Chapter 10

Utilizing Soft Computing Application for QOS and Security Optimization by Meta–Heuristic–Based Genetic Approach

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ABSTRACT

In cloud computing network, due to high node mobility, routing is regarded as one of the most challenging task. Some of the traditional protocols developed for cloud networks, wireless network and cyber world use dynamic optimization for QOS accomplishment using some of the optimality criterions like shortest distance, minimal bandwidth usage and minimum delay and constraints like limited power and limited capability of wireless links. GA (Genetic Algorithm) based approach is utilized in this chapter for QOS design based secured routing protocol, where GA is used for finding the most optimal (fittest route) hence improving QOS leading to an optimized secured routing protocol. GA based approach which is discussed in this chapter, selecting the fittest route leads to optimization of QOS based performance parameters like average packet delivery ratio, average drop rate etc. Simulation results shown in the chapter also validate the approach.

INTRODUCTION

Due to large frequency of various topological changes, mobility of node and conservation of energy in cloud networks, cyber world and wireless based networks, discovery of route becomes a Dynamic Optimization Problem (DOP). Deterministic and search heuristic also referred as meta-heuristic (GA, ant colony optimization, particle swarm optimization etc.) are being utilized for finding solution of dynamic routing problems. When considering a given route discovery request one route based tree is

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constructed by deterministic algorithm like the shortest path tree (SPT) based algorithm. On the other hand a number of route trees are searched and final tree is selected as the best one using the search heuristics and as these algorithms have polynomial time complexity effective QOS based solutions are provided for various cloud, cyber and wireless networks. When compared with their counterparts GA provides lots of advantages.

GA based approaches do not work on a single solution based iteration rather than on a population based on possible solutions. In GA based approach possible solution is represented through each individual and based on the fitness value selection operation takes place which is followed by crossover whose result indicates whether GA are stochastic or deterministic. Figure 1 depicts the various operations of GA based approach.

Abdullah et al. (2008); Cheng (2010); Ghazal et al. (2007); Gunasekaran et al. (2009); Yen et al. (2008); have illustrated GA for determining optimized solutions for problems like dynamic natured multicast problem, energy efficient based multicast routing, optimization of routing, best QOS based route selection etc. for cloud based environment. The upcoming sections of the chapter will discuss about QOS optimization through GA based approach. GA is utilized for selection of the fittest route through S(Source) to D(Destination) from a set of routes and hence performs optimization of various parameters like average packet delivery ratio, average hop count etc.

QOS AND SECURITY OPTIMIZATION BY META HEURISTIC BASED GENETIC APPROACH

Optimized results are produced in this approach using GA based approach as design and implementation of such an approach is the most demanding task for modern day cloud networks. Depiction of the optimized approach utilizing GA technique for cloud network is shown through figure 2. MATLAB environment is used for implementing the approach discussed and presented in this chapter.

Given below is the small portion of MATLAB code utilized for the implementation of GA based approach:

*Figure 1. Flowchart showing steps of genetic algorithm*