

Exploring Tourists' Collaborative Web Search: Implications for System Design

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Abstract

Web searching has increasingly become a prevalent channel for tourists to conduct collaborative search for travelling information. In this paper, we report results of a user study on tourists' collaborative search behaviour on the Web. The study aims to identify the features of collaboration and factors affecting the collaboration while tourists search for tourism information. Data collection techniques included pre- and post-search questionnaires, Web search logs, online chat logs during collaborative search, and post-search interviews. The analysis of search logs and chat logs data reveals the types of information the users exchange during the collaborative search for tourism information which includes Web links, messages related to the travel plan, division of search tasks and sharing of search results. The participants selected different search engines and tourism related websites based on the search task and their needs. The results also provide the contextual factors which influence the collaboration for tourism information are: the budget for the travel, the previous knowledge and the previous visit and the technology. The findings have practical implications for the content and presentation of tourism websites as well as the design of interface that supports online collaborative tourism information searching.

Keywords: Web search behaviour, Collaborative information retrieval, Tourism, Collaboration.

1 Introduction

Information searches play an important role in travel decision-making (Snepenger, Meged, Snelling, and Worrall 1990; Fodness and Murray 1998; Gursoy and Chen 2000). Traditionally, the common information sources used by tourists or trip planners have included travel agents, tour brochures, newspaper advertisements, TV/radio and visitor offices (Ho and Liu 2005). Nowadays information technology is playing a fundamental role in the tourism industry. The Internet has been steadily increasing as an important information source for visitors in recent years. According to a recent survey conducted by the Department of Resources, Energy and Tourism, Tourism Research Australia (Snapshots 2011), in 2010, around 29 million

international and domestic visitors used the Internet for information prior to commencing their trips. Tourists search for various sorts of information from the Web, including information about airlines, hotels, interesting places, and weather conditions, for arranging a better travel plan. There is evidence suggesting that people tend to collaborate with each other for gathering tourism-related information when information is unavailable, incorrect or incomplete when they seek information alone (Reddy, Jansen and Spence 2010). Unfortunately, the existing browsers and search engines are designed to support single-user scenarios (Morris and Horvitz 2007). The inclusion of collaborative support in searching for tourism information may produce more effective results and enhance the search experience for users.

However, few studies have modelled the nature of collaborative information retrieval (CIR) in tourism domain in detail. A sound collaborative search model would be helpful to the design of appropriate CIR systems. Our study aims to investigate the nature of tourists' collaborative Web search behaviour and provide a better understanding of how multiple users collaborate via a tourism search system simultaneously.

Specifically, the study reported in this paper addresses the following research questions:

1. **What search systems and search keywords do tourists use for searching on the Web?**
2. **What sorts of information do the tourists exchange during collaborative Web searches?**
3. **What are the factors affecting collaborative searching for tourism information?**

The remainder of this paper is structured as follows. Section 2 provides a literature review of related studies both on tourists' information search behaviour and the existing CIR systems. This is followed by a description of the research design explaining data collection techniques and data analysis methods used for our user study (Section 3). The overall findings are presented and discussed in Section 4, and the implications for system design are outlined in Section 5. Further research directions are also discussed at the end of the paper (Section 6).

2 Related Studies

The literature concerning Web information searching/seeking behaviour is quite large, with some focusing on the tourism domain. For example, a model for tourist information search behaviour has been developed where search strategies are related to search contingencies, individual characteristics and behavioural search outcomes (Fodness and Murray 1999). Gursoy

and Terry Umbreit (2004) found that national culture is likely to influence a traveler's information search behaviour. It is postulated that the experience of a trip begins with anticipation and planning, and sequentially involves the movement to the destination, the on-site experience and activities, the movement back to the origin, and the recollection and sharing of the experience (Crompton 1992; Crompton and Ankomah 1993; Dellaert, Borgers and Timmermans 1997; McKercher 1998). In the case of most travel decisions, particularly to new destinations, the search is often predominantly external, involving considerable effort and a variety of information sources (Fodness and Murray 1997; Raitz and Dakhil 1989). Evidence suggests that travelers are likely to utilize the four broad external information sources when planning their trips: family and friends; destination specific literature; media; and travel consultants (Snepenger and Snepenger 1993). However, most of the existing tourism information searching behaviour literature and tourism-specific search systems are based on the assumption of a single user's behaviour. Our preliminary survey study (Mohammad Arif and Du 2012) on tourists' collaborative search behaviour revealed that i) People collaborate for tourism information for sharing information, getting accurate and updated information and sharing knowledge and experience, ii) Phone, email, instant message and social networks are the most used media for collaboration, and iii) people collaborated with both co-located and remotely located people. The specific types of information that tourists exchange during the search collaboration, however, have not been identified yet.

Twidale, Nichols and Paice (1997) argue that users often desire to collaborate on search tasks and a truly user-centered system must acknowledge and support collaborative interactions between users. Researchers have designed some device- or domain-specific technologies for facilitating collaborative searches. For instance, TeamSearch, developed by Morris, Paepcke, and Winograd (2006), allows up to four co-located people to use a digital tabletop to search through tagged photo collections. C-TORI by Hoppe and Zhao (1994) is a multiuser system for querying a relational database. It provides interactive query formulation and result browsing by supporting cooperation between multiple users. Query formulation allows multiple users to formulate queries jointly in which the queries made by one user are visible to the other users.

Division of task is identified to be one important characteristic of collaborative search task. SearchTogether designed by Morris and Horvitz (2007) is one of those systems which facilitates collaboration by supporting awareness, division of task and persistence during the process of searching the Web. SearchTogether incorporates the processes of formulating query, exploring search results, and evaluating the found information. Proper communication is also essential for the user to collaborate during the search. Reddy, Jansen and Krishnappa (2008) developed another CIR prototype MUST (Multi-User Search and Talk) where communication was the focus point.

Collaborative search task would occur not only within the co-located people but also within remotely located

people. MUSE (Multi User Search Engine) is a CIR system developed by Reddy, Jansen, and Spence (2010) to examine how team members who may not be physically co-present interact while collaboratively searching for information

The existing CIR systems are not that specific to tourism domain, with few exceptions. Prestipino (2004) proposed a community system supporting communication and collaboration in tourism which is thread and forum based. In our preliminary collaborative tourism information retrieval modelling, (Mohammad Arif, Du and Lee 2012), we proposed some significant features for tourism CIR tools which should include synchronous communication, supporting strong vocabulary, providing past query and search history, voice and video call option, and trip planner. However, the authors' suggestions for the incorporation of these features were beyond the scope of that study. These features could be incorporated into a CIR tool for tourism information.

Starting with destination choices and itinerary planning, dynamic information needs arise spontaneously during travel. A tourist may extend or shorten his or her stay at a particular place due to unavoidable but unforeseeable occurrences. There is a need for communication and feedback thus allowing travelers to refine the information and tour plan. Travelers tend to acquire information through communities (Prestipino 2004; Mitsche 2005) and these communities comprise networks of people who can exchange information. As discussed, prior research provided insight into the overall field of information search behavior for tourism domain but little on collaborative environment. Some limitations of previous studies are i) the collaboration were assumed asynchronously; ii) No mention was made about factors which influence tourism collaborative information retrieval; and iii) the studies were not conducted based on any tourism CIR tool.

For the purpose of the work reported here, definitions of some basic terms are required:

Collaborative Information Retrieval is defined as an information access activity related to a specific problem solving activity that, implicitly or explicitly, involves human beings interacting with other human(s) directly and/or through texts (e.g., documents, notes, figures) as information sources in an work task related information seeking and retrieval process either in a specific workplace setting or in a more open community or environment (Hansen and Jarvelin 2005).

Information Searching Behaviour refers to the 'micro-level' of behaviour employed by the searcher in interacting with information systems of all kinds. It consists of all the interactions with the system, whether at the level of human computer interaction (for example, use of the mouse and clicks on links) or at the intellectual level (for example, adopting a Boolean search strategy or determining the criteria for deciding which of two books selected from adjacent places on a library shelf is most useful). It also involves mental acts, such as judging the relevance of data or information retrieved (Wilson 2000).

Web Searching is the discovery of useful information through the search engines from the World Wide Web. The users interact with Web search engines by submitting

queries and the search engines return the results (Jansen and Spink 2004).

3 Research Design

A user study was designed to explore the collaborative search behaviour of tourists and investigate how they collaborate with each other and interact with the search systems for tourism information.

3.1 Study Participants

According to Fidel et al (2004), information retrieval is collaborative only when the actors involved are colleagues; or they are engaged in the same work processes. We set corresponding screening criteria for the selection of participants and criteria for choosing a pair. The study participants were asked to work in pairs to search for tourism information; both of the participants in a given pair needed to be known to each other. In addition, we required that the participants in a given pair either should have done some collaborative work with each other or travelled together before, thus ensuring that they not only know each other, but also feel comfortable while working together in a collaborative environment. Additional criteria were that all participants should have travelling experiences and should have Web searching experiences (both on general searching and on tourism information searching). A total of twenty students and staff (17 males and 3 females) from a large university in Australia participated in the study. The participants were formed into ten pairs. Their ages ranged from 26 to 55 years and more than half (60%) of them were in their 20s and 30s. All participants have had travelling experience (an average of 9.8 years) and online search experience (an average of 10.65 years).

3.2 Data Collection

The study was conducted in a laboratory setting in March 2012. Data were collected via pre- and post-search questionnaires, tourism information search session consisting of Web search logs and online chat logs, and after-search interview. Pre- and post- search questionnaires consisted of both multiple choice and open-ended responses concerning users' demographics, travelling experiences, search experiences, search engines used in the current search, reasons for collaboration, way of collaboration, problems encountered in collaborative tourism information searching and expected features for a collaborative information retrieval tool in the tourism domain. Search logs recorded the typed search keywords and queries, browsed websites/webpages and employed search systems during Web searching, while chat logs documented the communication and information being exchanged between users during the search.

Each of two computers were provided and installed with Camtasia software and Google Talk. Google Talk was employed to facilitate the group chatting and exchanging messages. The pair of participants could perform the search task and chat and talk through Google Talk for collaboration. The search logs and chat logs were captured by the Camtasia Studio software concurrently. Interviews were conducted to solicitate the participants' experience of the collaborative search activities, such as how they conduct collaborative search, how they help

each other during the collaboration, the problems they encountered during the collaborative search, the factors affecting collaborative tourism information search behaviour, and participants' expectation about a CIR tool for tourism information search. Interviews were recorded using a voice recorder for further transcription and analysis.

3.3 Search Tasks during Tourism Information Search Session

Three identical search tasks were assigned to each pair of the participants. Search task 1 and search task 2 were designed to investigate the tourists' collaborative search behaviour with and without prior knowledge about the destination, respectively. The third search task asked the participants to find tourism information satisfying multiple conditions. The three search tasks for three scenarios are described below:

3.3.1 Search Tasks 1 – Searching Information for an Unknown Place

You and some of your friends are planning to go to a country or place for one month travel. For a better trip plan you need to gather information about the country, city, accommodation, transport, foods, weather, attractions, etc. It is presumed that none of you has any prior knowledge about that country or place. Suppose you and one of your team members want to gather information for the trip. You and your teammate are sitting in a room and using two computers separately for searching travel/tourism information on the Web and both of you have the communication tools (e.g. Yahoo messenger, Google talk, Skype) to discuss through this tools during the Web search. Now you and your teammate are asked to find as much information as you can for your trip.

3.3.2 Search Task 2 – Searching Information for Known Place

You along with some of your friends are planning to go to a country or place which was visited before by at least one of you. For a better trip plan you need to gather information about the country, city, accommodation, transport, food, weather, attractions, etc. You and one of your team members want to gather information for the trip. You and your teammate (who has prior experience) are sitting in a room and using two computers separately for searching travel/tourism information on the Web and both of you have the communication tools to discuss through these tools during the Web search. Now you are asked to find information along with your teammate as much as you can for your trip.

3.3.3 Search Task 3 – Searching Complex Information

Along with some of your friends, you are planning to go to a country which was visited before by at least one of you. For a better trip plan you need to gather information about the country, city, accommodation, transport, foods, weather, attractions, etc. Suppose you and one of your friends want to gather information for the trip. You and your teammate (who has prior experience) are sitting in a

room and using two computers separately for searching travel/tourism information on the Web and both of you have communicating tools to facilitate discussions. Now you have to find accommodation located near to a sea beach. Moreover, the weather forecast should be good (say no showers and temperature between 20 °C and 30 °C) and the accommodation should cost less than a certain amount of money (say AUD 100) and the money should be in local currency.

3.4 Data Analysis

The data were analysed to uncover the characteristics of users' collaborative search behaviour for tourism information. Data from chat logs and search logs were analysed to address the first two research questions, i.e. gaining insight into the types of useful evidence of searchers' collaboration for tourism information, and the information they exchanged during collaboration. The interview data were examined to address the third research question, i.e. finding out the influential factors for collaborative Web search for tourism information. Grounded theory approach (Strauss and Corbin 1990) and content analysis (Schamber 2000) were two main qualitative analysis methods employed in this study. These analysis techniques have been widely used in prior user-Web/Information Retrieval system interaction studies (e.g. Du and Spink 2009; Du and Spink 2011; Reddy, Jansen and Spence 2010; Wang, Hawk and Tenopir 2000). The content analysis of pre- and post-questionnaires, search logs, chat logs and interview responses developed taxonomies of keywords for tourism information search reported by study participants. The content of different types of information exchanged by the participants during the collaborative searches and the factors by which these collaborative searches are influenced have also been reported from this analysis.

In the following section we report key results on the types of keywords used for tourism information searching, types of information and Web links the participants exchanged (Web links are the URL addresses which provide tourism information about such things as accommodation, flight, attraction and food), and the factors affecting the search during the collaboration for tourism information.

4 Results and Discussion

The results of the study on collaborative search behaviour of users and their interaction with the search systems for tourism information are presented here. The discussion on the findings is also reported.

4.1 Overview of Web Search

This section presents results about which search engines the participants used, which websites the participants visited for tourism information and why and which keywords they employed for searching tourism information.

4.1.1 Search Systems Used by the Participants

All the participants used the Internet Explorer as their browser. Search engines used include Google, Yahoo and Bing. The users visited different websites for tourism

information. Sometime they visited general websites but most of the time they visited tourism specific websites for information. The major websites visited by the participants and the reasons for visits are listed in Table 1. Some of these websites, for instance tripadvisor.com and agoda.com provide not only the information on accommodation, flight, restaurant etc. but also provide reviews and comments of other users. Chat logs and search logs show that these reviews and comments have an impact on travel plan decision.

Major Websites visited by the tourists	Reasons for visit
www.tripadvisor.com	For accommodation, flight and restaurants
www.flightcenter.com www.airfaresflights.com	For flight information
www.wotif.com www.expedia.com	For accommodation, flight and restaurants
www.agoda.com	For accommodation
www.orbitz.com	For accommodation, flight, transport, local culture
www.lonelyplanet.com	To know about local attractions
www.wikipedia.org wikitravel.org	To know about food, local culture and attractions
www.cheapflights.com	For flight information
www.bbc.co.uk	For weather information
www.youtube.com	To gather information about culture
www.farecompare.com	For fare comparison
www.booking.com	To know about booking information
www.hostels.com	For accommodation, flight, and restaurants
www.stayz.com	For accommodation
travel.yahoo.com	For attraction, food, tour package
finance.yahoo.com/currency	For currency conversion

Table 1: Major Websites visited by the participants and the reasons for visit.

4.1.2 Searching Keywords Used by the Participants

Type of keywords used by the participants for search query and the type of exchanged information (which we term as message) through chatting tool have been classified for a better understanding of the structure and contexts of keywords users had in mind during collaborative search. The classifications were based on the common topics within tourism contexts (destination, accommodation, attractions, local transport, food etc.). The detailed taxonomy derived is presented in the Table 2. Similar findings were reported in Mitsche's (2005) study but our presentation is an improvement of Mitsche's (2005) presentation in the way that we represent the keywords in two levels: first level keywords and second level keywords. The second level keywords were used within the corresponding first level keywords. This hierarchy of keywords helps to understand the structure and order of keywords employed by the users during the search for tourism information. For instance, a user searches for an accommodation in a particular city and found some hotels, hostels/motels and service apartments. For making the decision the user then

searches for hotel, hostel/motel and apartment separately to compare the cost and service of each of the accommodation types.

First Level Keywords	Second Level keywords	First Level Keywords	Second Level Keywords
Destination	Country City Island	Food and Restaurants	Halal Local Food
Accommodation	Hotel Hostel Apartment	Visa	Visa office Visa Type Visa Form
Attraction	Beach Shopping Mall Park Zoo Museum Building Sporting event	Culture	Local Song Local Movie Local language
Local Transport		Budget	Total Tour Cost Flight Cost Accommodation Cost Food Cost
Flight		Package Tour	
Security			

Table 2: Taxonomy of search keywords and information during tourism collaborative search.

4.2 Useful Evidence of Searchers' Collaboration and Types of Information Exchanged during Collaborative Search

Sharing of experiences, exchanging messages, exchanging Web links, talking to each other for planning and requesting information provide useful evidence of searchers' collaboration. In addition to the contextual classification of tourism keywords presented in Table 2, the exchanged information is divided into two subgroups: Web link (URL) and Message. Messages for the collaboration were also classified into three categories for all three search tasks which are: 1) Messages for planning - messages exchanged for planning the travel and searching information 2) Messages for division of search tasks – messages exchanged for distribution of the search, tasks or sub tasks and 3) Messages for sharing the search results – messages regarding the sharing of search results. In addition to this classification an extra message category for search task 2 and search task 3 has been identified which we term 'Message for sharing experiences'. For search task 2 and search task 3, some of the team members are familiar with the travel destination, so they shared their knowledge and experiences.

Table 3 shows the total number of Messages and URL information exchanged during the collaboration for three search tasks.

Task	Messages exchanged (No.)				Web link exchanged (No.)
	Messages for Planning	Messages for division of search task	Messages for sharing results	Messages for sharing experience	
Task 1	141	45	58	-	33
Task 2	130	28	26	59	29
Task 3	119	28	35	47	23

Table 3: Number of messages and Web links exchanged during collaboration information for three search tasks.

The interesting finding is that for all three search tasks the participants exchanged different kind of messages and Web links but for search task 1 there is no message exchanged for sharing experience. The reason is that for search task 1 no participant had previous experience to share.

Figure 1, Figure 2 and Figure 3 show the number of messages and Web links exchanged by each pair of participants for search task 1, search task 2 and search task 3 respectively. In all cases, the participants exchanged more messages than Web links while collaborating.

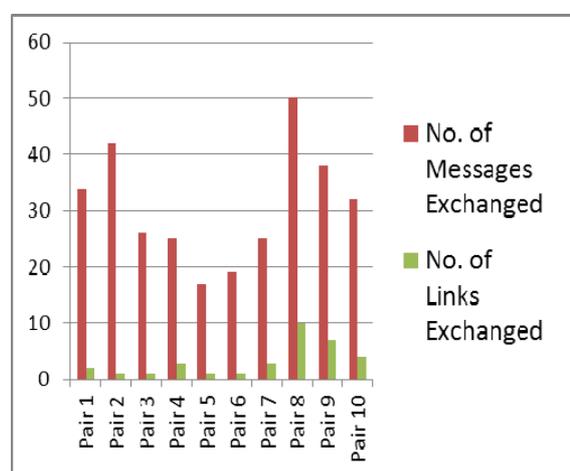


Figure 1: Number of messages and Web links used in Collaboration for search task 1 employed by each pair.

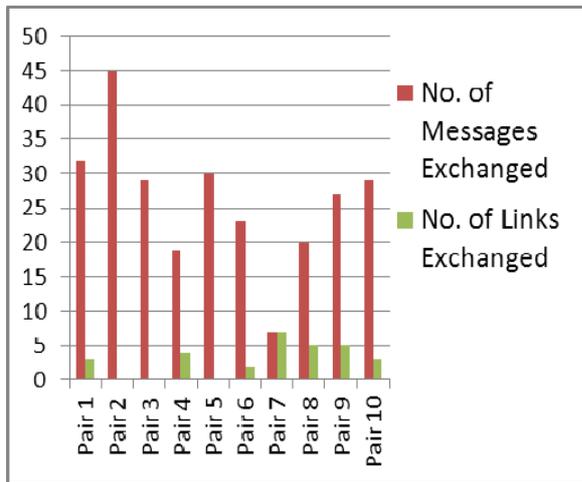


Figure 2: Number of messages and Web links used in Collaboration for search task 2 employed by each pair.

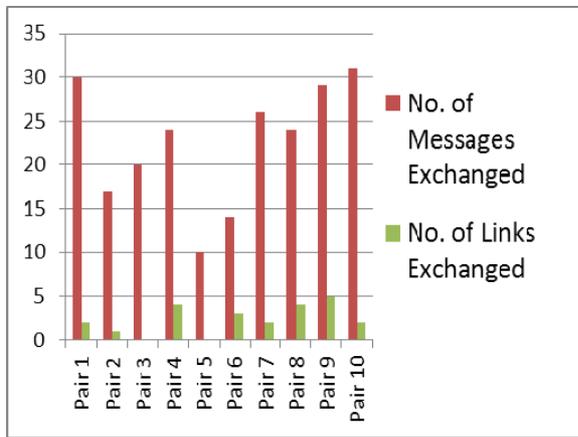


Figure 3: Number of messages and Web links used in Collaboration for search task 3 employed by each pair.

The data concerning collaboration through planning, division of search task and sharing of search results employed by each pair are illustrated in Figure 4, Figure 5 and Figure 6 for task 1, task 2 and task 3 respectively. For three search tasks, the participants collaborated more on planning (141 messages for task 1, 130 message for task 2 and 119 messages for task 3) compared to the number of messages on division of search task (45 messages for task 1, 28 messages for task 2 and 28 messages for task 3) and sharing search results (58 messages for task 1, 26 messages for task 2 and 35 message for task 3). For task 1 the participants exchanged more planning related messages than task 2 and task 3 as the latter two tasks were designed for known places. More messages regarding sharing of search results were also exchanged by the participants for task 1 compared to task 2 and task 3. As the place for searching tourism information described in task 1 was unknown to the participants, they exchanged more messages on planning and sharing of results. For search task 2 and search task 3 the users exchanged messages for sharing the experiences but for search task 1 no messages were exchanged for sharing experience. These findings indicate that previous

knowledge on destination has an impact on the collaborative search for tourism information.

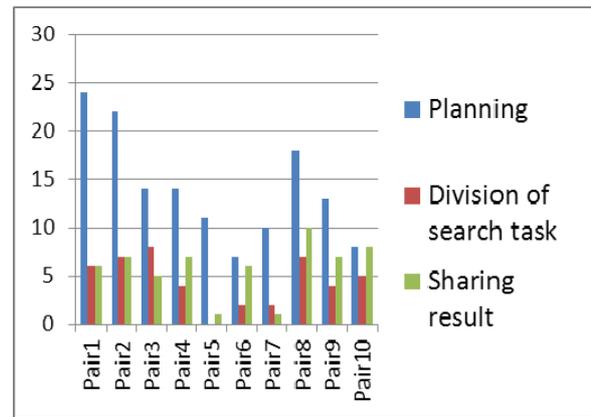


Figure 4: Collaboration on planning, task division and result sharing for task 1.

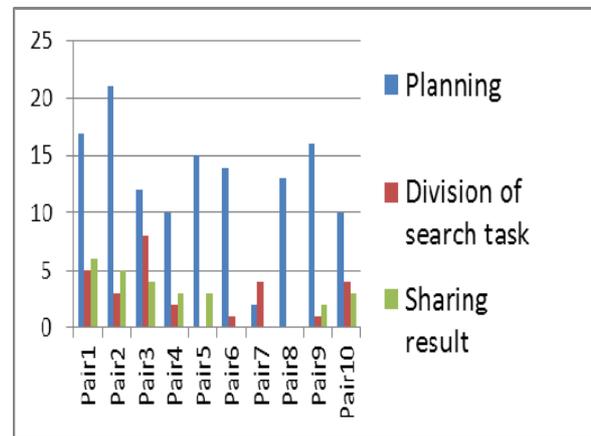


Figure 5: Collaboration on planning, task division and result sharing for task 2.

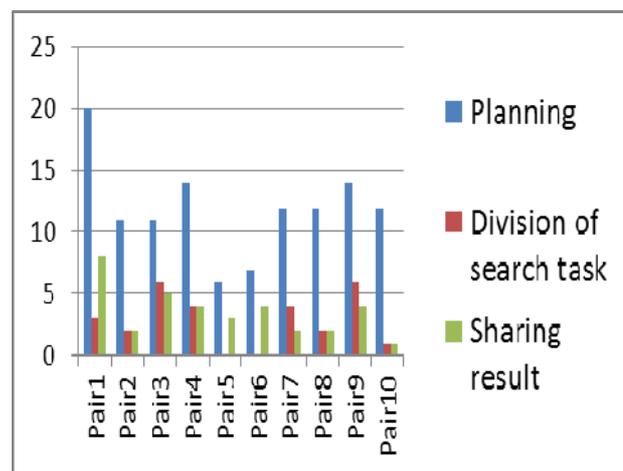


Figure 6: Collaboration on planning, task division and result sharing for task 3.

4.3 Factors that Influence Collaborative Searches for Tourism Information

Three primary factors have been identified that influence collaborative search for tourism information. Factors are:

4.3.1 Budget for the Travel

The different social classes demonstrate distinct preferences for a variety of products including leisure activities (Kotler and Armstrong 1995; Morrison 1996). The exact role and measurement of social class, however, continues to be controversial among consumer researchers (Boone and Kurtz 1995). Whereas social class typically is determined by things such as occupation, sources of income, accumulated wealth, highest level of income achieved, place of residence, and family history, some have argued that income alone suffices (Boone and Kurtz 1995). In this study, we found that budget which is associated with socioeconomic status affects collaborative tourism information searches. Travelers at lower income levels and higher income levels should match at a certain level of budget to plan for a better trip.

One participant noted:

“The problems depend on the budgeting because different people have different budget. So we have to take care of the budget of the other person if I am not searching for suppose flight information I have to accommodate the other person’s budget for the flight, I will look for cheapest one or I will look for the comfortable one or other person have to search for accommodation which cheaper or accommodation which is closer to something like that. So it depends on collaborative as well as people or touring in a group. So we have to take care of everybody’s budget.”

4.3.2 Prior Knowledge and Previous Visit

Tourists can gain prior knowledge from their experiences with the destination, from the experiences of others (collaborators), and by means of visual, verbal, and sensory stimuli, such as advertisements, newspaper/magazine articles, and television programming (Vogt and Fesenmaier 1998). Tourists also acquire information through ongoing searches (Bloch, Sherrell and Ridgway 1986). They process information gained through an ongoing search and store it in their long-term memory (Bettman 1979). This, in turn, forms their (prior) knowledge (Bettman 1979; Ratchford 2001). When a need arises to evaluate a destination, tourists first attempt to retrieve information from their long-term memory (Vogt and Fesenmaier 1998). Prior knowledge enables them to evaluate a destination’s attractiveness by retrieving information related to its attributes and attractions (Ratchford 2001). Thus, prior knowledge enhances internal memory and assists in the decision-making process (Brucks 1985). Findings on the relationship between prior knowledge and information search have been contradictory (Gursoy 2001). Some researchers concluded that there is a negative relationship between the amount of prior knowledge and the amount of external search or collaborative search (Coupey, Irwin, and Payne 1998; Fodness and Murray 1998). One

explanation for this negative relationship is that experienced consumers have prior knowledge about the attributes of various alternatives, and consequently do not need to acquire such information from external sources (Brucks 1985). They make decisions based on their prior knowledge (Vogt and Fesenmaier 1998). A second explanation is that experienced consumers perform more efficient information searches because they know what is important, useful, and where to get it (Coupey, Irwin, and Payne 1998) and they can disseminate the information to others. However, several researchers argued that prior knowledge encourages search by making it easier to process new information (Gursoy 2001; Rao and Sieben 1992). For example, knowledge of destination attributes and attractions may allow the individual to formulate more questions and, therefore, may lead to more external search.

Previous visitation to a destination is one of the most commonly examined factors likely to influence tourists’ information search behaviour and decision making process (Gursoy 2003; Vogt and Fesenmaier 1998). Fodness and Murray (1999) suggest that in the case of routine problem solving, decisions are made quickly and with little apparent effort due to the fact that for routine trips, pre-purchase information search probably is not necessary if previous visits provide an adequate basis for decision making. Knopf (1981), for example, studied the use of interpretative systems among tourist groups with differing levels of travel experience. He found that a more experienced tourist tends to use more detailed and specific travel information systems whereas the first-time tourist tends to use more general information. The results suggest that the level of travel experience has differential effects on the usage of travel information and travel search behaviour. For search task1, prior knowledge and previous visit have no direct impact as none of the team members knows anything about the destination. They have to explore all the information and interact more for taking any decision for the trip. But for other two search tasks (search task 2 and search task 3), the person who has the prior knowledge can help the other person in finding more information in parallel with his own search. One participant stated:

“Actually the first one (search task) is very interesting that both of us, the first one that we have to select a place where nobody been before. So that is in one sense it is very interesting and while searching these things we may face some little problems..... And for the second and third one, it needs time saving to collect the information because one may know very well about those place another one does not know, so one can share his experience another can be like, feel very much interest because when we say some story and some audience is there, they feel more interest about the story.”

4.3.3 Technology

One characteristic of our research is that it involves not just the collection and analysis of tourists search data but also the development of a prototype for a CIR system for the tourism domain. Although no single systematic method has been developed, Computer Supported

Cooperative Work (CSCW) and Human-Computer Interaction (HCI) researchers have developed effective methods for developing recommendations and designing systems (Ackerman and McDonald 1996; Moran and Carroll 1996; Twidale, Nichols and Paice 1997; McDonald and Ackerman 1998). Research shows that tourism has to be understood as a special stage for technology use (Gretzel 2011). Our intention, in this research, is to use the data analysis as a means to systematically question the assumptions behind traditional technology designs of conventional IR systems, and through this questioning, to generate design recommendations for tourism CIR systems. Through our laboratory user study, we explored how users collaborated during tourism information searching using traditional search technology. However, issues such as communication amongst collaborators have largely been ignored in current information retrieval tools in the tourism domain. Due to the lack of a proper tourism CIR system, tourists can not collaborate and can access only a tiny fraction of the information from the Web. The technologies that influence the online collaborative search for tourism domain are the search engines and communication facilities among the tourists. The participants were unable to see each other, and were instructed to communicate with each other only through the chat feature. We captured data through chat logs, search logs, observations, and interviews. We found that the chat feature played a prominent role in supporting the collaboration between team members during their information seeking and retrieval activities. Tourists demand more facilities from a CIR tool. As one participant noted that

“I think about these how you can provide the immediate communication between the two users or more users on their preferences and specially where to how to share the information as well because sort of like to have the screen share between us. We can actually point places, so we can show a map on where to go, what to do and what are the hotels to look forward so because we look at two different computers. So we are not sure what the other person looking at sometimes like things like hotel’s information. We need that information quickly to see whether we decide to go because sometime we have to book on line for hotels. So I need to find quick way of fully other person’s choices whether they want whether they approve of those particular one or not. So I think of a screen sharing else something.”

5 Implications for System Design

Our findings are based on the user study of collaborative search for tourism information. The users participated in the study are experienced in web searching and tourism information searching. Though the participants are not representative of all groups of people, we value their collaborative activities, their suggestions, the recommendations they made and their feedback on expectations from a collaborative information retrieval system for tourism domain. We have outlined how our findings reported in this paper can be combined for designing a CIR tool for tourism information are as follows:

Technology: Screen Sharing

The CIR tool can be incorporated with screen sharing technology. Screen sharing technology can help one team member to see the others' computer screen and avoid repeating the task the other person is doing. This will save search time and allow one member to see the information from the other without intervention.

Division of Search Task

The information search task can be divided into sub-tasks and each member of the collaborating team can perform some of the sub-tasks. With screen sharing technology embedded in the CIR tool, each member can see useful information from the others' screen. Each person does not need to search for all the information.

Sharing of Search Results

Search results are important for making travel decision. A CIR tool should have the facilities to broadcast the results to all the members of the collaborating team. It is not the ideal case that everybody always looks for the others' computer screen. If someone gets interesting information then he or she can broadcast the results to all.

Budget (cost) Minimisation

As different team members may have a different budget for a trip, a CIR tool may minimise this problem. A program (software) could be embedded within the CIR tool that can search for information (say accommodation cost) for an average budget of all collaborating members.

6 Conclusion and Future Work

In this paper we presented the preliminary results of a user study aiming at understanding the collaboration among tourists where they can benefit from exchanging query terms, Web links and other information during information searching. These findings will inform the design of a CIR system in the tourism domain. We observed 20 people (10 pairs). This is a higher number observed than that of Bruce, Fidel, et al. (2003) and Hyldegård (2006) and equal to Reddy, Jansen, and Krishnappa's (2008) size of participants. We cannot claim that our sample represents a wide range of information seekers for tourism information on the Web, though we believe this kind of collaborative search which we studied is widespread. More in-depth analysis is needed with respect to finding out how contextual factors, division of search tasks, sharing Web links, sharing search results and sharing of experiences influence the collaboration for planning and making the decisions for the trip, planning for the searching, and for tourism information searching. How these factors can be embedded into a CIR system and how the CIR system will support the collaborative search for tourism information is an area for further exploration.

7 References

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