Evolutionary Computation Term Project Proposal

Title

Finding k-shortest Paths in Network Using Genetic Algorithm

Team Members

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Type of Project

Evolutionary Computation Application

Objectives

Solving NP-problem using Genetic Algorithm

Method

1. Given a network G(N, E) with N nodes and E is the set of links connecting the nodes. Also, we consider the source node n_0 and destination nodes set U = {u_1, u_2 … , u_m}. The chromosome can be represented by a string of integers with length N. The genes of the chromosome are the nodes between the source node n_0 and destination node u_i.
2. Generate the initial population:
    a. A chromosome x in the initial population can be generated in a form {n_0, n_1 … , n_m, d}, where n_0, n_1, n_m, d are nodes between source and destination.
    b. If the generated chromosomes fail to agree with the provided link, then discard it and go back to Step a.
    c. Repeat Step a to b to generate *population_size* number of chromosomes.
3. Objective function
$$f(x) = \min\left(f(x), x \in E_p\right) \geq B$$
4. The crossover operation is performed by one-cut point.
5. The mutation operation is performed on bit-by-bit basis.

Contributions of This Project

Improve k-shortest paths solver using Evolutionary Computation technique.