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A location-based services and Google maps-based information master system for tour guiding☆

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ABSTRACT

This paper aims to develop a location-based services supported Dr.What-Info system, i.e. a master multi-agent system on what the information is, using Google maps and an image recognition technology as a tourism information provider and as a route planner for tourists. Users can have great fun during vacation travels through an easy-to-use interface, integrating smartphone GPS function, a QR/Bar code reader and easy access to a cloud database, to find all of the required web services. In particular, given an archeological site in New Taipei City, Taiwan, for testing purposes, the presented system is demonstrated not only as a provider of information on popular tourist attractions, but also as a high performance GPS navigation device to guide users toward their desired destinations. The complete system developments, displays, and corresponding experiments and comparisons show that the research results demonstrate performance superiority over a number of previous studies.

1. Introduction

The Taiwan Network Information Center (TWNIC), Taiwan, began to conduct an annual survey on the number of Internet users in Taiwan in the year 2002. Fig. 1 presents the numbers of various Internet users between the year 2006 and the year 2015. It is clearly seen that there is a high and steady growth of mobile users, including Wi-Fi LAN and Mobile Net, in Taiwan as a consequence of web service promotions and high quality network infrastructure. More importantly, up to half of Taiwan's population are mobile network users. Hence, it becomes an issue of immediate concern to provide users with a wide variety of mobile web services in a highly efficient and reliable manner, as stated in [1].

A statistical data analysis made by Taiwan Tourism Bureau (TTB) indicates that the number of visitors to Taiwan grew rapidly from 3.4 million in 2005 to 9.9 million in 2014, as illustrated in Fig. 2. Furthermore, as many as 72.6% of the visitors, i.e. 7.2 million, arrived for tourism, as shown in Fig. 3. In recent times, there has been a sharp rise in the demand for tourism information as a consequence of the policy for Chinese backpackers admitted to Taiwan. Accordingly, there is definitely a need to develop alternatives to conventional mobile tour guiding systems, such that an easy-to-use interface on mobile devices is developed which can take input data by a smart phone camera and a QR/Bar code reader; users can then have easy access to tour information of interest in a direct manner. As tabulated in Table 1, a survey conducted by the Neilsen Company at http://www.nielsen.com, points out that a high percentage of mobile shoppers take pictures of QR or bar codes when shopping online. This motivates the development of an easy-to-use tour guide system, referred to in [2].

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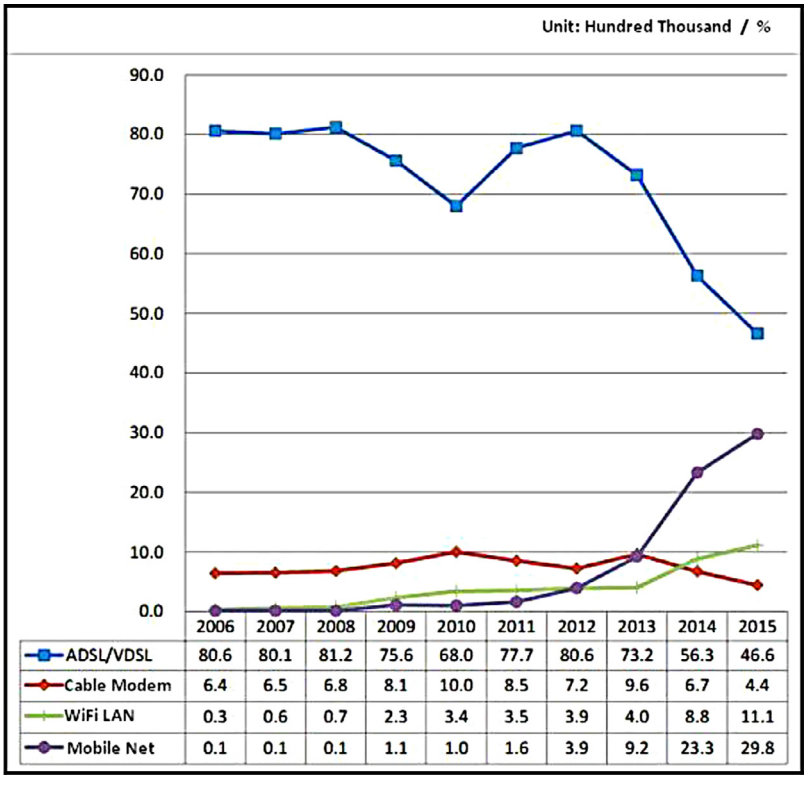

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ADSL/VDSL	80.6	80.1	81.2	75.6	68.0	77.7	80.6	73.2	56.3	46.6
Cable Modem	6.4	6.5	6.8	8.1	10.0	8.5	7.2	9.6	6.7	4.4
WiFi LAN	0.3	0.6	0.7	2.3	3.4	3.5	3.9	4.0	8.8	11.1
Mobile Net	0.1	0.1	0.1	1.1	1.0	1.6	3.9	9.2	23.3	29.8

Fig. 1. Statistical data on Internet users in Taiwan (TWNIC, Aug. 2015).

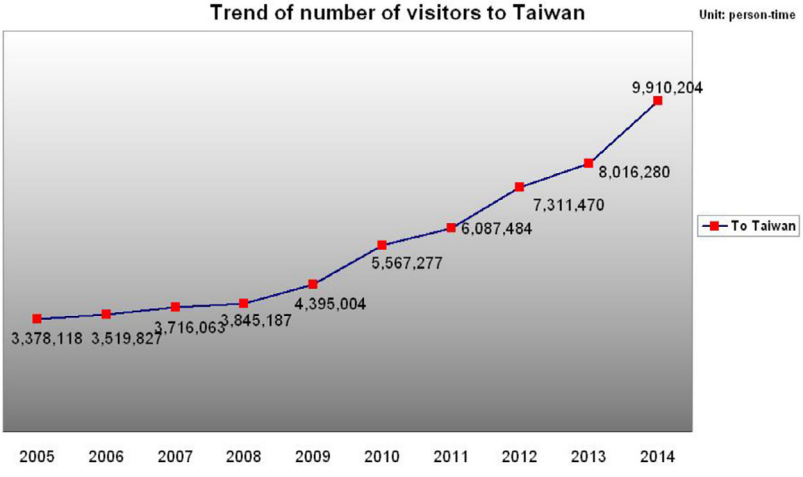

Fig. 2. Total visitors to Taiwan between 2005 and 2014 (TTB, Aug. 2015).

Google maps were firstly announced on Google Blog on Feb. 8, 2005, and the map coverage was extended from the USA, UK and Canada to the entire world on June 20th of the same year. Google Maps, previously referred to as Google Local, is a global online map service, which includes landmarks, path lines, area shapes, vector maps, satellite maps, topographic maps, etc. There have been a great number of Google map-based studies. For instance, an online map application using Google Maps APIs, SQL database and ASP.NET was created by Hu and Dai [3]; a travel guide teaching platform was developed using Google Street View by Kung [4]; an online location-based service was developed using Google Maps for Android mobile by Ibrahim and Mohsen [5]. There is no doubt that the integration of Google Maps into mobile devices will be a mainstream trend in the very near future, and it is the major reason behind this research as well. LBS refers to web service providing integrated services available nearby. Personalized LBS, once integrated with mobile devices, particularly smartphones, is gaining more attention than ever before. Optimized LBS is made accessible so as to meet users' need by integrating GPS navigation, mobile communication techniques, and more. An easy-to-use interface, developed herein, enables tourists to access desirable LBS, as mentioned in [6].

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