Modeling of intelligent shortest distance route navigation system for tourist places with the aid of GPS & GIS

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ABSTRACT

The accelerating interaction between technology and tourism has changed radically the efficiency and effectiveness of tourist guidance systems. This paper presents mobile e-tourism solutions for tourists with android smart phone. Authors propose an intelligent shortest distance route navigation system with the aid of integration of GPS with GIS. It uses object oriented programming to construct the navigation system. The system considers GPS data in real time and calculates the distance based on the latitude and longitude of the places already defined in the program and displays the places in the order of their distance from the current location. The user can decide the place of visit in the order based upon their distance.

Keywords

Intelligent systems, GPS, GIS, Dijkstra's algorithm, Android, Object Oriented Program.

1. INTRODUCTION

Navigation systems have gained significant popularity as they display a user's location and guide them to a destination using graphics, text and voice information. The advanced information and communication technologies provide tourists with numerous possibilities for searching information and planning their activities. The smart phones with global mobile data traffic is growing rapidly to an share of more than 50.3 % of the internet traffic[7], which was 13% in 2012[1].There are a lot of services and applications that allow simplification of the tourist information search, provide information about tourist attractions, user feedback etc.

Tourism mobile applications is classified into various categories such as mobile travel [3],online booking, information resource, location based services and trip journals. Intelligent tourist guide combines information resource and location based services. Authors propose intelligent shortest distance route navigation system that displays the tourist place in the order of distance from the current location of the user. The system provides the pictorial view and detail of the tourist spots and focuses on rural and ecotourism where people are hardly found to guide the tourists.

2. RELATED WORK

Vehicle navigation systems using global positioning system (GPS) technologies are rapidly becoming common place in automobiles. These vehicle navigation systems were costly options previously, but a new class of GPS, portable navigation devices is poised to make such features more affordable. Owing to the devices' similar size and hardware, portable navigation devices can be adapted from pocket PCs or PDAs. They can be transformed into navigation devices when connected to a GPS receiver. It involves multilevel cognitive processing and thus has attracted much theoretical and practical interest from researchers in many fields.C.J.Huang and Y.H.Lin proposed a computing approach with stored database for finding the approximate shortest distance route intelligent system for travelling in Taiwan. The system provides the user with the opportunity to compare the routes with the approximate shortest distance and to decide their journey[2]. Z.Yang et.al designed a navigation system with Dynamic route guidance and 3D map display developed using MapX,Multigen Vega and Visual C++. Dynamic optimal path algorithm was implemented using Dijkstra's algorithm [4].
J.M.Aljaam et.al proposed system to determine Location paths in Doha city with the features that allowed to find quickly a specific location. Intelligent paths like :avoid passing through roads with high accidents rate, heavy traffic during a specific timing, temporary closed roads etc. for specific location. A connected Graph Modeling of the city is as shown in figure 1, Dijkstra's algorithm is used to find the shortest path between the regions [5].

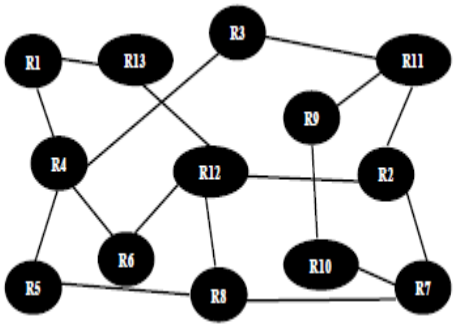

Figure 1. A connected Graph Modeling Doha City.

Aloquili et al. (2009) developed an automatic vehicle location tracking system based on GIS environment. The system was developed based on integration of three technologies GPS, GIS and GPRS. The tracking system used to pinpoint the position, ground speed and fuel level of a given vehicle. The system has the ability to detect the optimal path between source and destination, based on travel time, jam, topography and number of traffic lights. The authors applied greedy techniques. This proposed software has the ability to visualize the real position on maps and to take decisions according to real time information[8]. Zhong et al. (2010) demonstrated Mobile GIS is an outcome of integrating GIS, wireless communication, Embedded and mobile computing technologies. Services in the system include downloading the map by GPRS, defining geographical coordinate system of maps, GPS connection and information dynamically showing on the map, sharing users' GPS information through SMS, vector feature map and related property data editing and shortest route planning. The system was implemented and used in field data collection and simple navigation [10].Chu et al. (2012) designed a mGuiding system it is an Android application that can perform several tasks related to guiding tourists. The application was redesigned based on the tourists' preferences. The new features of the application include: (i) a Geopark map that is attractive and easy to read; (ii) augmented reality (AR) with camera and global positioning system (GPS) functions; (iii) user-friendly guiding interface of scenary spots. The application integrates tracking and location functions using GPS coordinates, multi-media guiding (descriptions of scenery spots, videos, photographs and audio presentations), suggested tour selection and searching using AR. The result infers that it offers a user friendly interface that the tourists can use on their own smart phone for a complete tour [9].Huang et al. (2007) proposed a shortest path algorithm with novel heuristics for dynamic transportation networks. The algorithm determines the shortest cost path between a moving object and its destination by continually adapting to the dynamic traffic conditions, while making use of the previous search results. Experimental results evidence that the proposed algorithm performs significantly better than the well-known A* algorithm[12].Nie et al. (2009) proposed a tourist route planning and navigation system (called TRPNS) which helps tourist to arrange travel route and navigate tourist through the chosen travel route. They have designed and implemented the TRPNS based on Location Based Services (LBS). With the help of LBS, the portable device such as PDAs and mobile phones are aware of its location and can query the back-end system for the updated information about the local sites of interest in anytime and anywhere. The result infers that the system will help user to navigate through the designated travel route efficiently[11].Literature survey reveals that Navigation system exists in many countries, especially for urban areas with varying features. The proposed research work aims at modelling navigation system for rural and ecotourism spots at Coorg district in Karnataka.

3. The intelligent shortest distance route navigation system implementation and snap shots

The system employs object oriented programming with android platform to implement the navigation system. The system considers GPS data in real time and calculates the distance based on the latitude and longitude of the places defined in the program and displays the places in the order of their distance from the current location. The user can decide the place of visit in the order based upon their distance.

3.1 The operational procedure steps:

When the application is launched, the screen with main tourist region will open as shown in figure 2. The application gets the current location latitude and longitude using either network provider or GPS provider services. Using this latitude and longitude, the application calculates the distance between the current location and all the sub places. This method is based on the web service call. So, in order to find the distance internet connection is must in the device. Then these distances are sorted in the incremental order from the current location as shown in figure 3. On selection of desired place to visit, the details dialog will open as in figure 4 and on activating the tab navigation screen will be displayed as in fig. 5.

3.2 Algorithm:

Step 1 : Initiate the application process
Step 2: Check whether the GPS is enabled, if not enabled go to Step 4
Step 3:Read the location details (latitude and longitude) and go to Step 5
Step 4:Check whether the mobile network is enabled, if enabled go to step 3 **else** return null and go to Step10
Step 5: Select the destination from the main screen
Step 6: Find the distance between the current location and all the sub places
Step 7:Sort all these distances and display in the incremental order
Step 8: When the sub place is selected open the dialog box with place information and the image
Step 9:On clicking start navigation, open the map screen and start navigator along with voice guidance
Step 10: Open the dialog box to enable GPS and Internet when not enabled.

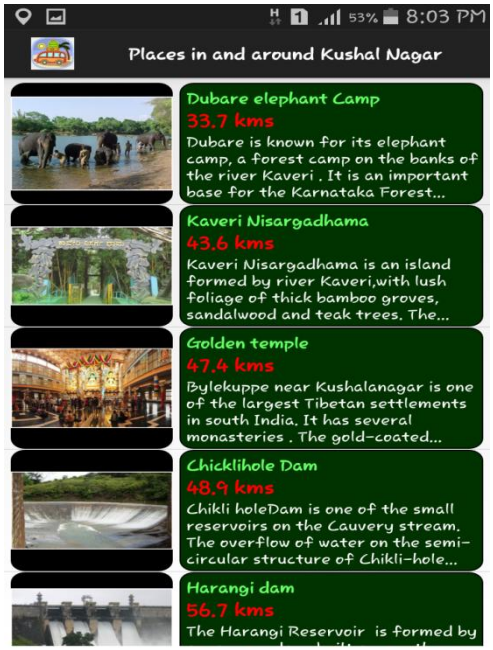

Fig 3: List of sub places in the order of distance

3.3 Screen Shots

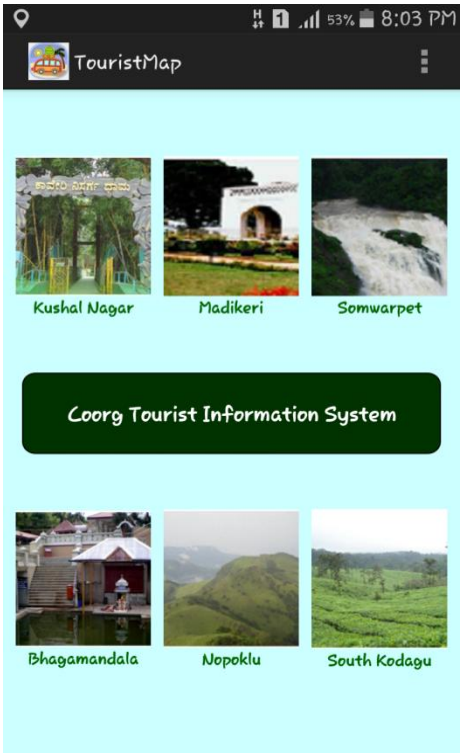

Fig 2: Important tourist regions

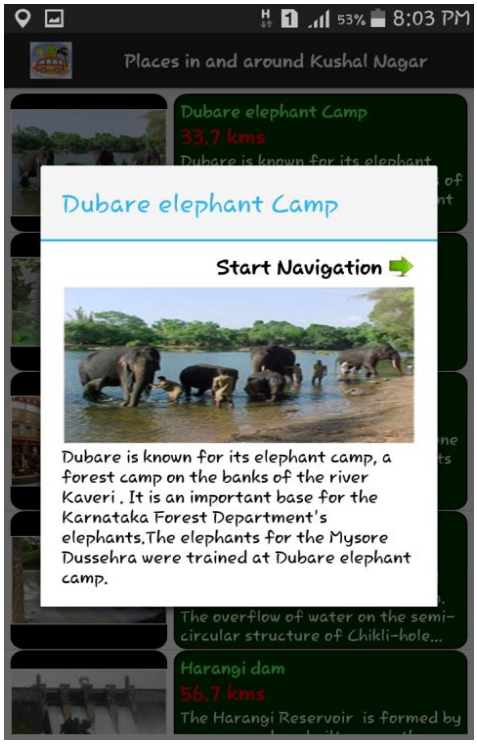

Fig 4: Individual place description

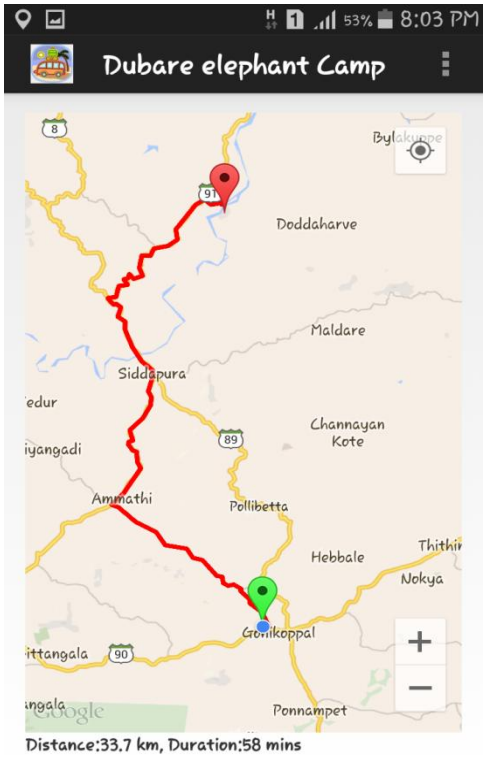

Fig 5: Route navigation

4. CONCLUSION

Eco-tourism has given Coorg a new name in the world of tourism. The plantations cover most of the area where hardly people are found to guide the tourists. Hence the Tourist information and Navigation systems are very much essential .

Most of the shortest path finding system used Dijktra's algorithm wherein our proposed system uses source and destination latitude and longitude to find the distance which is faster and simple to implement using object oriented programming concept. This proposal can significantly assist the tourists and also promote tourism to a great extent.

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REFERENCES

[1] S.Wagner ,T.Franke-Opitz, C.Schwartze, F.Bach, "Mobile Travel App Guide":Edition 2013, Pixell online Marketing GMBH, 2013,Web: http://www. Itb- berlin. de/ media /itb /itb_pdf/publikationen/ MTAG_2013.pdf.

[2] Chin-Jung Huang and Ying-Hong Lin, "The Approximate Shortest Distance Route Intelligent System For travelling in Taiwan" [C]IEEE, international conference on Innovative Computing, Information and Control,2006.

[3] S. Karanasios, .Burgess,C.Sellitto, "A classification of Mobile Tourism Applications", Chapter in book:Global Hospitality and Tourism Management Technologies, USA:IGIBGlobal,2012.

[4] Zhaosheng Yang , Lin Zhang, Jian Wang, QinGuan, Jinqiao Feng, "Design of intelligent In –vehicle Navigation Systems for Dynamic Route Guidance with Real –time Information" [J]IEEE,vol.06,2006.

[5] Jihad M.Alja'am,Shagra AliHassan,LulwaBurshaid, Arwa Ali, Suad Kaseem, "Toward An Intelligent Informative System to Determine Locations Paths in Doha City"QFIRST 2007.

[6] Jan Vrabec,Gregor ROZInaj,Renata Talafova,"IQ Kiosk in Metropolitan information system",ELMAR 2008.`

[7] http://exposureninja.com/cashing-in-on-the-unstoppable-mobile-traffic-trend/

[8] Aloquili, O., Elbanna, A. and Al-Azizi, Automatic vehicle location tracing system based on GIS environment. IET Software, v. 3(4), pp. 255-263,2009.

[9] Chu, T.-H. Lin , M.-L. and Chang, C.-H.mGuiding (Mobile Guiding) – using a Mobile GIS application for Guiding. Scandinavian Journal of Hospitality and Tourism, v. 12(3), pp. 269–283, 2012.

[10] Zhong, H., Wu, J., Li, P., Zhenhua, L.V., Yingjie, H. U. and Bailang, Y. U.Mobile and Wireless GIS based upon independent development. International Conference on Electrical and Control Engineering. pp. 2844-2847, 2010.

[11] Nie, Y. -F., Fu , X. and Zeng, J.-X. A tourist route planning and navigation system based on LBS. Proceedings of the International Symposium on Web Information Systems and Applications (WISA'09), pp. 288-290,2009.

[12] Huang, B., Wu, Q. and Zhan, F. B. A shortest path algorithm with novel heuristics for dynamic transportation networks. International Journal of Geographical Information Science, v. 21(6), pp. 625–644, 2007 .