

# Intelligent Travel Advisor System (ITAS)

Mohamad Firdaus Che Abdul Rani, Nor Azlina Abd Rahman, Khalida Shajaratuddur Harun

**Abstract**— This paper is discussing on Intelligent Travel Advisor System (ITAS) Framework. The purpose of this system is to help the tourist to plan their trip based on budget, tourist spots or any criteria that they want to base on. Several similar systems reviewed such as TripAdvisor, Priceline and Expedia Inc to identify the functionalities, strength and weaknesses of the existing system. Overall ITAS system architecture discussed that includes user terminals, ITAS and payment Agencies. ITAS components are highlighted which are web crawling, database and secure network. The process that involve in ITAS divided into three parts which are input process that accept the criteria of searching, system process that match the input with certain websites by using web crawler and output process that will display the information that match with user's input. Besides that this paper is also discussing on the impact of ITAS to the tourists and society.

**Index Terms**— *advisor; intelligent; trip; tourist; Web Crawler*

## I. INTRODUCTION

Tourism has become a popular global leisure activity. There were over 983 million international tourist arrivals worldwide. In Malaysia itself there were over 24 million tourists' arrivals in 2011. Tourism is a dynamic and competitive industry that need's user satisfaction and enjoyment are particularly focus on the industry can offer. Tourist, mostly like to explore their self by using maps or guide that has been provided by the respective authority like ministry of tourism and their agencies. Nowadays, technology became part of the human lives, it takes most of the human works and it make more convenient to the users. With the help of technology our goal is to assist the tourist before, during and after their travel. The system can make a decision for the trip according to the budget and related information (i.e. visa requirements, culture, currency, weather, language, map etc.) with the place that the user going to visit. It also can suggest a suitable and effective itinerary that includes the details for the entire trip which will be semantically summarized and generated using Web Crawling supported by latest Web technologies.

## II. RELATED WEB BASED TOURIST SYSTEM

Generally, a travel agent is business organization which specializes in making travel arrangements on behalf of other people. The travel agents often have access to cheap airfares fares, transportation arrangement, hotel deals, meals and other travel needs which average tourists may find the coordination are either too much time consuming or taxing.

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Travel agent usually plan the entire vacation packages inclusive of the items mentioned earlier with sightseeing visits to attraction spots, point of interests, cultural, heritage and religious sites. Travel agents also help to sort out visas, recommend travel insurance and assist the tourists including emergency and medical needs. The agency also engages a tourist guide as an escort to the group of tourists. The tourist guide shall be able to speak the language preferred by the tourists, able to dispense information as listed in the vacation package and provide assistance.

As the usage of internet have been extensively used by the public; many airlines, hotels, destination spot ticketing offices and other tourist related events began to sell directly to potential tourist. As a consequence, the travel agents experiencing cut in the commissions. In response to not be completely disinter-mediated, many travel agencies have been gradually making an internet presence by implementing travel websites, with detailed information, online booking and payment. This section will discuss on three popular websites, which are free to potential travelers to browse, that offer several services to the tourists which are TripAdvisor, Priceline and Expedia Inc.

### A. TripAdvisor

TripAdvisor has been mentioned as the world's largest travel site for travelers to plan for hassle free perfect trip. TripAdvisor provides reliance advice from genuine travelers based on their travelling experiences. It is also offers variety of travel choices, planning features, seamless links to booking tools for hotels, flights, vacation rental and destination activities [1]. TripAdvisor has claimed it websites as make up the largest travel community in the world with at least 200 million unique monthly visitors [2] and above 100 million reviews and opinions regarding the traveler traveling experiences. The websites run in 30 countries worldwide, together with China under daodao.com.

"TripAdvisor Launches Powerful, Free Review Collection Service For Businesses: TripAdvisor's Review Express offers a fast, free and effective marketing solution to drive valuable traveler feedback and reviews with customizable email service" [1]. To simplify, the article revealed that TripAdvisor has started to use its suite of review collection services, known as Review Express. Review Express is a powerful, free solution to user, and available exclusively on TripAdvisor. The new service encourages fresh reviews, by giving registered businesses the option to email in bulks to their guests asking them to write their views about their customer experience. As said by the TripBarometer of TripAdvisor, 87 percent of worldwide travelers indicated that they use travel review websites to help them plan a trip and 95 percent say that other people's reviews on travel review sites influenced their plans. Review Express was built to help business owners of accommodations, restaurants and attractions, build their reputation online and enhances their TripAdvisor presence.

The solution is also to give prospective guests, the travelers' response they need as they need to plan the perfect trip. A study from The Cornell Center for Hospitality Research [3] expresses that there is a monetary reward for having an impressive online reputation, and reviews can influence a hotel's ability to raise prices, influence occupancy and maximize revenue.

Another article "TripAdvisor Global Study Reveals Traveler Spending and Accommodation Profitability Expected To Rise in 2013: TripAdvisor Announces Results of TripBarometer: World's Largest Accommodation and Traveler Survey with More than 35,000 Global Respondents" [4]. The results of the TripBarometer emphasizes country level, regional and global trends within the travel sector and reveal the economic outlook, travel planning, booking methods and traveler expectations. TripAdvisor claimed that it is the world's largest travel site, has released the results of the world's largest accommodation and traveler survey, the TripBarometer by TripAdvisor. This study, conducted by independent research firm StrategyOne, on behalf of TripAdvisor, covers top travel and hospitality industry trends based on more than 35,000 travelers and accommodations from around the world. The article mentioned that the top three decision making factors for global travelers are: price (76%), location (68%) and online reviews (44%) [4].

The TripBarometer reveals that travel review websites as the "most useful" sources of information when researching and planning a trip, this websites reviewing surpasses feedback from family and friends [4].

### B. Priceline

Priceline, as stated by [5], would be name as leader in online travel. The website - priceline.com, travelers can "name their own price" for airline tickets, hotel rooms, rental cars, cruises, vacation packages (flight & hotel or flight & hotel & car), tour and attraction. The organization was founded in 1997; the company operates five primary brands: Booking.com, priceline.com, Agoda.com, KAYAK, and rentalcars.com. The following are the rank provided by the same source; number 473 in FORTUNE 500 (May 2013) and number 14 in FORTUNE's Fastest-Growing Companies (September 2012).

Based on user observation, Priceline.com provides 2 options of search of lowest price. Firstly the website allow traveler to search for the lowest available price on hotel rooms, flights, car rentals, combination of those as well as cruises. Then, traveler is to enter the information into the forms provided on the website. This information includes traveling dates, hotel types and car rental information of which priceline.com shall list different options with different prices. The second option is to key-in the fare traveler wish to pay for the service, known as bidding function. For example, if traveler wishes to pay an amount for a round-trip airline ticket, traveler would type that information in the given area, and Priceline.com will drop an email to the traveler if a fare is in the range becomes available. Or, traveler may check his or her request and bids through a link on the website [6]. Based on services provided by Priceline group, it is said to be ahead in global online hotel reservations [4]. The Priceline Group is composed of five major brands; Priceline.com, Booking.com Agoda.com, KAYAK and rentalcars.com, as well as several additional brands. Priceline.com offers travelers several

options to save on their airline tickets, hotel rooms, rental cars, vacation packages and cruises [4]. On top of getting irresistible published prices, travelers can take advantage of priceline.com's renowned Name Your Own Price(R) service [7].

### C. Expedia Inc

Expedia Inc is a well known and said as a leading online travel service [8]. Expedia.com offers millions of travelers per month to conveniently arrange and reserve their travel itineraries. Expedia.com intends to give the most recent technology and the broadest choice of flights, hotels, combination of flight and hotel, vacation packages, cruises, rental cars, and in-attractions, destination activities, and services. Expedia has been recognized in awards such as Forbes "Favorite General Travel Site" and PC Magazine's "Editors' Choice" for its quality and leadership [9]. According to the Expedia website [10] stated that it run sites which have been localized for at least 150 travel booking sites in at least 70 countries and has localized the language to 31 countries. From the same website source, Expedia Inc. claimed that it covering all parts researching, planning, and booking travel, from choosing the most suitable airline, to reading other comments on travel reviews of hotels, to choose tour operators, to choose car rental companies, to planning activities to do in a destination once get there. The Expedia Inc. makes available travel service from budget to luxury for both travelers of leisure and business.

## III. PROPOSED FRAMEWORK

The proposed framework will be working similar as traveling organizer. Basically the system is able to search for what the user wants or show them related information using a Web crawling process. Web crawler will gather all kinds of travel related websites and store in the database. When the user input a keyword, it will be "crawling" to the related websites with the keyword and intelligently summarize the results to the user. For example, if the user key in "Shopping in KL", the intelligent Web crawler will identify the most related information on the Internet and summarize it semantically based on certain criteria (i.e. location, transportation, price range, products etc.).

The user also can use the system to organize their travel or look for suggestions even if the user doesn't have a plan yet. There will be an interface where the user will input some information regarding the travel, for example, location and budget. Then the system will show information about the location and suggest related activities, reviews, maps and accommodation based on the budget range for user to compare and match with their requirements. The user will be able to read reviews from all kind of websites like professional reviewers and bloggers regarding the location they intended to travel. It will also show all nearby infrastructures such as bus stop, train stations and eatery places integrated on one map.

### A. System Architecture

Figure1 shows the overall architecture of the travel advisor framework. The framework is compatible to be used either for the computers or any held devices with reasonable security. The overall framework is integrated with several

components which are:

- Computer/ hand held devices  
User terminals that can be used to access to ITAS are any handheld devices such as mobile phone or any computer that can access to internet
- Intelligent Travel Advisor System (ITAS)  
The system that helps the tourist to plan their trip based on criteria that the user entered such as budget, location, date etc.
- Payment Agencies  
There will be several payment methods that link to ITAS such as PayPal, Visa and Master card.

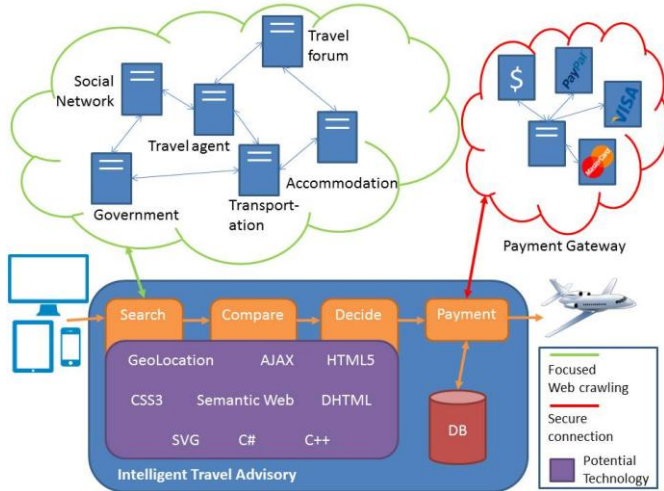


Figure1. Intelligent Travel Advisor Framework

### B. Intelligent Travel Advisor System Components

Intelligent Travel Advisor System or ITAS is formed by several components. The components that going to discuss in detail are:

- Web crawling  
To gather related information needed for ITAS, web crawling process will be implemented to systematically browse the World Wide Web. Since the scope for this crawling process is only limited to travelling or tourism information, a focused crawler will be the most suitable technique to be used as it collects Web pages that satisfy some specific keyword/ meta, by carefully prioritizing the crawl frontier and managing the hyperlink exploration process [13].

Crawling process has been used widely by the search engine since the beginning of the World Wide Web [18] [19]. From time to time, it has been evolved and most of the search engine provider structuring and introducing their own and customized algorithm to enhance the search results of their search engine.

To improve and ensure the quality of information that leads to perfect decision making, ITAS will be adapting the process that has been used by the major search engine but will be focusing more on the travel related information.

Figure2 summarized the flow of the focused crawler:

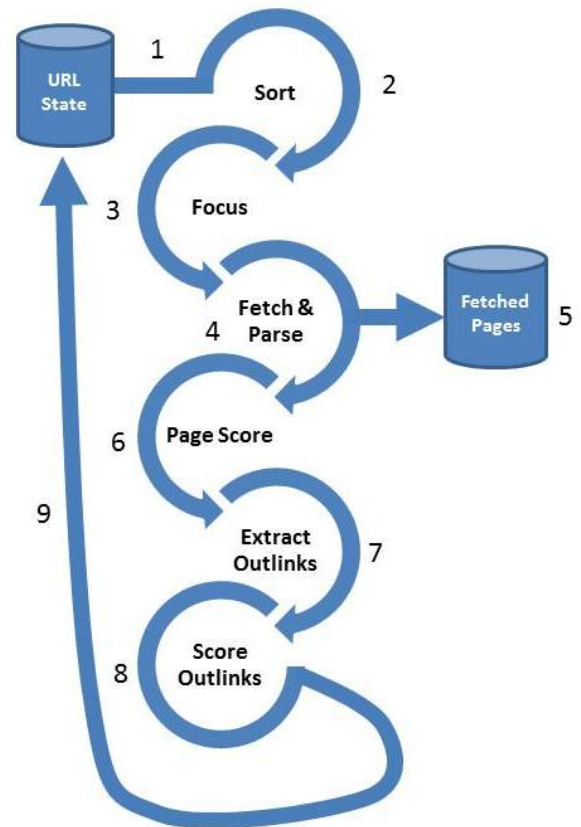


Figure2. Flow of the focused crawler [17]

- URL State database  
This database will be recording one entry for each unique URL that has been fetched up through cron job (scheduled task) [17].
- Page score  
A score will be awarded to each page. It can be based on a simple target term frequency calculation to a complex Natural Language Processing (NLP) analyzer and will be related to travelling activities or tourism. For testing purposes, the criteria of the score can be pre-determined at the database [17].
- Link score  
Every URL has a score that represents the sum of page scores from all pages which contain an outbound link that matches the URL [17].
- Fetched Pages database  
This is where all fetched pages are stored, utilizing the URL as the key. It'll be an optimized, compressed read-only structured data. For the next phase, a semantic ontology will be structured to read the metadata of the page and relate it with the score that has been awarded above [17].

Below are the steps in a focused crawl workflow that will be implemented for ITAS:

1. The first step is to load the URL State with an initial set of URLs. These can be a broad set of top-level domains travel websites which includes travelogues, forums, Individual airlines, hotels, bed and breakfasts, cruise lines, automobile rental



companies, and other travel-related service providers [17].

2. Once the URL State database has been loaded with some initial URLs, the first loop in the focused crawl can commence. The first step in each loop is to extract all of the unprocessed URLs, and sort them by their link score. It will be sorted intelligently based on the Semantic criteria that have been set in state database [17].
3. A decision is made on how many of the top-scoring URLs to process in this loop. The fewer the number, the more minute the scope of the crawl. The options on the URLs that can be accepted will be based on the criteria that have been set earlier [17].
4. Once the set of accepted URLs has been engendered, the standard fetch process commences. This includes all of the conventional steps required for distributed, scalable, efficient, polite and robust fetching such as robots.txt processing. Pages that are prosperously fetched can then be parsed [17].
5. Typically fetched pages are additionally saved into the Fetched Pages database.
6. The parsed page content is given to the page scorer, which returns a value representing how proximately the page matches the focus of the crawl.
7. Once the page has been scored, each out-link found in the parse is extracted.
8. The score for the page is divided among all of the 'out-links' and store as the 'page-rank' [15][16] [17].
9. Finally, the URL State database is updated with the results of fetch endeavors (prospered, failed), all incipiently discovered URLs are integrated, and any existing URLs acquire their link score incremented by all matching out-links that were extracted during this loop [14].

At this point the focused crawl can terminate, if sufficient pages of high enough quality (score) have been found, or the next loop can begin. In this manner the crawl proceeds in a depth-first manner, focusing on areas of the web graph where the highest scoring pages are found. These processes are to ensure that the data that has been crawled is accurate and will be very helpful for the user to make the travelling related decision.

- **Secure network**

This system is also focuses on security measures as security become one of the main concerns in online payment services by most of the people that using this kind of services. There are two protocols that going to be considered which are:

1. **SSL (Secure Sockets Layer)**

SSL is normally used for transmitting private documents via the Internet. SSL is using asymmetric cryptography system that using public key for encryption and private key for

decryption. It is operates at transport layer where encryption of the transport layer allows SSL to be application-independent. SSL creates secure connection between a client and a server which any amount of data can be sent securely. Many websites use SSL to obtain confidential user information, such as credit card numbers etc. The URLs that using SSL connection starts with https: instead of http [11].

2. **S-HTTP (Secure HTTP)**

This protocol is used for transmitting data securely over the World Wide Web. It is designed to transmit individual messages securely. S-HTTP operates in application protocol where it allows users to produce digital signatures on any messages [12].

Based on the discussion above on SSL and S-HTTP, it is found that both protocols can be seen as complementary rather than competing technologies.

### C. Travel Advisor Process

Figure3 shows the whole process that involve in Intelligent Travel Advisor System. The process is divided into three parts which are input, matching and output process. The input that is required is either time schedule that prefer by the users, budget that affordable and location that prefer by the user. After inserted the input, the Intelligent Travel Advisor will generate information which is related to the input given and vacation such as flight schedule, list of available hotels based on budget and number of stars input by the user, tourist spots that are interesting to be visited, weather forecast on the date of vacation and also Google map that will shows the direction to the several tourist spots from the hotel that being booked.

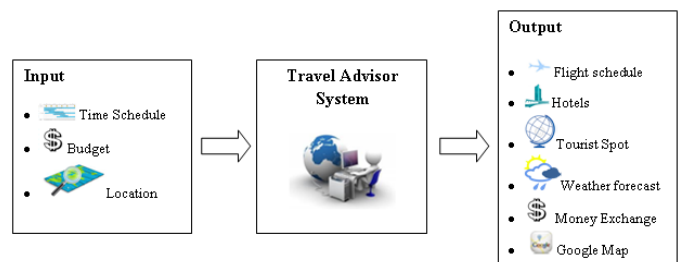


Figure3. Intelligent Travel Advisor Process

Additionally, there will have a scheduler in the system. From the previous list of activities and infrastructure, the user is able to check them and proceed to the scheduler and the scheduler will schedule the whole trip for the user. After choosing the hotel, the system will organize a route map for the user base on the chosen schedule. There will also have a currency converter in the system for the convenience of the user. Example the user can check how much they would spend after converting back to their own currency without going to another currency converting website or program.

## IV. IMPACT TO THE TOURIST AND SOCIETY

This section will discuss on how the Intelligent Travel Advisor will bring impact to the tourist and society.

- Internet have made the process of booking system in airline, hotel reservation, searching info for the location details have come to much more easier.
- Convenient as any booking and arranging the time for the trip or day can be done over the internet and phone call without any involvement of the third party. The system work similar to Google but everything is about vacation.
- The system is emerging with several functionalities which are booking system, checking location, GPS, food station and prices. Any searching which is related to the vacation the system will be able to provide detail information which is related to the searching criteria. Example if the user search for Kuala Lumpur, select 3 days 2 nights, the system will list based on several budget. When the user does the booking, the program will includes with the airline booking and finish with downloading the GPS map into their Smartphone and provides information and recommendation on location to visit.
- Save time in searching for tourism information as the searching will only focus on vacation related information.
- Suitable for any generation to use the system as it make the searching become easier and more specific to vacation related information.
- This intelligent system also will help not only the potential tourist but also the poor countries which are struggling in promoting their tourism industry. As we know, tourism is the most high impact medium which can boost up the economy of the country.
- By having this system, the potential tourist able to plan their vacation better and at the same time able to help the economic growth of the country.
- Free and flexible scheduling provided by the system to ensure that the tourists are not tight to the schedule as what occur if the tourist goes for vacation through the travel agent. The system enables the user to edit or postpone the schedule if the user facing any problem such as short of cash, not feeling well etc.
- This system is suitable to use by individual or a group of tourist for their vacation planning.

#### V. CONCLUSION

The research starts with comparing the related current web based systems that provide alternatives for travelers to choose options of airlines, hotels, cruises, car rental, tourist destination packages and activities. All of the web based systems do allow the travelers to select individual option or any combination of those options. While TripAdvisor extends the ability to include traveler's review and rate the reviews. Those web based systems works as a single point of contact portal to traveler requesting for options for airlines, hotels, cruises, car rental, tourist destination packages and activities. Those requests should link to the individual databases of the related airlines, hotels, cruises, car rental, tourist destination packages and activities. And the single point of contact portal shall only display the result of available facilities and services.

ITAS is using proposing web based systems with similar concepts with the existing systems, with the following criteria;

1. Additional search options which include budget, weather forecast, currency exchange, Google map route (from point A to point B)
2. ITAS has its own database that will store all of the information that gathers from the web crawler. Web crawler shall semantically fetch URLs, conduct page score, link score with sum, and kept fetched pages in the database.

ITAS shall benefit every possible entities; the traveler for conveniences of planning the trip with a single point of contact portal with many functionalities. ITAS should also benefit the business organization as their availability of facilities and services will be crawled into ITAS database

Future plan for ITAS is to include travelers' review and rate services since most travelers would only proceed with booking after reading real experience reviews from previous travelers. Rating is also important since travelers would prefer to book facilities and services which rate of at least average.

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