Railway Route Optimization Using Genetic Algorithm

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***Abstract*— Nowadays, the development of"smart cities" with a high level of quality of life is becoming a prior challenge to be addressed. In this framework, promoting the model shift towards more reliable, greener and in general more sustainable transportation modes, namely towards a "smart mobility" could significantly contribute to achieve this goal. The aim of this paper is to provide users with more regular and reliable rail system by optimizing the route among stations.**

***Index Terms*—Railway, framework, smart mobility**

I. INTRODUCTION

The railway system is a complex system. The operations performed by the railway system it more confusing. The requirement of railway operations is to meet the demand assigned to railways through the optimization of usage of the railway transportation specific resources. So problem-solving oriented optimization algorithms or techniques form the basis, especially in the era when information technologies prevail, of modern railway operation, in which the most typical cases are, not limited to Railway management information systems design.

I. AIM AND OBJECTIVE

Railway Route Optimization System is a product to serve to users who are tourists. The objective of this project is to give the end users or passengers to know the shortest path to reach the destination with in short period and with amount as minimum as possible and as early as possible when more than one Railways route is to there to reach the destination. The output for this optimization system shows in graphical form of the train route from source point to destination point. Now a days it is very useful to know about the train details i.e. train Source Point and Destination Point.

There are four modules are used for optimization.

- Station
- Route
- Points
- Trains

II. EXISTING SYSTEM

Railway Route Optimization System are developed to helps many passengers or tourist to know the Shortest Path for their requested route this is the main purpose of our system. You can find the shortest path of a train route by manually but there may be problems that have to be faced so to overcome such problems we need to help the Optimization Techniques to know the shortest path. There are lot of time required to main the retrieve the details of train, station and routes manually system. Even a single information for a train or route from starting point to ending point it will take lot of time problem statement.

The passenger or end user requested for the shortest path between two stations then optimized system is responsible to show the route in between two stations. The passenger required less time to reach the destination.

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III. PROBLEM STATEMENT

The most important work in railway management information system design is to design the physical structure. The requirement of physical structure optimization is to allocate the physical resources of railway in order to realize logical structure, minimizing the costs and time.

The optimization objectives include customer satisfactory degree, response time, costs and so on. The restrictions are reliability, safety and etc. Objective variety, combinatorial complexity and objective index nonlinearity this problems are occurred in physical structure of optimization system. A typical application of GA in railway management information system design is the physical structure optimization of emergency succoring system. Here we give the detailed implementing process of GA in physical structure optimization of emergency succoring system through a computing case study.

IV. SCOPE AND PROPOSED SYSTEM

We are proposing system which is automated, so that it is easy to retrieve the responses from the system fastly and updating the details once the response or services are provided to the end-users upon their request without any difficulty and saves time.

V. IMPLEMENTATION

There are four modules are used in Railway Route Optimization System.

- Station
- Trains
- Route
- Points

Stations module:

The data about station and operations like addition, deletion and modification are maintained by this module. This module contains stations tables and fields are station-id, station-name. In this table Station-id, station-name is unique value. The station-id is the primary key of this table.

For arranging a route source station, destination station, via stations are must be registered in stations module, administrator can arrange the path among that stations. This station module is cannot be handled by end user, only administrator.

Trains module :

The data about different trains and various operations like addition, deletion and modification are maintained by this train module. The train module handles trains table and it contain different fields are train-id, train-name, source-station, destination station, arrival-time, departure-time, train-type.

It contains unique train id and duplicate values does not belongs to this module.

Route:

This module maintains the data about routes between stations and this module handle the routes tables and fields are route-id, starting-station, destination also time taken for ordinary, and time taken for express. This module provides the graphical representation of a route between starting-station and destination.

This module is provides information regarding routes between two stations and also know shortest path among the routes, and also gives graphical representation of the corresponding routes.

Points:

This module maintains the data about trains, routes tables and this module gives routes of train on map.

VI. ALGORITHM

Step 1. The initial population P[0] is generated through fake random method.

Step 2. To grade the individuals.

Step 3. For refresh the individuals in elitists pool. The first grade in the elitists pool is stored by individually.

Step 4. To calculate the virtual adaptability according to equation (1).

Step 5. To apply the share strategy in objectives functions space according to equation (2) ~ equation (5).

Step 6. Selection: To select the individuals according to the adaptability ratio method (roulette).

Step 7. To crossover.

Step 8. To mutate.

Step 9. To generate the new generation ' P .

Step 10. To apply the elitist strategy and add the individuals in elitists pool into the new
generation ' P and delete the non-elitist individuals in ' P randomly.

Step 11. To adjust the size of the new generation. Set the size to be N . The new generation is P .

Step 12. To check if the ceasing condition is satisfied. If no, go to step 2; else, cease.

VII. ANALYSIS

System Analysis is first stage according to System Development Life Cycle model. This System Analysis starts with the analyst. The detailed study of the various operations performed by a system and their relationships within and outside the system is major aspect of analysis. The major aspect of analysis is defining the boundaries of the system and determining whether or not a candidate should consider other related systems. The available information, decision points, and transactions handled by the current system is collected by data in the time of execution. Logical system models and tools are useful for detailed examination, skill development, experience, and common sense are required for collection of the information needed to do the analysis.

VIII. APPLICATION

GA can also be applied in many other fields of railway applications, such as the crew scheduling, station operating plan optimization etc. Its optimization ability affords the possibility to solve the optimization problems in railway applications with high precision and efficiency. It is no doubt that GA has a bright future in the field of railway applications.

IX. EXPIREMENTAL RESULT

Fig.1 Flash Window

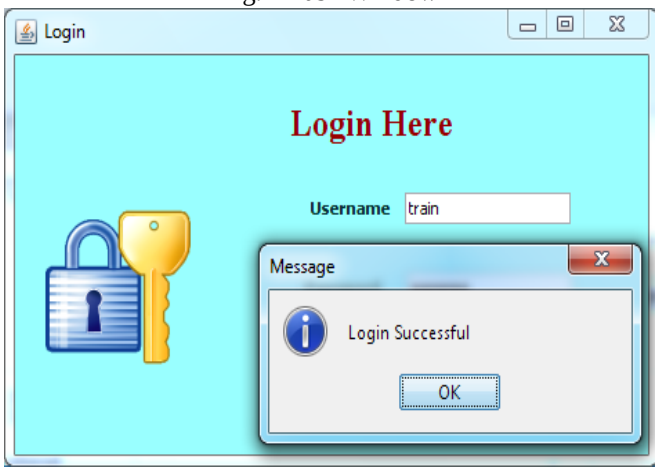

Fig. 2 Login Window

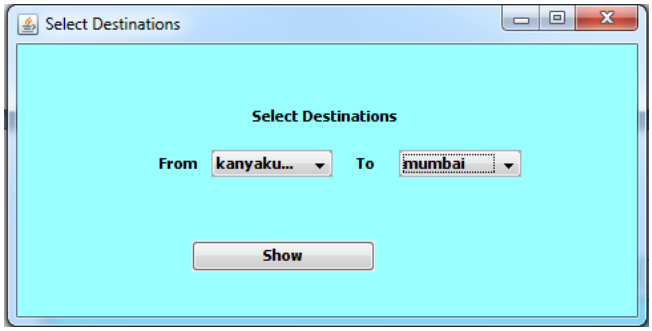

Fig. 3 Select Frame Window

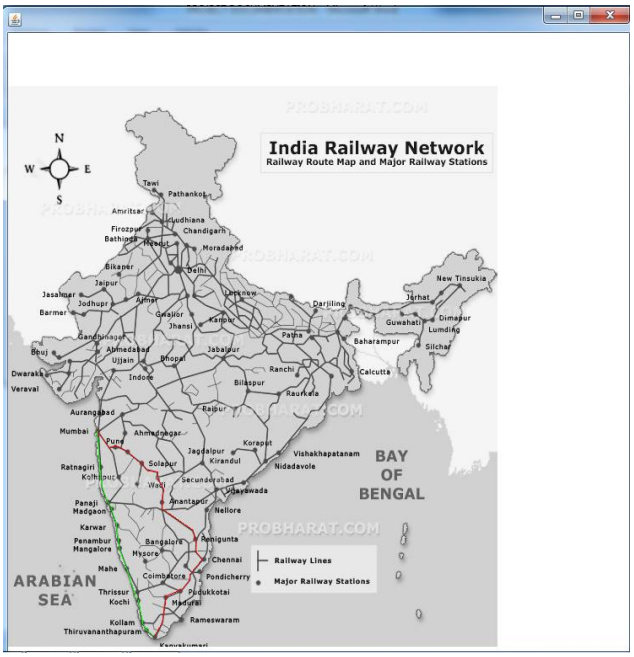

Fig .4 Output Window

X. CONCLUSION

The main findings are as follows.

1. The improvement to GA brings high calculating precision and efficiency, meeting the calculating requirements of large scale optimization problem with combinatorial complexity and nonlinearity.
2. GA is suitable for railway application oriented problems solving. Although the solution may not be the optimal solution, the calculating time cost is much more acceptable.
3. GA is very easy to apply in optimization problem, not only reflecting in decision variables description, but also in objective function formulas.

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