Abstract

This project studies and explores the potential of using genetic algorithm to solve the shortest path problem in Open Shortest Path First (OSPF) and Multiprotocol Label Switching (MPLS).

The most critical task for developing a genetic algorithm to the shortest path problem is to how to encode a path in a network. In this project, two genetic algorithm solutions are developed for the above two problem domains, i.e. Previous-node-based Encoding to solve the shortest path problem in OSPF and Priority-based Encoding to solve the shortest path problem in MPLS.

For each of the shortest path problem domains, the proposed solution model has been tested on 10 randomly generated networks with different weights setting using mesh topology of 9 nodes and 36 edges using the routing simulator.

Whereas Dijkstra algorithm is used traditionally to find the shortest path for hop-by-hop routing in OSPF, genetic algorithm has proved itself in the experiment that it is able to find the same optimum solution with high probability. For MPLS explicit-routing, the test results indicate that genetic algorithm is able to find the optimum solution, which is the shortest path that meets the resource requirements (constraints) of the traffic flow.

This study demonstrates the potential of using genetic algorithms to solve the shortest path problem in optimizing the weight in OSPF and MPLS. This solution can provide a potential alternative.