STIG: A Short Trip Itinerary Generator for Planning Trip- Ratchaburi Province Case Study

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Abstract
In this paper, a trip planning system is presented for planning short trip to the province of Ratchaburi, Thailand. The proposed system, the Short Trip Itinerary Generation, or STIG, provides a flexible trip planning for 1-3 days trip based on user preference and trip related information that can be specified by a tourist and by the system. STIG can work in two modes: Trip Planning Mode and Trip Mode, to generate the trip plan and follow the plan or making real-time adjustment to the plan, respectively. The computation of the distant between two point-of-interests can be carried out by the google mapping functions or by using the pre-stored information to minimize the risk of losing internet connection during the real-time Trip Mode. A location-based trip learning module is also implemented to provide enhanced experience for the tourist. STIG was evaluated by tourists from Bangkok taking short trip vacation to Ratchaburi Province, 95% of the respondents reported opinion that STIG for trip planning is very useful once it is used, and it will become an essential and beneficial tools making trip more fun and enjoyable.

Keywords: location-based learning, location-based trip learning, trip planning, trip itinerary generation, trip planning system.

Introduction

In Thailand, there are 77 provinces. Each province is divided in to a number of cities called Umphurs. Usually, the reference to a tourist attraction is associated with the Umphur, the point-of-interest is located. So, in an Umphur there are a number of tourist attractions. A Thai tourist would plan a short trip by identifying the main attraction in an Umphur that will be visited. He will also visit some other secondary tourist attractions before or after reaching the main destination. The attraction can be either a hotel, a resort, a restaurant, a temple, a natural attraction, or a man-made attraction. As of now, no trip planning tool is available for a Thai tourist visiting another province. In this paper, we will describe a trip planning system, specifically for 1-3 days short trip. The trip from Bangkok to the province of Ratchaburi, Thailand in chosen as the test case. This trip planning system, which will be referred to as STIG (Short Trip Itinerary Generator), will generate the itinerary of the trip automatically based on the information supplied or partially supplied. STIG can handle six types of short trips, with 340 pre-stored POIs, trip support information and location based learning or information related to a POI to provide enhance experience for the tourists [Ph.D. Dissertation].

Previous work

The information technology is used extensively to support the entire value chain of tourism. Among the applications of information technology for tourism, one of the most widely research topics is the trip planning (Katerina Kabassi, 2010, Damianos Gavalas, et al. 2012). In certain city, the tourist can use trip planning software to revise the itinerary and determine the attractions that really match the tourist's interest within allocated time frame and budget.

In general, there are five major approaches to trip planning solutions, namely ontology-based solution, software agent-based solution, computational algorithmic solution, case-based solution, and social media solution.

Ontology is widely used in trip planning work (K. ten Hagen, R. Kramer, M. Hermkes, B. Schumann & Patrick Mueller (2005)Kim and Gil, 2003; Chen et al. 2011; Park, Yoon and Kwon, 2012; Kongthon, Kongyoung, Haruechaiyasak and Palingoon, 2011; Moreno et al. 2013). Lee, Chang and Wang (2009) proposed trip planning to Tainan City in China. Lee employed ontology and multiple software agents to generate the trip plan. SigTur/E-Destination: an Ontology-based personalized recommendation of tourism and leisure activities was proposed by Moreno, Valls, Isern and Borras (2013) for tourists in the Tarragona. The main characteristic of an agent-based solution to trip planning is to have a number of functional software agents working collaboratively to give a tourist the best trip plan. There are a number of research work that utilizes software agent to implement various tasks needed to plan a trip (Sun and Lee 2004; Dickson ,Chiu and Leung, 2005 Castillo et al. (2008), Batat, Moreno, Sanchez, Isern and Vallas (2012)). Usually, software agent approach will combine with other techniques such as ontology. Starting from formulating the trip planning problem as the Orienteering Operation (OP) introduced by Tsiligirides (1984), a graph theoretic–based algorithm is used to find the optimal solutions (Gavalas, Konstantopoulos, Mastakas, Pantziou and Tasoulas, 2012).   Vansteenwegen, P., Souffriau, W., and Van Oudheusden, D.,

(2011) provided a comprehensive survey of Orienteering Operation solutions. Case - based reasoning (CBR) is one of the approaches that can be applied to trip planning. The case based repository comprised of the past travel case information will be used for matching with a tourist trip profile so that the best matched - case can be recommended to the tourist. Lenz (1996) was the first to apply CBR technology to this domain in the CABATA system. Ricci and Werthner (2002) proposed a case based querying system for travel planning. Online social media is now very popular as a mechanism to aggregate user generated trip content. The Trip Advisor is the most successful commercial product of this category of trip planning system (http://www.tripadvisor.com/PressCenter-c4- Fact_Sheet.htm, Miguéns, Baggio, and Costa, 2008). Choudhury, Feldman, and Amer-Yahia (2010) described a two-step approach to generate tourist itineraries automatically from photos in the Flickr deposited by tourists.

STIG System Architecture

The trip planning system for short trips planning to a destination province is shown in Figure 1. The system provides two modes of operations: the Trip Planning Mode and the Trip Tracking Mode. In the trip planning mode, the system will take in the inputs and personal preference then it will generate the trip itinerary. Once, the user is on the trip, the Trip Tracking Mode will take in real time information such as actual time to start the trip, time of arrival to a destination, time of day and location, to generate the actual trip plan for the remaining time of the trip. The distant computation between an attraction at location i and another attraction at location j is based on google distant function with attraction-distant tables for each Umphur as a backup in case no internet or 4G connection in that area. The system is also location-sensitive in accessing the POI information structured as e-learning lessons with quizzes in order to provide a enhanced learning experience about the background of each POI. This architecture supports the 6 types of short trips as follows.

Type 1: 1-day trip: start from province K in the morning, back from province R in the evening or late evening.

Type 2: 1-day trip, visit attraction in the morning or afternoon or early evening, then travel to another province.

Type 3: 2-day trip, visiting attractions within the province R, spend 1 night in province R, then return to province K in the evening of the next day.

Type 4: 2-day trip, visiting attractions within the province R, spend 1 night in province R, the next day, the trip party will visit attractions on the way to another province.

Type 5: 3-day trip, spend 2 night in the province R. The first day, the trip party will visit attractions in the province R. On the second day, the trip party can travel within province R or visit attraction in a bordering province, then drive back to spend the night in province R at the same hotel. The next day, the trip party will go back to province K and visit attractions along the route back.

Type 6: 3-day trip, spend 2 nights at two different hotels in province R and return to province K in the third day.

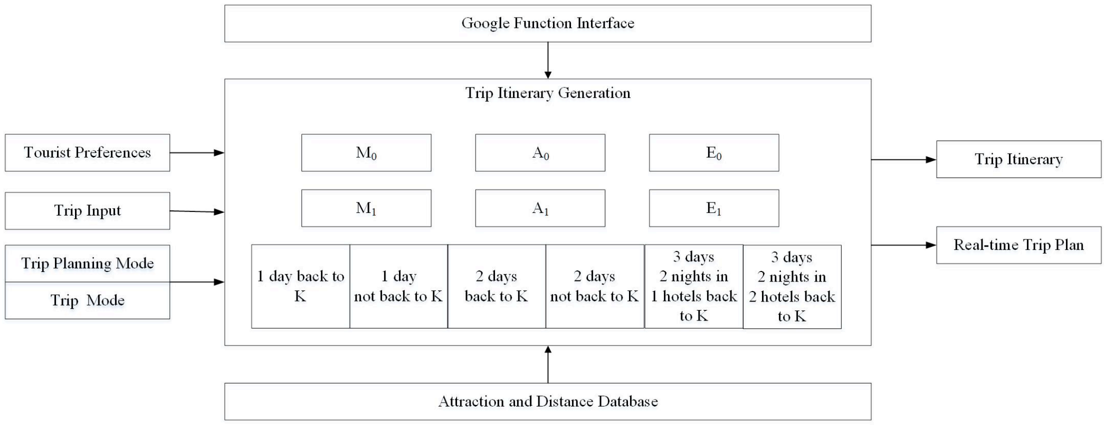

Figure 1. The architecture of the Short Trip Itinerary Generator for a trip from province K to province R.

Information Supports

The proposed trip planning system is intended for a 1-3 days trip planning for tourists from province K, to visit attractions in the destination province, R. The trip planning mechanism is time-driven to produce a workable itinerary and a tourist can use the itinerary as the base information to guide the entire trip with real time simulation and tracking to make any adjustment matching the current situation.

Supporting Database and Routing Information.

The data needed for trip planning consists of a number of tables.

Let n be the number of Umphurs. And p be the number of major attractions in an Umphur.

B2U(n) stores the time to reach the central district (Umphur Muerng) of an Umphur from province K.

U2U(n,n) is the Umphur to Umphur distance matrix of size n by n since there are n Umphurs in the destination province.

UA(n,p) defines n arrays, one for each Umphur, to store the attractions and associated information in each Umphur. The information for each entry comprises the name of the attraction, the location, routing information, and restaurants in the vicinity, shopping center and markets in the vicinity, hospitals or clinics in the vicinity, police stations in the vicinity.

UA2UA(p,p) is the matrix showing the distance between the distinctive attractions and associated information in an Umphur.

UHotel(n,h) is a list of hotels in each Umphur with location information.

UCoffeeShop(n,c) is a list of (h is the number of hotel.) coffee shops (c is the number of coffeeshops) in each Umphur with location information.

URestaurant(n,r) is a list of restaurants (r is the number of restaurant) in each Umphur with location information.

UCarService(n,s) is a list of car service shops (s is the number car service shops) in each Umphur for the major car brands with location information.

Trip Planning Enroute Processing Requirements

The processing from the province, K, to the destination province, R**.**

The distance from City, K to each of the Umphur in R, The data on the road from K to R: gas stations, hospitals, police station, car dealers with service shops, major restaurants, starting time for the trip, time to reach the first destination in the province R.

We need all these data since during a trip, many events can happen, some of which are sufficiently common such as fill in the gas tank, stop by at the hospital due to a sudden illness, go to police station due to an accident, and in some unforeseen reason, the car can have engine problem and need to be fixed at a service shop of that particular brand. In addition, the trip party might need to find a restaurant in order to find something to eat before continuing the trip.

Trip Processing within Destination Province

After reaching the first destination, the trip party will visit attractions in that Umphur and attractions in other Umphurs constrained by the remaining time of the day, and the time to going back to hotel or going back to Province K.

Input.

Main Input: The trip day, and time from city K; The destination; Umphur; R.; The main attractions for this trip; The day and time leaving the destination city R (such as time after the checkout from the hotel, after having breakfast, or lunch or dinner, or after the meeting).

Secondary Input: The stop-over points on the way to the destination R; Lunch or dinner location for each day of the trip; the accommodation.

Personal preference (or group preference): Types of attractions; Types of restaurants; Types of shopping; Walking Street.

The other attractions (other than the main attractions specified): The optional attractions that can be visited after the visiting the main attractions; Additional stop-overs on the way back from the destination R.

Setting and initialization.

Define the number of trip days

Define the types of trip

General conditions of visit: The list of attractions that must be visited on the trip; The list of restaurants that must be patronized; Preference: rank the preference of the type of attractions that can be recommended for the trip: natural, man-made, cultural, temple.

Accommodation selection or by recommendation: Specify the name of the hotel for first night; Specify the name of the hotel for the second night

Specify the major points of stop-over in the trip for the first day: Start time from K (t_1) ; Stop-over time (t_2) ;Time to reach the first destination in the province R (t_3) ;Lunch time (t_4) ;Time to reach the afternoon destination (t_5) ; Time to reach the evening destination (t_6) ; Time to check - in at accommodation (t_7)

Specify the major points in time for the second day trip

Type 1 trip (not applicable).

Type 2 trip: Specify time to check out and the name of the destination province; Time to stop-over while in province R.

Type 3 trip (second day): Time to check out. Time to the first destination of that day; Time to the second destination of that day; Time to lunch; Time to dinner; Time to reach city K using route r_1.

Type 4 trip, same as Type 2.

Type 5 trip, same as Type 2 trip, then followed by Type 3 trip.

Type 6 trip, same as Type 3 trip for the second day trip, except no need to specify the time to reach province K.

Specify the major points in time for the third day trip.

Type 5 trip, same as Type 3 trip for the second day.

Type 6 trip, same as Type 3 trip for the second day; The routes to destination province R and the routes back to the origination province K; The route to R The route to K; Stop over points

Default conditions: Dinner at 19:00 p.m., lunch at 12:30 p.m., start time from province K 8:00a.m.; time back to province K before 23:00 p.m.

Trip Planning Processing Algorithm

The sightseeing can be arranged in three intervals, M_j, A_k and E_l. M_j represents morning sightseeing before 12.00 p.m., A_j represents afternoon sightseeing from 12:00 p.m. to 17:00 p.m., and E_j represents evening sightseeing is from 18:00 to 21:00 p.m. Hence, a tourist can specify if he wants to do sightseeing in what interval for a trip day. Alternatively, the tourists can let the system recommend the attractions for a trip interval. As a result, there are eight possible combinations of making a trip arrangement for each trip day as follows.

Table 1

The eight combinations of a trip day.

M_j	A_k	E_l
j	k	l
0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
1	1	0
1	1	1

For M_j, if j=1, the tourist will specify attractions for sightseeing in the morning, otherwise, for j=0, the system will determine the appropriate attractions for the morning visit.

For A_k, if k=1, the tourist will specify attractions for sightseeing in the afternoon, otherwise, for k=0, the system will determine the appropriate attractions for the afternoon visit.

For E_l, if l=1, the tourist will specify attractions for sightseeing in the evening, otherwise, for l=0, the system will determine the appropriate attractions for the evening visit.

The actual trip depends on t_1, the time leaving from the Province K, and t_3 the time arrival at the first destination specified in the destination province.

Consequently, for the trip planning algorithm, there are 6 trip types, and there are 8 trip interval combinations that need to be processed. Hence, there are 6 by 8 cases that need to be considered in order to generate the trip plan or trip itinerary.

Let u_i = Destination Umphur i, t_a = arrival time at Umphur i, t_{noon} = noon time as defined us time to have lunch.

Let us define the following functions:

DTime(loc_1, u_i) which returns the driving time or walking time from a location , loc_1 to an Umphur attraction, u_i in the destination province.

Attraction(loc_1, t, u_i, loc_j), this function returns the name of the attraction u_i at location loc_j, within the Umphur whose trip time (driving time plus sightseeing time) from loc_1 can be accomplished within t hours. This function accesses UA(n,p)

Restaurant(loc_1,t,u_i,loc_j), this function searches for the name and location of a restaurant at location loc_j within time t from location loc_1. This function accesses UResturant(n,r).

CoffeeShop(loc_1,t,u_i, loc_j), this function searches for the name and location of a coffee shop in Umphur u_i at loc_j within time t from loc_1. This function accesses UCoffeeShop(n,c).

Hotel (loc_1, t, u_i, loc_j), this function searches for the name and location of a hotel at loc_j within t hours of driving time from loc_1).

TripTime(Attraction), it returns the time of driving from the current location to the attraction plus the time visiting the attraction knowing the context of morning, afternoon and evening trip.

Visit(Attraction), this function gives the time spent on an attraction.

Case A for $M_0A_0E_0$

The system will recommend attractions to be visited, the attraction can be any POIs including restaurant, coffee shop, hotel, etc.

Morning trip (M_0)

$t_a = t_1$ + DTime(loc, u_i)

If $t_a < t_{noon}$,
then (check if sufficient time for morning sightseeing)
compute $t = t_{noon} - t_a$
case
case i: If t ≥ 2hr then A= attraction (loc_1, 2 hr,u_i, loc_j)
case ii: If t ≥ 1hr, ≤2hrs then A= attraction(loc_1, 1 hr, u_i, loc_j)
case iii: If t ≤ 1hr, then C=CoffeeShop (loc_1,t_{walk}, u_i,loc_j)
end
for case i and ii, $t_a = t_a$ + TripTime(A)
R = Restaurant (loc_1, t_{drive}, u_i,loc_j)
$t_a = t_a + t_{drive}$
for case iii, after the coffee break, set t_a = 12.00 p.m. (then Lunch time)
R = Restaurant (loc_1, t_{walk}, u_i,loc_j)
$t_a = t_a + t_{walk}$

If $t_a > t_{noon}$,
then (no time for morning sightseeing, need to have lunch now)

R = Restaurant (loc_1, t_{walk}, u_i,loc_j)
$t_a = t_a + t_{walk}$
$t_a = t_a + t_{lunch}$ (t_{lunch} can be a preset value)
(End morning trip period for M_0)

Afternoon trip (A_0)

This period of trip would lead to the evening period of trip. But in general, the attraction selection can be from any Umphur, constrained only for the time and route to get back to Bangkok or back to the hotel, or on the way to another destination province.

$g_1 = t_{evening} - t_a$

If $1 \leq g_1 \leq 2$ hrs,
then A = attraction(loc_1, 1 hrs,u_i,loc_j)
$t_a = t_a$ + TripTime (A)
If 2 hrs $\leq g_1 \leq$ 4 hrs,
then find one or two attractions that soft-align with evening trip destination
A_1 = attraction(loc_1,2 hrs,u_i,loc_j)
A_2 = attraction(loc_1,2 hrs)

If Near(A_1, A_2),
then $t_a = t_a$ + Trip Time(A1)
else $t_a = t_a$ + Trip Time(A_2)
$t_a = t_a$ + Trip Time(A1)+ Trip Time(A_2)

Evening Trip (E_0)

The evening trip mainly finding a restaurant/ for dinner and/ or visit to a night market a walking street.

R = Restaurant(loc_k, t_{drive}, u_i,loc_j)
$t_a = t_a + t_{drive}$

If walking street or night market nearby,
then (visit)
$t_a = t_a + t_{ws}$

Trip back to hotel or Bangkok

If going back to Bangkok,
then $t_a = t_a$ + DTime(loc_j,loc_2)
exit

If spending the night,
then
case1: has hotel reservation , t_{drive} = DTime (loc_k, loc_{hotel})
case 2: no hotel reservation, then H = Hotel(loc_1, t_{drive}, u_i, loc_j)
end

$t_a = t_a + t_{drive}$
exit

If driving to another province,
then $t_a = t_a + DTime(loc_i, loc_7)$

Case B for $M_1A_1E_1$

Now, Let us consider the cases for M_1, A_1, and E_1. For these three cases, there are certain pre-specified attractions that need to be visited.

For M_1

The following conditions are specified:
Condition 1: The attraction to be visited in the morning and A_1 and A_2
Condition 2: Lunch will be at restaurant R on location loc_3

$t_a = t_{1,}$

If near (A_1,A_2),
then
$t_a = t_1 + \text{Visit Time }(loc_1,A_1)$
$t_a = t_a + \text{Visit Time }(loc_1,A_2)$
else
ta = $t_1 + \text{Visit Time }(loc_1,A_2)$
(A) $t_a = t_a + \text{Visit Time }(loc_1,A_1)$

If only one attraction is specified,
then $t_a = t_1 + \text{Visit Time (A)}$
case i: If t ≥ 2hr then A= Attraction (loc2, 2hrs,u_i,locj)
case ii: If t ≥ 1hr, ≤2hrs then A= Attraction(loc2, 1hrs,u_i,loc_j)
case iii: If t ≤ 1hr, then C=CoffeeShop (loc_2,t_{walk},u_i,loc_j)
end

for case i and ii,
$t_a = t_a + \text{TripTime(A)}$
$t_{drive} = \text{D Time }(loc_3, R)$
$t_a = t_a + t_{drive}$

for case iii, after the coffee break,
set t_a = 12.00 p.m. (then Lunch time)
$t_{walk} = \text{D Time }(loc_3, R)$
$t_a = t_a + t_{walk}$

If $t_a > t_{noon}$,
then (no time for morning sightseeing, need to have lunch now)
$t_{drive} = \text{D Time }(loc_3, R)$
$t_a = t_a + t_{drive}$
$t_a = t_a + t_{lunch}$ (t_{lunch} can be a preset value)
(End morning trip period for M_1)

For A_1

After the morning trip, for the afternoon trip, after the lunch, the attraction specified for the visit is A_1 at location loc_3 and A_2 at location loc_4

$t_a = t_a + TripTime\ (A)$

Let $g_1 = t_{evening} - t_a$

Near (loc_1, loc_3, loc_4)

If A_1 is near,
Then
$t_a = t_a + Trip\ Time(A_1)$
$t_a = t_a + Trip\ Time(A_2)$
else
$t_a = t_a + Trip\ Time(A_2)$
$t_a = t_a + Trip\ Time(A_1)$

For E_1

Let R be restaurant destination/ for the evening at location loc_7.
$t_a = t_a + D_{Time}(loc_7, R)$
$t_a = t_a + t_{dinner}$
$t_a = t_a + D_{Time}(loc_i, loc_6) + t_{engagement}$
$t_{drive} = D_{Time}(loc_6, loc_7)$
$t_a = t_a + t_{drive} + t_{dinner}$

If walking street or night market near by
then (visit)
$t_a = t_a + t_{ws}$
$t_a = t_a + D\ Time\ (loc_7, R)$
$t_a = t_a + t_{dinner}$

Trip back to hotel or Bangkok

If going back to Bangkok,
then
$t_a = t_a + DTime(loc_7, loc_2)$
exit
If walking street a night market nearby
then (Visit)
$t_a = t_a + t_{visit}$

If spend the night,
then
case i: has hotel reservation , $t_{drive} = DTime\ (loc_k, H)$, H is the hotel
case ii: no hotel reservation, then $H = Hotel(loc_7, t, u_i, loc_j)$
$t_{drive} = D\ Time\ (loc_j, H)$
end

$t_a = t_a + t_{drive}$
exit

The Implementation of Short-trip Itinerary Generation System

Trip planning mode

The STIG system for Short-trip itinerary entails the implementation of 48 trip planning cases related to the 8 combinations of user specified attractions and related information, or the system recommended selections, and the 6 types of short trips as explained in Section III, STIG System Architecture. The STIG system is implemented as a web-based application using PHP language and MySQL database. The system is also interfaced to google mapping functions ("Google Maps APIs," 2016) so as to use the distance and driving time functions. The system will accept the inputs specified by the user, and then produces the itinerary of the trip. An example of the itinerary generated for a 2-day, one night trip is shown in Table 2.

Table 2
A sample of the trip itinerary generated by STIG.

Time	Programs	Remarks
09.00-09.40	Leave from BKK	
09.40-10.10	Porto Chino Shopping Mall	Breakfast 30 min
10.30-12.31	Arrive at Suan Pueng, Ratchaburi	
12.31-12.47	Lunch Location at Krua Ta Nao Si Restaurant	
12.47-13.47	Lunch	1 hr
13.47-14.15	Go to Scenery Resort	
14.15-15.15	Enjoy Scenery Resort	
15.15-15.18	Hot Spring at Boe Klueng	3 min to Hot Spring
15.18-16.18	Enjoy Hot Spring	1 hr
16.18-17.25	Arrive Amphur Mueng	1 h 7 min, 67.4 km
17.25-17.31	Krua Thung Song Restaurant	6 min, 2.1 km
17.31-19.31	Dinner	2 hrs
17.31-19.38	Arrive Western Grand Ratchaburi Hotel	
07.00-08.00	Breakfast at hotel restaurant	1 hr.
08.20-09.00	Depart from Hotel to Damnoen Saduak Floating Market, Damnoen Saduak District, Ratchaburi	40 minutes
09.00-12.00	Shopping at Damnoen Saduak Floating Market	3 hrs.
12.00-13.00	Lunch at Maikaew Damnoen Resort near Floating Market	1 hr.
13.20-15.00	Depart from Maikaew Damnoen Resort via Route 338	1 h 40 min, 97.4 km
15.00	Arrive Bangkok	Trip end

Trip Mode

For the Trip Mode, it is used during the trip to track the trip itinerary. At any point of the trip, if there is an unforeseen event causing the delay, the trip plan can be regenerated to accommodate the actual event [ ]. In this manner, it provides the real-time context aware trip planning capability. Moreover, since STIG is interfaced to google mapping functions, the tourist can easily access google location-based information if the internet is available. In the Trip Mode, the location based learning capability will be activated so that when the trip is near a destination attraction, the background information related to that attraction will be available for the tourist.

Evaluation

So far, in Thailand, there is no trip planning tools available for the public, not even the experimental trip planning system exists. Hence the users will be those with only travel directory and travel-related web content experience. To evaluate the usability and benefits of using STIG for a tourist, we have selected a sample of 80 Bangkokians to use STIG to plan the trip and experiment on the generation of various trip itineraries. Then they actually took the trip during the period from June 2015 to October 2015. After which, they answered the set of questions and a set of Likert-scale assessment. These volunteers will be referred to as respondent in this section.

In the evaluation of STIG, the respondents were 60% taking one-day trip, 30% taking two-day trips and 10% taking 3-day trip (representing long weekenders). Our respondents are predominantly university graduates with good skill in using mobile smart phones and tablets.

Findings

The respondents are 35 % female and 65 % male. Most of them are young adults between 22 and 40 years old. We also collect the annual income, and number of children and adults in the household. 25 % of the respondents reported having children in their household. A total of 20% of the respondents have the children on trip. The major finding as related to using STIG can be summarized as follows.

Most respondents plan the weekend trip in advance (80 %). Almost all of them prefer the itinerary of the trip and only open to minor changes. Only a small percentage (10%) would want to make the trip decision on-the-fly.

All the respondents have taken trip to Ratchaburi before, but only 30% took the trip in the last 12 months.

60% of the respondents prefer a one day trip to Ratchaburi, only 25 % would like to have a two-day and one-night trip.

95% of the respondents reported opinion that STIG for trip planning is very useful once it is used.

All the respondents run multiple simulations for the trips and select the best itinerary that all parties in the trip agree.

Overall, the respondents, after using STIG for trip planning and real-time adjustment of the trip plan feel that the STIG is a trusted tool for trip planning to a province in Thailand.

Compare STIG recommendation to the conventional advice from friends and internet search, the STIG recommends attraction is very acceptable in terms of where to go, how to go, where to eat and shop, where to stay and what activities to do.

Implication and Conclusion

The Short Trip Itinerary Generator, STIG, is an essential tool for planning 1-3 days short trip to a Province in Thailand. A tourist can specified a number of trip related information including the tourist's preference, or let the system make the decision of visiting attractions for the tourist. The tourist can use STIG to run multiple trip scenario, each time producing a trip itinerary, so that the tourist or group of tourists can choose the itinerary they like most. During the trip, the tourist can use STIG to monitor the progress of the trip. Any unexpected event causing the delay to the schedule can be accommodated by regenerating the itinerary that match the current situation. Since STIG interfaces with google mapping function, it derives all the benefits of identifying current position, time to destination, street view, and alternate route. STIG also maintains its own internal attraction data so that trip planning can be done any time with or without internet connection. The location-based e-learning capability is also provide enhanced experience for the tourists to learn about the background of the attractions.

From the evaluation data, most of the people who has used the STIG gave very favorable rating. SO, to deploy STIG for public use, a cloud-based implementation can be carried out so that it can be accessed from any location. Moreover, the model itself can be generalized and extended to cover the trip planning to any province in Thailand and the origination city can be any city. As for extending STIG for the general tourist from oversea, it is interesting to investigate the aspect of trip planning to generate itinerary for a group of tourist to visit multiple cities in a single trip. This future work must also take into consideration of multi-modal aspects of travelling from city to city.

In summary, STIG provide a new approach to trip planning that is realistic and applicable to extend accommodate longer trip for inbound trip from oversea.

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