Location Based Information Delivery in Tourism

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Abstract
Context in Mobile tourist information systems is captured as the current location of the user. Traveling to a country every one has a number of locations where they want to travel. Therefore a traveling plan is necessary to select nearby point of interests like accommodation places, tourist places, transportation facilities, medical facilities.

In this paper a Location based information delivery system is designed. The influence of such a richer context model on the user interaction for both the capturing of context and context-aware user/device interaction is discussed. The basics of context in this work are location, time of day, personal preferences and device type describing how these basics are leveraged to become habituated web-based information that is delivered to mobile tourists.

Keywords: Context Awareness, Mobile Information System, Delhi Tourism, User Interface Design.

Introduction
Mobile phone and the Internet have revolutionized the communication and with it the life style of people. An ever-increasing number of mobile phone and Personal Digital Assistants (PDA) allow people to access the Internet where ever they are and when ever the want. From the Internet they can obtain on one hand information on events (cinema, concerts, and parties) and on the other hand information on places (city maps, restaurants, museums, hospitals).

Context-awareness is very critical for mobile users. These users have at their disposal devices that are not very advantageous to interactivity (e.g., small screens, space constrained keyboards). Context-awareness can help to improve user interaction by knowing a priori the user’s situation, personal preferences, information interests, and environment conditions, so that the user doesn’t have to specify these constraints, and information delivery is automatically adapted to his state of affairs.

Tourism Context Challenges
We consider three facets of context: (1) the concepts of context pertinent to a mobile tourist application; (2) the issues one faces when managing context data; and (3) the usage of the context data. We will discuss how each of these challenges affects the interface and interaction design.

Concepts of Context
For a mobile information system, several aspects of context can be considered, such as the characteristics of the particular mobile device (storage and screen size) and network (bandwidth and peers), context of the application (requirements in storage download and display capability), context of the user of the system (e.g., time, location, and interests), context of information objects (e.g., location).

Context Management
For the management of context we distinguish four tasks:
Modelling: A mobile information system needs an open hierarchical approach to context modeling, that is, context should be explicitly modeled on several levels to support further change. Here we consider only the application aspect in detail.

Observation: The application context is assumed to be relatively static. New services might be on offer depending on the location of the user. For these, an infrastructure must be provided to dynamically integrate or release services. Most general object contexts can be pre-captured. The observation of the user context and the evaluation of the current context of the objects are more demanding.

Storage: Data about the user context may have to be available on the mobile device as well as on the server. The data needs to be stored and distributed in an efficient way.

Access: For access to (context) data, the same issues arise as for storage: efficiency and privacy. Context-awareness can be used to reduce the amount of data to be accessed and distributed by pre-selecting the pertinent data.

Usage of context
Usage and benefit of context information depends on the quality that the system designer aims for:
Effectiveness: Effectiveness in the system design of a mobile information system means that the pertinent (i.e., right) information is delivered to the user in a way that they are satisfied with the service.

Efficiency: The system's interaction with the user should not be impaired by data storage and exchange. This affects the implementation of the context-dependent selection of the communication model, communication partners, and local storage on the mobile system as well as context-aware pre-caching strategies and display options.
Related Work
With the evolution of Internet technologies web-based tools for tour planning can now be easily made available, implemented and become a valuable resource for the traveling community and tourists. Ando and Mimura et al. [13] developed a travel time information system for the road users and by using the historical data of Toyota City and analyzed the effects of the factors such as what day of the week, what time period of the day, weather. Berger et al. [6] described an e-Tourism environment based on a community-driven approach to foster a lively society of travellers who exchange travel experiences, and recommend tourism destinations. Chiu et al. [4] proposed a Collaborative Travel Agent System (CTAS) based on a scalable, flexible, and intelligent Multi-Agent Information System (MAIS) architecture for proactive aids to Internet and mobile users to provide tourist information and services such as airlines, hotels, tour operators effectively during trips or even in the planning stage.


Schernthanner and Asche [7] provided a basis for discussion of a generic approach to housing market analysis based on free open source geo-information systems. Park et al. [3] developed a smart context-aware self guided tour assistant as a context aware real world application. Loh et al. [15] presented a recommender system that helps travel agents in discovering options for customers, especially those who do not know where to go and what to do. Kumar et al. [12] presented a GIS-based Advanced Traveler Information System (ATIS) for Hyderabad City, India.

O’Grady and O’Hare [9] presented a vision of how an electronic context-aware tourist guide might operate. Dunstall et al. [14] described a prototype travel recommender system called the Electronic Travel Planner (ETP), which prepares travel itineraries for tourists. G.M.P. O’Hare, and M.J. O’Grady [5] introduced the design of Gulliver’s Genie a context-aware tourist guide that assists roaming tourists.

Raento et al. [10] developed ContextPhone, using an iterative, human-centered design strategy. Nie et al. [16] designed and implemented the tourist route planning and navigation system (TRPNS) based on Location Based Services (LBS).


Proposed System Architecture
The System architecture that supports a tourist information service is shown in Figure 1. This architecture is Web service-based and the major elements include:

- A thin client device that hosts a Web browser.
- A web application server that delivers web content customized to the user’s context.
- A UDDI (Universal Description, Discovery and Integration) services directory that provides users with a centralized registry of tourist information services (e.g., a restaurant finder service).

A context manager that keeps track of the user’s dynamic context e.g., location, wireless device features) as well as the user’s preferences.

A collection of web services that deliver tourist content (e.g., landmark information, restaurant locations, etc). Each Web service has a WSDL (Web Services Description Language) document in XML format that describes the Web service’s interface and gives a concrete binding to a network address.

When a new user registers himself in the system, he logs on to the application server and enters his preferences (e.g., restaurant and accommodation preferences). These preferences are then forwarded for storage to the context manager. If the client device possesses a GPS receiver then the client sends location updates to the context manager at regular intervals. If the user doesn’t have a GPS receiver then at the point of the information inquiry he enters his location manually in the form of a city name or zip code.

In our implementation we used Microsoft’s .NET Framework, a native XML Web services platform. Microsoft .NET includes ASP.NET, a framework for creating application servers that support dynamic web pages, standard Web service technologies like SOAP and WSDL, as well as a multi-language development environment (including C#). One of our Web services was implemented in C#.

![Fig.1 Architecture of Mobile Web-based System](image)

Modelling the User
A great challenge in delivering well-targeted information to the user is to make a high-loyalty profile of the user’s interests and preference. However, users switch roles and conditions swiftly-varying mode of transport, role and interest. For example, a traveler may meet up with a friend in a city, and unpredictably have access to a car and an addition set of interests and constraints. On the other hand, one more user may be primarily visiting a city for business purpose, but a Saturday evening free for leisure normally they would inquire
about a club, but due to their work commitment the next day, they pursue a less exhausting alternative. Thus one of the great questions is how to capture changes in the user’s job, such as business context or personal context.

**Mobile User Interface**

The mobile user interface design makes the user's interaction as simple and efficient, in terms of accomplishing user goals.

For the developed system, it has been designed using Microsoft Visual Web Developer 2008 for presenting and viewing the tourism data on the Web. Figure 2 and Figure 3 present screen shoots of user interface which allows the users to select and input the query criteria in order to view the tourism data they want.

![Fig. 2 User Interface Screen-1](image1)

![Fig. 3 User Interface Screen-2](image2)

**Personal Adaptation**

An important aspect of context-awareness is the system’s ability to deliver information that is personalized, i.e., custom-made to user’s specific needs. The personalization aspect includes system awareness of the user’s information interests and service preferences. A tailored list of restaurants that meets the user preferences is generated as shown in figure. Upon receiving the list of restaurants from the web services, the application server can modify directly this list only restaurants that meet user pre-specified preferences. Initially, the list of restaurant is modified to include preference levels as indicated in user profiles and distance from the user’s current location. The result of this step is a modified list with Restaurant elements that include preference level and distance sub-elements.

```
<Restaurant>
  <Name>Ramji Bhai Restaurant</Name>
  <Street>7404 Shivaji Park</Street>
  <City>New Delhi</City>
  <State>NCT of Delhi</State>
  <Country>India</Country>
  <PINCode>110032</PINCode>
  <Phone>(011)22110889</Phone>
  <Cuisine>South Indian</Cuisine>
  <PriceHigh>70</PriceHigh>
  <PriceLow>40</PriceLow>
  <Latitude>00.0000</Latitude>
  <Longitude>00.0000</Longitude>
  <OpenTiming>08.00</OpenTiming>
  <CloseTiming>11.00</CloseTiming>
  <Distance>1.786</Distance>
  <PrefenceLevel>2</PrefenceLevel>
</Restaurant>
```

**Advantages of System**

One of the main advantages of Internet is its ability to provide almost unlimited access to information to anybody and anywhere, who has technical possibilities to connect with the Web. The developed system will provide the tourists to answer the fundamental questions such as near-by facilities, finding route, searching tourist places of interest etc. Using this kind of system increases convenience and efficiency in tourism activities by providing location information in order to save money, manpower and time.

**Conclusion**

In this paper, System deliberate to provide tourism information for tourists visiting to Delhi has been developed. The development of System has followed all essential and mandatory steps from capturing data to publishing on the web. The data is stored in a data base and contain historical, cultural, geographical, administrative and hospitality related information in order to be accessed by the tourists through mobile Internet to improve the convenience, wellbeing and efficacy of their travel.
References


