant Algorithm, Agent Based P2P System, Routing, Foraging Behavior.

1 Introduction

Introduction Ant metaphor has been successfully applied in routing of both data packet network application; wireless and leased-line network. But, its applicability in P2P, in terms of routing are still being a subject for most researches particularly in distributed network.

Ant algorithm created based on foraging behavior was first founded by Grasse who named it as stigmergy [1]. During foraging, ant use trail-laying and trail-following behavior according to an organic chemical produced called pheromone to find a shortest path between its nests into resources. As mentioned before, this paper will focus on ant algorithm approaches that are applicable to an unstructured P2P network. Question remains of *which method have to be used to prevent an issued that occurs for most in free network if same P2P unstructured architecture is applied in manageable network architecture.*

In particular, one thing that most research community yet did not handle it down is that of how P2P network inherent dynamically based on behavioral changing on every peer without damaging any activity within a small-monitored community, not free and each rules within are set beforehand.

1.1 Enterprise Network

P2P in an enterprise environment can be described as an Internet overlay where resources and infrastructure are structurally created by users and participants (particularly new users) are invited [2]. One of primary design goal of enterprise P2P is that to avoid single point of failure. And one of most challenge to be faced in enterprise environment is, centralized-based factor can't be eliminated. Even though it could disrupt a real concept of unstructured P2P network, its implementation are required and rely on the needs of organizational requirements such as peers monitoring and policy implementation.

By that point of view, to separate multi-level peers that run different roles is almost possible. In an unstructured but enterprise P2P, freeriders may could be minimized. But a group of nodes that register, and act as a normal peer to gain the benefits as much as possible could not be prevented.

To monitor them or at least all rules are installed correctly, there is must be an exclusive node, that belongs to service providers, act as policies executor used to assure that everything especially a runtime environment are running well. The question is, what approaches could be used to enable the communication between different level of nodes as well as to handle other P2P issues? How does the routing protocol was look like during 'food' foraging?

1.2 Ant Algorithm Approaches

Thus, this paper presents the research made when ant algorithm approaches that derived from Dorigo's ACO was employed in an enterprise P2P network. Grasse [1] describes, in real behavior, ant use trail-laying and trail-following behavior according to an organic chemical produced called pheromone to find a shortest path between its nests into resources. It does require 3 basic principles;

- a. Ant drops a pheromone during travelling.
- b. Sense a path for previous pheromone dropped. If there is a pheromone then it follows the trails.
- c. If there is no pheromone, ants walk randomly.
- d. Pheromone evaporated if the trails are not being used in several times.