

Development of a Bus Information Web System

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Abstract : Bus service is often either main or the only public transportation available in cities. In metropolitan areas, both subways and buses are available whereas in the medium sized cities buses are usually the only type of public transportation available. Bus Information Systems (BIS) provide current locations of running buses, efficient routes to travel from one place to another, points of interests around a given bus stop, a series of bus stops consisting of a given bus route, and so on to users. Thanks to BIS, people do not have to waste time at a bus stop waiting for a bus because BIS provides exact information on bus arrival times at a given bus stop. Therefore, BIS does a lot to promote the use of buses contributing to pollution reduction and saving natural resources. BIS implementation costs a huge amount of budget as it requires a lot of special equipment such as road side equipment, automatic vehicle identification and location systems, trunked radio systems, and so on. Consequently, medium and small sized cities with a low budget cannot afford to install BIS even though people in these cities need BIS service more desperately than people in metropolitan areas. It is possible to provide BIS service at virtually no cost under the assumption that everybody carries a smartphone and there is at least one person with a smartphone in a running bus who is willing to reveal his/her location details while he/she is sitting in a bus. This assumption is usually true in the real world. The smartphone penetration rate is greater than 100% in the developed countries and there is no reason for a bus driver to refuse to reveal his/her location details while driving. We have developed a mobile app that periodically reads values of sensors including GPS and sends GPS data to the server when the bus stops or when the elapsed time from the last send attempt is greater than a threshold. This app detects the bus stop state by investigating the sensor values. The server that receives GPS data from this app has also been developed. Under the assumption that the current locations of all running buses collected by the mobile app are recorded in a database, we have also developed a web site that provides all kinds of information that most BISs provide to users through the Internet. The development environment is: OS: Windows 7 64bit, IDE: Eclipse Luna 4.4.1, Spring IDE 3.7.0, Database: MySQL 5.1.7, Web Server: Apache Tomcat 7.0, Programming Language: Java 1.7.0_79. Given a start and a destination bus stop, it finds a shortest path from the start to the destination using the Dijkstra algorithm. Then, it finds a convenient route considering number of transits. For the user interface, we use the Google map. Template classes that are used by the Controller, DAO, Service and Utils classes include BUS, BusStop, BusListInfo, BusStopOrder, RouteResult, WalkingDist, Location, and so on. We are now integrating the mobile app system and the web app system.

Keywords : bus information system, GPS, mobile app, web site

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