

Name: Sutapa Samanta

Roll No. : Y210340

Thesis Supervisor: Partha Chakroborty

*Thesis title: **Multiple Vehicle Routing using Genetic Algorithm***

Problem Statement:

Let us consider a scenario where a number of points, each of which demands some form of service, are distributed over a certain area. The service provider has a fleet of vehicles, typically located at a single location called the depot. Each of these vehicles has a limit on the amount of service it can provide; the limit is referred to as the capacity.

The problem is to find a set of routes, one route for each of the vehicles, such that the sum of the route length is minimum. A route is a set of nodes arranged sequentially in the order in which they are visited. Further, each route starts and ends at the depot and the sum of the service required by the nodes included in the route must be less than or equal to the capacity. Typically, one node is serviced by one vehicle. The above problem is referred as the multiple vehicle routing problem and arises often in the real world. For example, the problem of agents distributing soft-drinks to different shops of a city is a multiple vehicle routing problem. In this case, the service required by each node is the number of bottles each of them want and the capacity is the number of bottles that can be carried in the delivery truck. The depot is typically the warehouse.

Objective:

Minimize the total travel cost

Constraints:

- capacity of vehicle
- each node should be visited exactly once
- all the nodes should be visited

The problem is solved by Genetic Algorithm. It uses two operators here. They are:

- Reproduction
- Intra-string crossover.

Proposed methodology:

The flowchart of the proposed methodology in details is given in Fig.1.

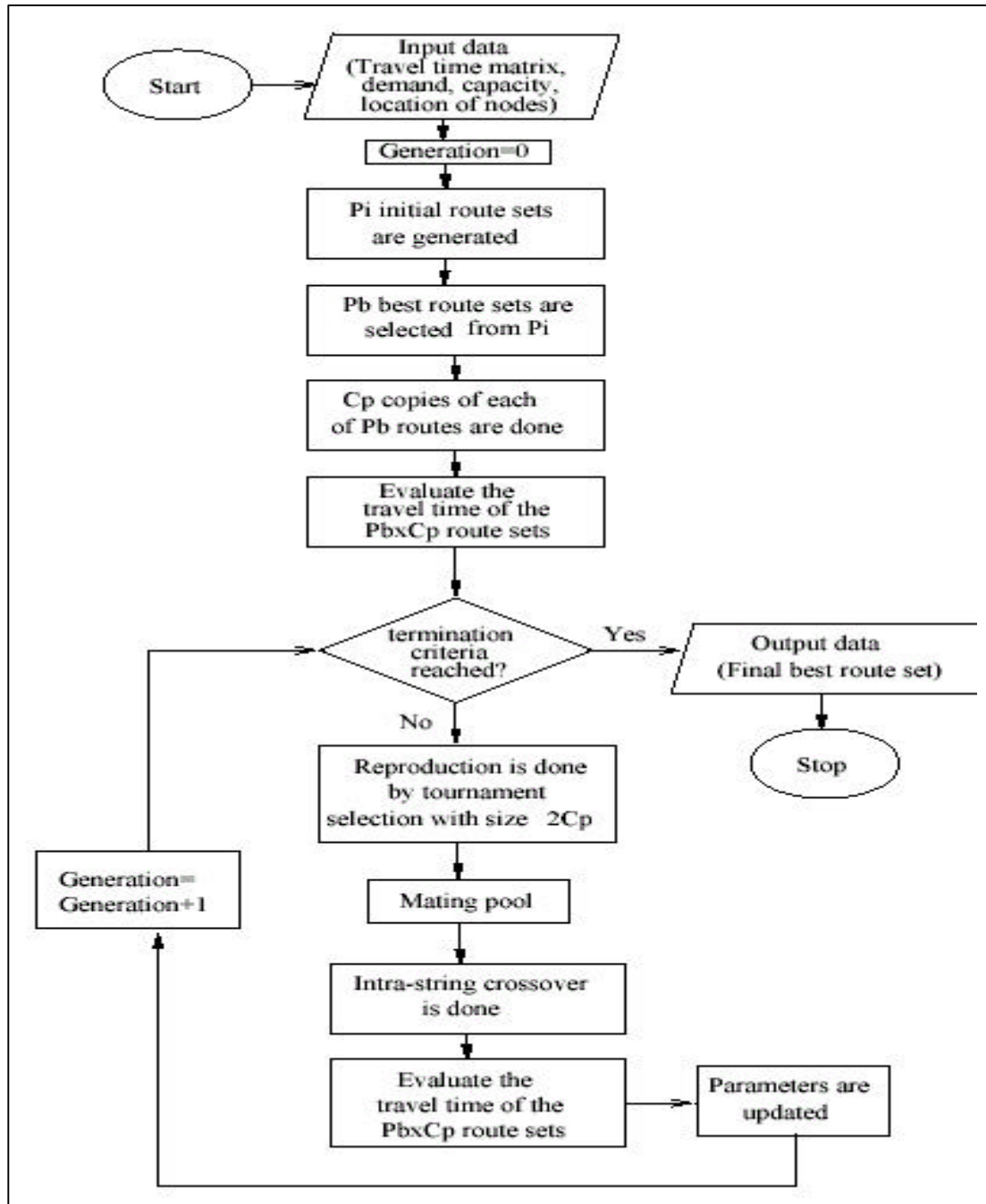


Fig.1. Detailed description of the proposed methodology

Results:

The various steps to obtain the best solution using the proposed methodology for EIL51 problem are given below:

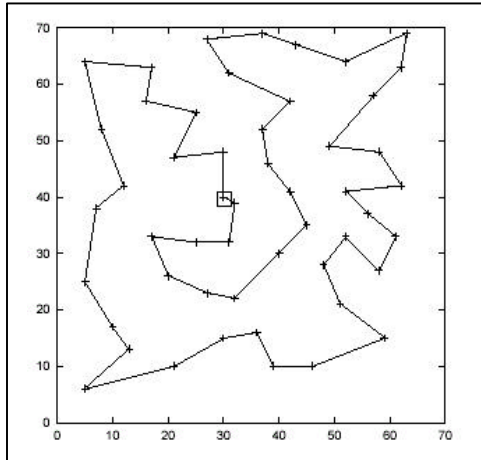


Fig.2 Initial TSP-order of the nodes

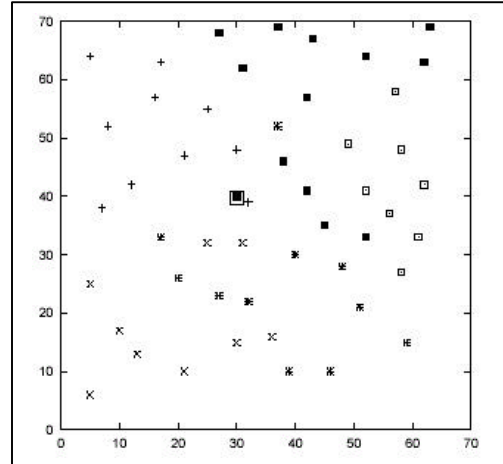


Fig.3 Clustered nodes for Eil51

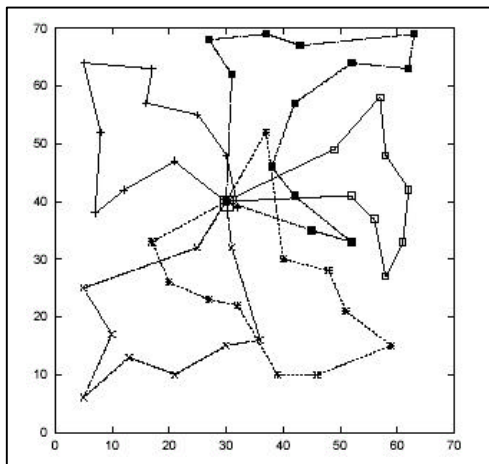


Fig.4 Best initial route set for Eil51

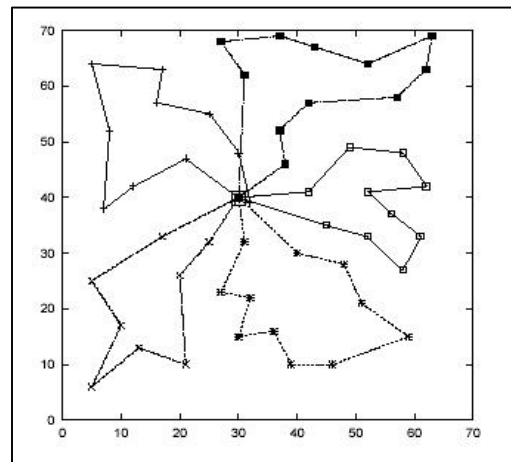


Fig.5 Best route set for Eil51