

A Graphical-pseudo-algorithmic approach to evaluate Shortest Route Maps of Indian Railway Stations

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Abstract

Railway route map may be defined as a showcase where different stations of different states are kept back in a well structured array. According to an index system, it allows the users to opt for their route or choose the source and destination station after viewing the route. In this way the railway route map helps to distribute knowledge among different people about the route from one place to another. A Graphical-Pseudo-Algorithmic approach is proposed to evaluate the shortest paths between different stations of Indian railway route map. Through the approach any people will able to know the route only with a few keyboard hits.

Keywords

Indian Railways, Railways Route Map, Knowing Indian Railways Network, Railway Services Available in India, Alternate Route Between Two Stations, Customer Service.

Introduction

Indian Railways Route map is typically divided into five zones – a) East Zone, b) West Zone, c) North Zone, d) South Zone, e) Center zone. Survey of India, The National Survey and Mapping Organization of the

country under the Department of Science & Technology, is the OLDEST SCIENTIFIC DEPARTMENT OF THE GOVT. OF INDIA. It was set up in 1767 and has evolved rich traditions over the years. Survey of India will take a leadership role in providing user focused, cost effective, and reliable and quality geospatial data, information and intelligence for meeting the needs of Indian Railways Route. The railway route is shown in Figure 1.

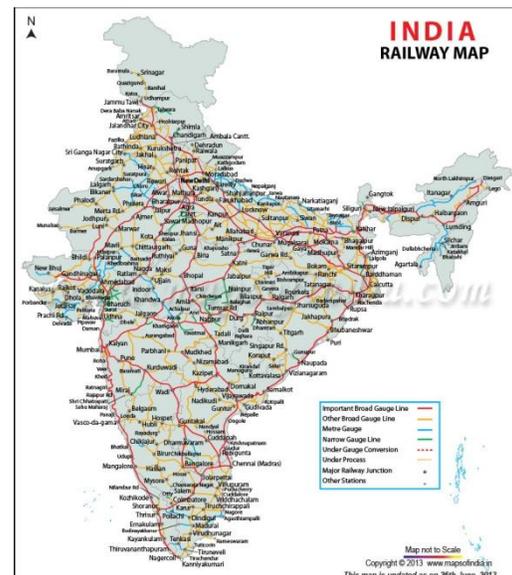


Figure1: Railway route map of India

Computerized railway route map is the key for the perfect functioning of the map. It introduces the total route map zone wise and also introduces a map by selecting the source and destination location in a moment of a second. So it is very user friendly for handling a vast railway route map into some small parts. Therefore there is no chance of wastage of time and the job of the user is much easier than in manual system. This project will give an idea and knowledge about the path which he /she will want to know. Yet like all other human created aspect of the world my too have some limitations: a)It works only in CUI i.e. without graphical user interface. B) The route map of each zone is not similar as the 'Route Map'. In a zone a station is connected with more than one stations of another zone, but in favour of the program it is declared that a station is connected only with one station of another zone. Get only the information of the path of some important stations that means stations are limited. At the moment of viewing the route from one location to another some other stations are displayed. The intension of the research work is to overcome the limitations.

In this research work if the zone wise display map is selected, the map will display all connections among the important stations present in the selected zone. The locations of every station are traced from Indian railways map published by Indian Railways Department. According to the geographical position of important stations in the map their co-ordinate positions have been considered to locate the station appropriately on the display unit. There is a data structure array and link list to preserve all the information regarding the important stations zone wise.

Objective of the Study

Objective of the project is to provide easy handling of the INDIAN RAILWAY ROUTE MAP. In a nutshell scope of this project is as following: Using this

software, user can easily understand the aspect of Indian Railway route map. It can be used by railway travel agency or any similar type of user or any people to realize the Indian railway route considering the important stations throughout the country. It provides two options – displaying zone wise route display and the route display between the two specified stations. It also provides options for station selections.

Indian Railway Route Map works effectively in character user interface to select the zone out of five zones to show the connectivity among the stations in the selected zone and to select the source and destination stations for displaying not the entire connection rather the connection of the specified route with neighboring stations. This system helps user to obtain knowledge about the Indian railways route. The system has provision to show the five zone names and zone wise station names. Users can change or modify their selection of stations and zone as necessary. It maintains a proper location of each station according to the Indian railways route map for keeping a track of the station in a zone. It checks proper destination station to trace the route connections.

It displays the names of the stations while connecting the route and two different color circles have been used to distinguish the stations. It shows the colorful screen in order to provide proper impact over viewing the map.

Literature Survey

There is no such railway route map documented which is interactive and shows the railways route map between two stations including the important station names and their connections. There are a lot of projects to show the train names running between important stations. But there is no such project which shows the railways route maps between important stations as we see in Google map, Yahoo Map where the map shows route between the places.

The total length of track used by Indian Railways is about 115,000 km (71,000 mi) while the total route length of the network is 65,000 km (40,000 miles). The Indian Railways is divided into 16 zones, which are further divided into a total of 68 divisions. Each zone is administered by a General Manager (GM) and the divisions are under the control of Divisional Railway Managers (DRM). The Indian Railways is the world's fourth largest commercial employer with over 1.4 million employees [1]. The aim of this document is to try and collect together various sources of information on Indian Railways, so that people unfamiliar with India and or railways are given some ideas on where to look [2]. Impact of Computerization in Indian Railways paper first introduced computerization on Indian Railways. Also, many new areas for computerization are taken from this paper[3]. A model-based algorithmic approach for supporting planners in the creation of shunt plans for passenger trains. The approach provides an example of a mathematical model and a corresponding solution approach for model based support. We introduce a four-step solution approach [4].

Preliminaries:

Using graphics mode project is developed in C language. On graphics displayed the program must map each dot (pixel) onto the screen. In this mode the computer screen is made up individual pixel such as 640 pixels in x-direction and 480 pixels in y-direction. The x-direction is horizontally across the screen and the y-direction is vertically down the screen. The top left corner is the (0, 0) y-x point and the bottom of the screen is (480,640) y-x point. Graphics are not intrinsic part of programming language. They are normally found in graphics library. ANSI-C does not include graphics functions. So that the code produced will only work on DOS based PC using TURBO/BORLAND C. The TURBO-C and BORLAND-C libraries implement a complete library

of more than 50 graphics routines. The development uses some of the graphics function. These are: -a) Simple graphics function, such as line and circle. b) High level calls, such as bar3d. c) Several fill styles. d) Several font that may be magnified, justified and oriented. A graphics display is interfaced to the PC-system using a video driver card. The resolution and the number of displayable colors depend on the type of graphics driver and display being used. A program (initgraph() function in TURBO-C) can automatically detect the graphics driver and load the required file that contains the information on how the program interfaced to the driver. Typical graphics driver and driver file are listed in Table 1.

Table 1: Graphics drivers used in the development using C programming

Graphics driver	Resolution	Color	Driver file
CGA	320*200(CGAC0)	4	CGA.BGI
	320*200(CGAC1)	4	
	320*200(CGAC3)	4	
	640*200(CGAH1)	2	
EGA	640*200(EGAL0)	16	EGAVGA.BGI
	640*350(EGAH1)	16	
VGA	640*200(VGA0)	16	EGAVGA.BGI
	640*350(VGAME D)	16	
	640*480(VGA1)	16	
SVGA	800*600	256	SVGA256.BGI
	1024*768	16	SVGA16.BGI

A program uses the graphics file when the program runs. This allows a single program to be used with the several different types of graphics displays Driver

files are identified with a .BGI file name extension. It is an advisable to copy standard graphics a Driver onto a disk or into the current working directory.

Pseudo-algorithmic approach for displaying railways route map between selected source and destination station (using Disjatra Shortest path algorithm [6]):

Step 1:

Create a structure for storing stations' information.
 In this mapping there is five zones-c=central, e=east, w=west, n=north, s=south.
 There are fifty one stations in this mapping and store their data.
 Create an array-city[].

```
struct coordinate
{
    char stn[15], zone, jn; /*stn=Station Name,
zone=zonal character, jn=zone char. to which it is
connected*/
    int ro, co, cons; /*co and ro are for x and y co-
ordinate point of the station, cno=no. of connection a
station has */
}
```

Step 2:

Create a structure for storing connection data.
 A station can have maximum five connections i.e. a station can be connected maximum to five other stations.
 Store index no's of connections of a station.
 Create an array-no[].
 struct connect

```
{
```

```
int stnno[5];
}
```

Step 3:

Pick the zone name of source station from array
 Pick the zone of destination station from array

Step 4:

```
IF source station index no. = destination station index
no THEN
    Display the source station at its co-ordinate.
END IF
IF source & destination is in same zone THEN
call zone() to draw connections between source and
destination station index.
ELSE
    SWITCH source-zone
        CASE central-zone
            source-station-index=0
            destination-station-index=7
        CASE north-zone
            source-station-index=8
            destination-station-index=17
        CASE south-zone
            source-station-index=18
            destination-station-index=27
        CASE west-zone
            source-station-index=28
            destination-station-index=38
        CASE east-zone
            source-station-index=39
            destination-station-index=50
    END SWITCH
```

IF user want to see route map east to west & north to south,viceversa THEN

 call check_jun() to find nearest junction in the central zone for source station in same zone which is connected with destination's zone.

 call zone() to draw connections between source and junction station index.

 call cont() to find the station of destination zone which is connected to the source station and return its index number.

 call zone() to draw connections between junction station and connected station index.

 call check_jun() to find nearest junction between destination zone and the junction in central zone.

 call zone() to draw connections between destination zone and junction station index.

END IF

 call check_jun() to find destination zone for destination station which is connected with destination's zone.

 call cont() to find the station of destination zone which is connected to the source station and return its index number.

 call zone() to draw connections between source and junction station index.

 call zone() to draw connections between junction station and connected station index.

 END IF

Display the source and destination station Names.

Step 5:

Function cont (junction-station-index) is used to return destination zone which is connected to the source station and return its index number

Do continue for the no. of connections the junction station has

SWITCH source-zone

 CASE central-zone

 source-station-index=0

 destination-station-index=7

 CASE north-zone

 source-station-index=8

 destination-station-index=17

 CASE south-zone

 source-station-index=18

 destination-station-index=27

 CASE west-zone

 source-station-index=28

 destination-station-index=38

 CASE east-zone

 source-station-index=39

 destination-station-index=50

END SWITCH

CHECK whether connected station is within one zone or not.

IF present within one zone THEN

 return station-index no for destination

END IF

END DO

END FUNCTION

Step 6:

Function check_jun(destination-zone,source-station-index,destination-station-index) is used to find nearest junction of source station which is connected with destination's zone.

```
FOR j=source-station-index to destination-station-index
IF destination-zone=city[j].zone char. to which it is connected THEN
    return station-index-no
END IF
END FOR
END FUNCTION
```

Step 7:

Function zone(source-station-index, destination-station-index) is used to display the connectivity of source and destination station.

```
IF source-station-index<destination-station-index THEN
    FOR i=source-station-index to destination-station-index
        Display station-name at its co-ordinate point
        Do continue for the no. of connections the junction station has
        Display next station-name
        Draw line between current-station-index to next station-index
    END DO
END FOR
END IF
IF source-station-index>destination-station-index
```

```
FOR i=source-station-index to destination-station-index
    Display station-name at its co-ordinate point
    Do continue for the no. of connections the junction station has
    Display next station-name
    Draw line between current-station-index to next station-index
END DO
END FOR
END IF
END FUNCTION
```

The shortest path between the start and end nodes is evaluated using Dijkstra algorithm and its relaxation method which simple does Breadth First Search(BFS) from start node to end node, and stop the search when it encounters the first occurrence of the end node.

Screenshots as output:

First output to show zone wise routes and route map in Figure 2

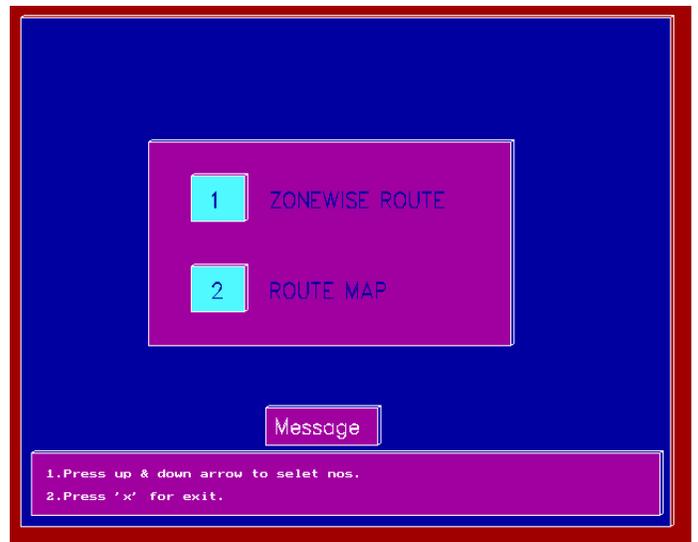


Figure 2: Zone wise route and route map of Indian railways

Second Screen of zone wise route map (Western route map) in Figure 3

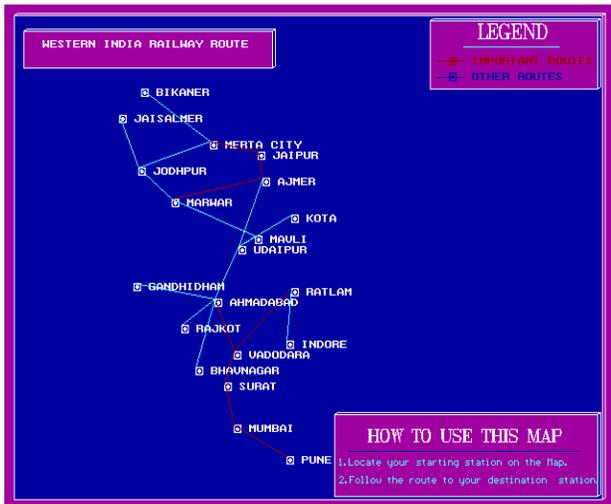


Figure 3: Western route map

Menu screen for route maps of all zones in Figure 4



Figure 4: Menu for the route maps of all zones

Route map of a source station and a destination station in Figure 5

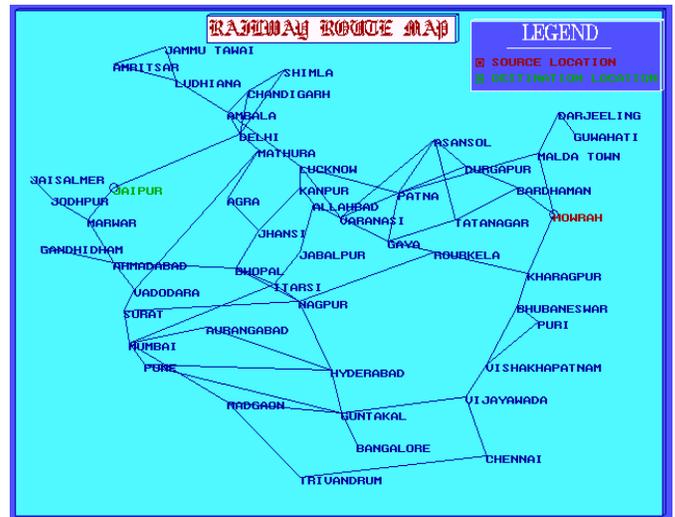


Figure 5: Route map of a source station (JAIPUR) and a destination station (HOWRAH)

Limitations

There is no provision made for authorized log in with valid password protection. So anyone can access the system. This system can run only on CUI platform of Windows XP and it's any version. If any user uses LINUX or UNIX or any other operating system they will not be able to run this system. This system can be executed in LAN environment through server and in this case the current location from where the program is called must contain all the .bgi files provided with the program. It will not work in Internet environment and since it is not a database oriented work i.e. there is no scope to store data in any database software in backend environment, it does not require any DBMS software and it does not provide any backup facility. It works with the predefined stations data mentioned in the program statically. That is, dynamically new station data cannot be inserted or old station data cannot be modified or deleted. In this case the entire program will be updated according to the needs of new requirement. It does not work in Internet browser, i.e. through Internet it can be accessed. It does not include any financial aspect regarding the travel cost or freight cost because it does not consider the distance among the stations and any information

related with fare of passenger or goods, etc. Mouse facility could make the program more users friendly. The sketch of Railway route map if divided same as the actual Indian Railway then it make the project more sophisticated.

Conclusion

In this project the important routes and main stations are displayed. Displaying the distances between two stations could make this project work more helpful. It is more and more time taken task to acquire the appropriate distance between two stations. There are no such books and sites which can provide a list of distance between the two given stations in rail route. Individual searching is required which it is not time efficient feature. The idea of shortest path route could make this project ideal.

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