

Online Trip Planners for the Tourism Industry

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Abstract

Tourism is one of the first industries to capitalize on internet technology. In fact, more than 70% of the search engine traffic is used for travel-related activities. Travelers usually access tourism systems on the internet to book their hotel, rent a car, buy an air ticket or plan their trip. This article reviews the existing online trip planners, which are a tool on the internet that helps travelers plan their trips by providing information about “Where to go?”, “What to do?”, “When to go?” and “How to get there?”. A common framework for these online trip planners has been analyzed and summarized. The existing online trip planners have been categorized into well-defined classes by their distinctive operations. The article also discusses the possibility of creating an effective online trip planner which combines the advantages of the existing online trip planners.

Keywords: online trip planner; tourism; travel

บทคัดย่อ

การท่องเที่ยวถือเป็นหนึ่งในอุตสาหกรรมแรกๆ ที่ใช้ประโยชน์จากเทคโนโลยีอินเทอร์เน็ต ในความเป็นจริง มากกว่าร้อยละ 70 ของการใช้งานระบบสืบค้นบนอินเทอร์เน็ต จะใช้เพื่อค้นหาข้อมูลที่เกี่ยวข้องกับการท่องเที่ยว โดยนักท่องเที่ยวจะใช้อินเทอร์เน็ตในการจองที่พัก เช่ารถ เชื้อตัวเครื่องบิน หรือวางแผนการท่องเที่ยว บทความนี้เป็นบทความที่ศึกษา รวบรวม และวิเคราะห์ระบบวางแผนการท่องเที่ยวผ่านอินเทอร์เน็ตที่อยู่ในปัจจุบัน โดยระบบดังกล่าวช่วยให้นักท่องเที่ยวสามารถวางแผนการท่องเที่ยวได้ด้วยตนเอง โดยการจัดหาข้อมูลเกี่ยวกับ สถานที่ กิจกรรม เวลา และการเดินทาง ให้กับนักท่องเที่ยว นอกจากนี้ บทความนี้ยังจัดระบบวางแผนการท่องเที่ยวให้เป็นหมวดหมู่ที่เหมาะสม ตามหน้าที่การทำงานที่

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แตกต่างของระบบเหล่านั้น และยังกล่าวถึงความเป็นไปได้ที่จะพัฒนาระบบที่มีประสิทธิภาพมากกว่า โดยการรวมเอาข้อดีของระบบวางแผนการท่องเที่ยวผ่านอินเทอร์เน็ตที่มีในปัจจุบันมาใช้ในการพัฒนาต่อไป

Introduction

Currently, the internet plays an important role in our lives. There are more than 1.3 billion people (20% of the world population) using the internet worldwide (Miniwatts, 2008). The rapid growth of the internet affects almost all businesses and industries, including tourism. Travelers can easily and rapidly access travel information from the internet by themselves. Recently, travel-related activities have utilized more than 70% of the search engine traffic (Comscore, 2005). The online tourism business (e-tourism) is so important that it has its own top-level domain “dot-travel” (e.g., www.company.travel) separated from other “dot-com” domains since 2005 (IANA, 2008). Not only did travelers use the internet for searching for travel information, but they also use it for hotel reservations, booking flights or car rentals through the e-tourism systems. These operations can be performed online by either personal computers or cellular phones via WAP and WML technologies (Zhou, 2004).

Generally, the existing e-tourism systems have been well performed on the reservation tasks; therefore a trip planning approach has recently been a focus of interest for enhancing performance. The development of a trip planning approach is useful in managing and planning a journey, including the cost of trips. Ideally, the trip planning approach should facilitate scheduling a trip based on the traveler’s actual requirements. For example, in planning a 2-day trip to Thailand for Singaporeans, if travelers do not like beach and shopping activities, but they prefer rafting, venture and history, the trip plan should be scheduled as follows.

The first day:

- 7.40 am Depart from Changi airport, Singapore – Arrive at Suvarnabhumi Airport, Bangkok*
- 9.00 am Continue by coach to Kanchanaburi*
- 12.00 am Lunch and visit to the War Museum (Thailand-Burma Railway), War Cemetery and Bridge over the River Kwai*

- 15.00 pm *Take a long-tailed boat from pier to get to hotel, passing by unspoiled mountainous jungle scenery, and check-in.*
- 17.30 pm *Relax in the hotel (Optional activities: Canoeing or Mountain Biking, etc)*
- 19.00 pm *Dinner and overnight*

The second day:

- 7.00 am *Breakfast at hotel*
- 8.00 am *Visit to the nearby ethnic Mon Tribal Village (Optional tour: Elephant Riding through the bamboo forest)*
- 12.00 am *Lunch and check-out*
- 13.00 pm *Take a historic ride on the Death Railway Train, passing lush forest*
- 13.45 pm *Continue by coach to Bangkok*
- 18.00 pm *Arrive at Suvarnabhumi Airport, Bangkok*
- 19.40 pm *Depart from Suvarnabhumi airport - Arrive Singapore at 22.55 pm*

Traditionally, trip planning systems use maps to get routing information (how to get there), travel magazines to survey places of interest (where to go and what to do) and weather forecasts on radio or television to plan when to go. Hence, travel agents, people who work on travel-related activities, are intended to perform the trip planning tasks on behalf of travelers. However, owing to the rapid growth of the internet, online trip planners have recently become an essential factor in the planning of trips. The online trip planner is not only useful in managing the travel and costs of tourism in accordance with the traditional trip planner, but it also helps travelers plan a trip more easily, rapidly and satisfyingly by themselves (Poslad et al., 2001).

Unfortunately, the ideal online trip planner is difficult to be implemented because of some technical difficulties in calculating the optimal program which includes all the places of interests for travelers. The optimal program could be calculated using shortest distance, the minimum time or the minimum costs. Furthermore gathering all the information needed from all sources may not be a trivial thing to do, e.g., information about how much time the travelers need to spend at each place. More details of the ideal trip planner are described in the discussion below.

The focus of this article is on surveying online trip planners. The study of online trip planners is used to analyze the planning process, define their common framework and categorize them into appropriate classes. Additionally, the study will help in discovering the flaws in existing online trip planners. This article first describes a common framework for online trip planners and their systems in the next section. The section on online trip planner classification is to distinguish existing online trip planners into several classes defined by their different operations. The discussion section discusses flaws in existing online trip planners and the possibility of creating an ideal online trip planner. Finally, all the topics relating to online trip planners are summarized in the conclusion.

The Common Framework of Online Trip Planners

Online trip planners have recently become an area in which it is essential to improve performance (Pease et. al. 2007). The major advantage of an online trip planner is to manage the travel and costs of tourism and search for attractive places and good weather. In addition, planners help travelers facilitate their trip planning by themselves. Their main process, called the expert system (Giarratano and Riley, 2004; Tyler, 2007), is to incorporate concepts derived from experts in the field of tourism and uses their knowledge to provide a trip planning analysis for users of the online trip planner. In addition to using an expert's knowledge to plan the trip, almost all trip planners use tourism information contributed by experienced-travelers through their user interfaces (user reviews and opinions) and information from several tourism websites or online-magazines in order to plan trips more efficiently. Figure 1 illustrates the model of a common framework for online trip planners consisting of five major components as follows:

- **Knowledge Acquisition System**

The knowledge acquisition system is to extract knowledge from data or information. The information may be obtained from tourism experts, tourism websites, online tourism magazines or travelers (who give a review of their experiences or state their preferences).

- Knowledge Base

The knowledge base contains all trip-planning knowledge that is acquired from the knowledge acquisition system. The structure of the knowledge base is designed to support a knowledge inference engine which is discussed next.

- Knowledge Inference Engine

The knowledge inference engine is a computer program that tries to derive answers from the knowledge base. The inference engine is the heart of the expert system that is used to rationalize the information in the knowledge base for the ultimate purpose of formulating new conclusions (trip plan).

- Trip Planning Explanation

The explanation system is used to describe the details of the conclusions acquired from the knowledge inference engine. With the dynamic planning capability of the online trip planner, the explanation system adapts several trip plans to provide more definition, elaboration, justification, and summarization. The explanation system also provides more details of the trip plan, such as how to get there, where to go, what to do, when to go, etc.

- User Interface

The user interface of online trip planners is based on web technology. It provides output and accepts input by generating web pages. The output is shown to the user using a web browser program and the input is transmitted via the internet to the expert system through the web server. The web server is responsible for accepting HTTP requests from clients, which are known as web browsers, and serving them HTTP responses along with optional data, which are usually web pages.

Following the explanation of how the common framework is derived, the expert system is the heart of online trip planners; however, the contribution of travelers is an important source for enhancing the performance of online trip planners. The next section discusses in detail the approaches to trip planning and classifies existing online trip planners into appropriate categories.

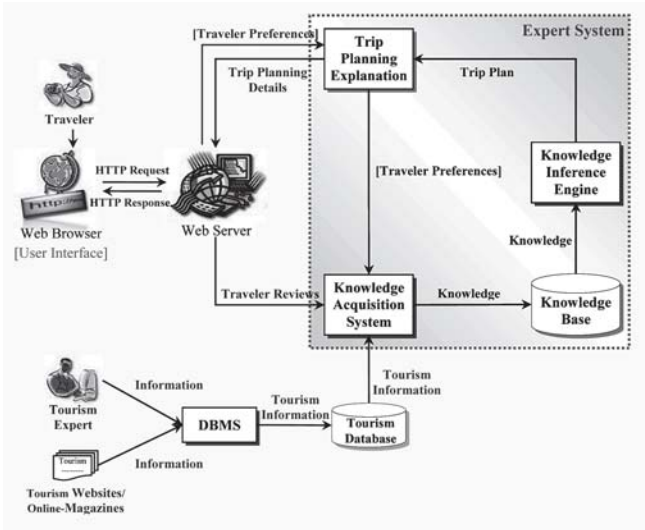


Figure 1: Common Framework of Online Trip Planners Consisting of Five Major Components as follows: (1) Knowledge Acquisition System; (2) Knowledge Base; (3) Knowledge Inference Engine; (4) Trip Planning Explanation; and (5) User Interface.

The Classification of Online Trip Planners

In general, most online trip planners are well-known as automatic journey planning systems; however, other online trip planners aim to develop planning systems based on places and weather. For example, in a planning system based on places, the system contains information about popular attractions, restaurants and hotels with rankings and comments from experienced-travelers, and then applies the information to schedule a trip plan. Hence, this section focuses on distinguishing existing online trip planners according to their different operations as follows:

(1) Journey Planning: Online trip planners, such as Sydney's trip planner (www.131500.info), google.com/transit and Washington D.C.'s trip planner (www.wmata.com), focus on journey planning. Generally, travelers give information about their address, destination and their preferences (such as transportation, accessibility, transportation with bike-racks) to a trip planner

and then the planner will apply the information to calculate a travel route, the travel time and fares. Some planners may also provide point-to-point map and other additional information, such as Wi-Fi services and restaurants along the routes. The routing calculation of these trip planners is based on the user's specified algorithm, such as the fastest route, the fewest transfers, the minimum walking distance and the lowest fares. The key to success of these online trip planners is the accuracy of the route. The accuracy depends on the consistency and the accuracy of the information and the speed and reliability of the routing algorithms. Most of the online trip planners in this category can also answer the question of "How to get there?".

(2) Place Ranking: Online trip planners, such as travel.yahoo.com and tripadvisor.com, are based on the decision support system (DSS) concepts (Turban et al., 2004). They contain information about popular places, e.g., restaurants, accommodation, attractions, festivals, entertainment and shopping centers with rankings and comments from experienced-travelers. Travelers can plan and print their trip to the places recommended. Some of the planners provide photos, videos and maps of the places. In addition, some of them are able to book and compare the prices of accommodation, events and tickets in real-time. The key to the success of these online trip planners is the contribution of experienced-travelers (travel reviewers). For example, tripadvisor.com has more than 10-million travel reviewers; therefore this site attracts nearly 30-million visitors per month who wish to read the travel reviews or give their opinions about accommodation, attractions and restaurants. Most of the online trip planners in this category can also answer questions of "Where to go?" and "What to do?".

(3) Weather Planning: Online weather forecasts, such as weather.com and weatherunderground.com, provide trip planning functionality. These weather-based planners use statistical weather information for specific places and specific periods of time, such as temperature, cloud cover, wind, humidity and visibility, for the scheduling of trips. The key to the success of these weather-based planners is the accuracy of their forecasts. The accuracy depends on the consistency and the accuracy of the statistical data and the speed and reliability of the prediction models. Most of the online trip planners in this category can also answer a question of "When to go?".

(4) Agent-Based Planning: These online trip planners, such as iguide.travel and tourismthailand.org, use tourism experts to plan a trip (called a tour program). Most of these online trip planners can answer all previously discussed questions of “Where to go?”, “What to do?”, “How to get there?” and “When to go?”. In other words, the agent-based planners are a hybrid system that combines all the different operations (i.e., place ranking, journey planning and weather planning) together. All of these questions need to be answered before travelers leave for their destinations. The tour program can fulfill these requirements. It provides local tourism information in terms of the most popular trip for a specific number of days, e.g., a 3-day trip to Bangkok, Thailand. Although these agent-based planners can answer all the questions, travelers are unable to personalize their trip. For example, if a traveler wants to plan a trip to Thailand and is interested in watching wildlife, existing tour programs could not do that. Most of the existing tour programs are arranged by location, not by the interests of the traveler. The key to the success of these online trip planners is the expertise and experience of tourism experts.

This article classifies the online trip planners into categories according to their distinctive operations; however, some online trip planners can perform more than one operation. This review found that the planners which efficiently perform one specific operation attract a lot of people, e.g., the tripadvisor.com has nearly 30-million visitors per month as mentioned above. In the USA, if travelers want to plan their journey, typically they will access the google.com or mapquest.com, while they will access the weather.com or weatherunderground.com, if they want to avoid a weather problem on their trip. On the other hand, a common pattern which can be observed is that almost all online trip planners provide agent-based planning. The analytical results reveal that planning a trip needs to use all the information (i.e., place ranking, journey planning and weather planning) to manage the travel and costs of trips. The classification of existing online trip planners into four distinct operations is illustrated in Table 1.

Table 1: Classification of Online Trip Planners

Online Trip Planners	Trip Planner Categories			
	Journey Planning	Place Ranking	Weather Planning	Agent-Based Planning
iguide.travel				X
themagazine.travel				X
travel.sanook.com				X
travel.yahoo.com	X	X	X	X
wizz.travel				X
www.131500.info	X			
www.aaa.com	X	X		X
www.expedia.com	X	X		X
www.google.com	X			
www.indiatripplanner.com				X
www.lonelyplanet.com		X		X
www.mapquest.com	X			
www.priceline.com		X		X
www.randmcnally.com	X	X		X
www.travelbag.travel		X		X
www.travelocity.com		X		X
www.travelsd.com		X	X	X
www.travmatrix.com	X			
www.tripadvisor.com		X		X
www.tourismthailand.org				X
www.weather.com			X	
www.weatherbonk.com	X		X	
www.weatherbug.com			X	
www.weatherunderground.com			X	
www.wmta.com	X			
www.yellowpages.travel				X

Table 2 depicts a comparison of four trip planner categories according to the following conditions: What questions the planners of each category can answer; what keys the planners of each class use to accomplish their goals; and whether the planners of each category can personalize each

traveler’s trip or not. Notice that if travelers want to completely plan their trips (i.e., where to go, what to do, how to get there and when to go), they must access agent-based planners. However, travelers are unable to personalize their trips using the existing agent-based planners. The comparison of the trip planner categories shows the flaws in the existing planners and reveals a research challenge, i.e., the design and development of powerful agent-based planners, as discussed in detail later.

Table 2: Comparison of Trip Planner Categories

Trip Planner Categories	Explanation	Keys to Success	Personalization
Journey Planning	How to get there	Routing information and algorithms	Available
Place Ranking	Where to go What to do	Traveler reviews	Available
Weather Planning	When to go	Statistical data and prediction models	Available
Agent-Based Planning	All of the above	Tourism experts	Not Available

Discussion

From the traveler’s point of view, if they want to plan their trip, they need to access at least three online trip planners to complete their trip plan. By contrast, travelers can access only agent-based planners to succeed in planning a trip, but they can not personalize their trip by themselves. The ideal online trip planner would combine all the systems of the existing trip planners, i.e., an online trip planner that would have all the necessary information and also allow travelers to personalize their trip. However, implementing the ideal trip planner might be a complicated task at present.

The problems of developing an ideal trip planner are due to some technical difficulties. Gathering the necessary information from all sources may not be easy. This challenge could be achieved with the advent of a new web service (a software system standard defined by W3C to support interoperable

machine to machine interaction over a network). Unfortunately, some of the information may not be available from the existing online trip planners, such as how much time the travelers need to spend at each place. Such information is important in order to plan the trip automatically. If the trip planners have all the necessary information, calculating the optimal program with all the places of interests, the travelers wish to visit, is similar to the Traveling Salesman Problem (TSP) (Cormen et al., 2001). It can be classified as an NP-hard problem (Baase and Gelder, 2000), which is a class of problems at least as hard as the hardest problems in the set of decision problems solvable in polynomial time by a non-deterministic touring machine, i.e., it is a very complex problem. Generally, this problem is difficult to solve in large amount of input. However, the number of places of interests that can be visited per day is limited. Hence, it is possible to compute the optimal path.

The human-computer interaction (HCI) (Diaper and Sanger, 2006) is another challenge. Displaying travel information using an official turn-by-turn direction might not be the ideal solution, e.g., a road named US-129 is known by the name of “Alcoa highway” by the local people (technically, it is called the naming convention problem). Thus, directions given to travelers should display both official street names and the names used by local people. Local people should be able to edit and correct the names of roads and places. This could be accomplished by using the web 2.0 technologies (Vesson and Hagemann, 2007). The graphical user interface using an online map (Peterson, 2003) or Web-GIS technology (online cartography) (Bill, 2005; Tyler, 2005) might be used to display directions. Traditionally, all computations will be calculated for either client-side (using Java applet (Flanagan, 2005) or ActiveX (Fenstermacher and Crabb, 1997)) or server-side (using CGI (Hamilton, 2004) or Java Servlets (Flanagan, 2005)). However, a hybrid solution between client-side and server-side computation could be used to balance the load on both sides, i.e., all geographical computations are calculated on the server while basic operations, such as zoom and pan, can be performed by the clients. This solution can be achieved by AJAX technology (Asynchronous JavaScript and XML) (Ullman, 2007), a group of related web development techniques used for creating interactive web applications.

Conclusion

As a result of the explosive growth of the internet during the last few decades until now, e-tourism now plays an important role in today's tourism. Generally, existing e-tourism systems are well performed for several reservation tasks; therefore a trip planning approach has recently become a focus of interest for enhancing performance (e.g., searching for routes and attractions, comparing prices for hotel reservations and flight bookings, implementing web personalization, etc). This article aims to survey the existing online trip planners. The study of online trip planners helps us to analyze the trip planning process, define their common framework and classify them into well-defined categories according to their distinctive operations. Moreover the study indicates the flaws in existing online trip planners, i.e., the existing planners can not help travelers to plan their trip by themselves. Finally, the study also reveals a challenging task in the development of a powerful online trip planner which combines several advantages from existing trip planners.

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