Railway Train Dynamics Analysis System

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I. INTRODUCTION

Train Traffic Optimization System is a research targeting to seek a solution to minimize train delays and maximize train productivity in Srilanka Railways. Main purpose of the research is to find out feasible heuristic algorithm for train traffic optimization. Time table generation and application of evolutionary computing to solve above problem is another consideration of the research. This research encompasses with five major modules.

- Real time data generation module
- Optimization Engine module
- Controlling data input module
- Decision generation and output module
- Time table generation module

In this paper discuss railway train dynamics analysis system under Real time data generation module of the research.

A. Concept

No any passenger need to wait one minute to get another transportation media to get his or her destination.

B. Motivation

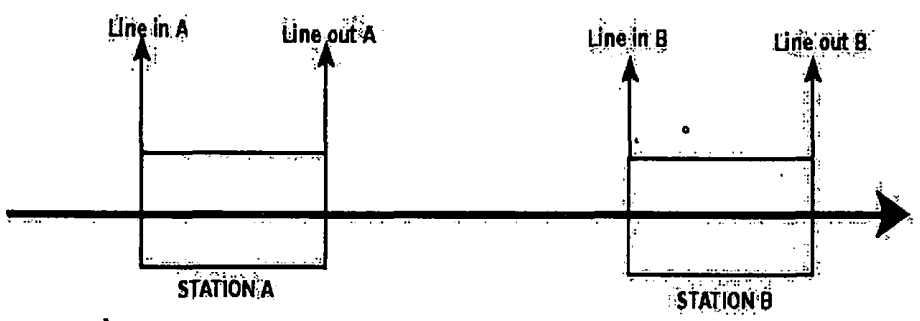
Since many years train delays are unavoidable due to increasing number of trains and generation of impracticable train time-tables. Srilanka railway loss considerable amount of income due to lack of use of maximum track capacity and scheduling problems. This is the reasons motivated the research to seek a solution in the domain of evolutionary computing.

C. Background

Optimisation of train traffic is totally depend on real-time data of moving train. In this research paper consider the methodology applied for gather real-time data of moving trains and how accuracy is proven of generated data. Train speeds and GPS locations of trains are collected via implementing devices on drivers desk of each locomotives. In this research Android mobile phones are used to track train positions. All GPS data are sent to the central server in regular time period for analysis. As initial step of train optimisation fifteen numbers of trains those are running on southern coastal railway line are monitored. This enable to study train routing problems, train crossing problems as well as station dwell time problems and train dynamics. These problems are dramatically affected on daily train service. Application of mobile phones also facilitate establish communication between train drivers, train controllers and station masters.

D. Methodology

In order to identify just in time train position using GPS coordination rectangular binding box principal is adopted.



Using this principal the system compare latitudes and longitudes sent by each mobile phones implemented in the locomotives are within the rectangular box every time. By this way system detects entering time and exit time of station limits regularly and send to the server. Calculation and recording of real-time arrival and departure of a train to a particular station is not difficult.

E. Evolution

Evolution focus on to validate accuracy of gathering data. It is performed by comparing system collected real-time data with manually recorded times of approached and departed trains of selected stations. According to the analysis mean accuracy of stations recorded 93%. In this research initially focused on several trains and in this paper arrival time of train number 8058 to Matara railway station is depicted out. Train number 8058 is Ruhunu Kumari that plies Colombo Fort to Matara. However, Ruhunu Kumari never reached on time during considered period of three months. The highest rate is 26% which mean train arrival to Matara is between 30 – 35 minutes lagging with its scheduled arrival time.

F. Discussion

In here discuss the methodology used to collect real-time data of moving trains. According to analysis using collected data generated by GPS/GPRS system of moving trains it revealed many reasons of train delays. Based on this, next step of this research will be planned to find out suitable algorithms in order to optimise train traffic.