ONLINE TRIP ADVISORY SYSTEM

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ABSTRACT

Travelling had been proven to have a lot of benefits. People get to relax their bodies and souls, increases knowledge, widen perspective, and enrich memory of travelling together with family and friends. Tourism in another hand, has also contributed significantly to the economy of Malaysia. The government has not only formed ministry to govern tourism, arts and culture in Malaysia, incentives and facilities are also offered to any parties or authorities that wish to develop or improve the tourism industry in Malaysia. Tourists had always had problems in deciding where should they go for holidays and how much would they spend during the holiday. Thus, Online Trip Advisory System (OTAS) is a solution to the problems. OTAS is a web-based system that uses questionnaire method to determine the preferences of the users. Based on the preferences captured from the questionnaire, OTAS implements rule-based technique to recommend to user the places to go for travel purposes. There is another questionnaire that is used to estimate the trip expenses for users. The answers of the questionnaire are the criteria of the trip planned by user. By implementing rule-based technique, OTAS is able to estimate the trip expenses for the users.

ABSTRAK

Melancong sudah terbukti mempunyai pelbagai kebaikan. Kita dapat merehatkan tubuh dan jiwa kita, menambah pengetahuan, melapangkan perspektif, dan memperkayakan kenangan melancong bersama keluarga dan sahabat handai. Dalam pada lain, pelancongan juga banyak menyumbang kepada ekonomi Malaysia. Oleh itu, kerajaan bukan sahaja membentuk kementerian yang menguruskan pelancongan, seni dan kebudayaan, insentif dan kemudahan juga turut diberikan kepada mana-mana pihak yang berhasrat untuk membangun dan menaiktaraf industri pelancongan di Malaysia. Pelancong selalu berdepan dengan masalah dalam membuat keputusan dalam tempat untuk pergi semasa cuti dan perbelanjaan yang bakal diperlukan semasa melancong. Oleh itu, *Online Trip Advisory System (OTAS)* merupakan jalan penyelesaian kepada masalah ini. OTAS merupakan satu system berasaskan web yang menggunakan kaedah senarai soalan untuk mengenalpasti keutamaan pengguna. Berdasarkan keutamaan yang didapati daripada senarai soalan terssebut, OTAS mengaplikasikan teknik berasaskan peraturan untuk menyarankan tempat yang sesuai untuk pengguna pergi melancong. Terdapat juga satu senarai soalan lain yang digunakan untuk menganggar perbelanjaan perjalanan untuk pengguna. Jawapan senarai soalan tersebut merupakan criteria perjalanan yang dirancang oleh pengguna. Dengan menggunakan teknik berasaskan peraturan juga, OTAS mampu untuk menganggar perbelanjaan perjalanan untuk pengguna tersebut.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

There are a lot of advantages of travelling. Travelling for tourism gets people connected by getting to know the cultures and traditions of the others. People strongly believes that travelling educate tourists' minds. The exploration of the journey widens the knowledge of the person itself. Travelling is also the best solution for those who want to escape from the boredom and wish to get away from the hustle-bustle of the city lives.

Realizing the advantages of travelling, the Malaysia government had taken initiative to promote tourism through programs such as Visit Malaysia Year 2007. Travel fairs such as MATTA (Malaysian Association of Tour and Travel Agents) fair is carried out occasionally to promote the tourism of Malaysia. However, these kinds of fair are not carried out regularly in every place in Malaysia. Tourists that would like to go on a trip do not get the information they want such as where to go and how to get to the destinations.

Online Trip Advisory System (OTAS) is thus an online system developed to provide information of tourism destinations to the tourists. The system provides the convenience to the clients to search for attractive tourism destinations without having to go to the tourist agencies or travel fairs.

The system will recommend where tourists should go for trip based on their preferences. Another function of OTAS is that it can estimate the trip expenses for the users based on the information given by the users. On top of that, OTAS will also provide clients with the information such as ways of getting to the destinations, prices of accommodations, food and beverages to try on, etc.

1.2 Problems Statement

Clients need to go to travel fairs or travel agencies to get the details of the tourist destinations by their own. As travel fairs are organized occasionally and not every place in Malaysia, clients will have to go to the travel agencies to get the information about the trips. Online Trip Advisory System is an online system which allows clients to get all the information that they want just by a few clicks. The system makes it convenient to the clients to search for the particular of the place of interests.

Attractive travel packages and tourist destinations advertised on the television, newspapers and magazines make people wish to go for trips to get away from their busy lives. However, the various advertisements make it hard for the tourists to choose where they want to go and which place that suits their preferences their best. Online Trip

Advisory System in this case, recommends its clients to the tourism destinations based on the preferences of the clients. For instance, if the client likes islands and beaches, places such as Pulau Tioman or Cherating will be recommended to the client.

There is also another case where clients know where they want to go but they do not know how much is the expenses for going on the trip, causing the client to end up overspending or not enough money to spend on. The system will estimate the expenses for the clients based on the accommodation and meals aspects.

1.3 Objectives

There are few objectives to be achieved in this project:

i. To implement rule-based techniques to estimate the expenses on a particular trip.
ii. To utilize the rule-based techniques to recommend the place of interest to clients based on their preferences.
iii. To develop an online system that provides information of tourism destinations to clients.

1.4 Project Scopes

There are several restrictions in this project:

i. Tourist destinations are limited within Pahang.
ii. Target users are limited to Malaysians.
iii. Expenses are estimated are based on the accommodation and food and beverages in destinations excluding transportation cost.

1.5 Thesis Organization

This thesis consists of a total of six chapters.

Chapter 1 describes the overview of the system. There are also problem statements, objectives, scopes and the thesis organization in this chapter.

Chapter 2 reviews on the critical points of the research carried out by other researcher. All relevant journals, technical papers, books and reports from those researchers will be discussed in detail in this chapter.

Chapter 3 explains the techniques and algorithms that will be used in conducting the study and software used in the implementation of the project.

Chapter 4 discusses about the implementation details of the project.

Chapter 5 consists of the result and discussion of the project. Results and data analysis obtained will be explained briefly in this chapter.

Last but not least, Chapter 6 concludes the entire thesis.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses about the literature review of Online Trip Advisory System (OTAS). Several related techniques, methods and languages will be explained in this chapter. Reviews on articles, journals, websites, systems and other resources relevant to this will also be described to provide further understanding. The purpose of this chapter is to give a clear view and to conduct studies on few existing systems and techniques that will be used in developing the OTAS.

2.2 Decision Support System

Decision support systems constitute a class of computer-based information systems including knowledge-based systems that support decision-making activities [1].

A well-designed DSS is an interactive software-based system which is meant to help decision makers to identify and solve problems, complete decision process tasks, and make decisions by compiling and analyzing useful information gained from raw data, personal knowledge, documents, or any other related resources.

There are a few classifications of DSS according to different authors. Haettenschwiler, uses the relationship with the user as the criterion to distinguish different types of DSS, which are passive, active and cooperative DSS. According to him, a passive DSS is a system that assists in the process of decision making without bringing out explicit decision suggestions or solutions. While an active DSS also aids in decision making process but it can bring out such decision suggestions or solutions. Meanwhile a cooperative DSS allows the decision maker (or its advisor) to modify, complete, or refine the decision suggestions provided by the system, before sending them back to the system for validation. The whole process then starts again, until a consolidated solution is generated [1].

Another taxonomy that is more widely used is the model created by David Power. There are basically five different types of DSS [2] which are:

i. Model-driven DSS
ii. Communication- driven DSS
iii. Document-driven DSS
iv. Data-driven DSS
v. Knowledge-driven DSS

The subsection below will discuss about the model-driven DSS followed by data-driven DSS. Some information about communication-driven DSS is then briefly explained. The rapid development in search engines and document storage technologies

made document-driven DSS a widely-used web-based system. The last subsection describes about the knowledge-driven DSS which also known as knowledgebase.

2.2.1 Model-driven DSS

Model-driven DSSs are complicated systems that help in analyzing decisions or choose between different options. Model-driven DSS emphasizes access to and manipulation of a model, for instance, financial, statistical, simulation or optimization model. Generally, model-driven DSS uses complex financial, simulation, optimization or multi-criteria models to provide decision support. These systems are usually being used by people who interact with an organization, or the managers and staff members of a business depending on how the model is designed. Model-driven DSSs are usually deployed in software or hardware in stand-alone PCs, client/server systems, or the web.

Dicodess is one of the examples of an open source model-driven DSS generator. Dicodess is a software framework for developing distributed cooperative decision support systems. It helps build DSS for mission-critical decision-making situations happening in dynamic, rapidly changing and often unpredictable distributed environments [3].

2.2.2 Communication-driven DSS

Communication-driven DSS, as its name suggests, prioritizes on communications, cooperation and shared decision-making support. It supports a group of people to work on a shared task. Communication-driven DSS has at least one of the following characteristics [4]:

- Enables communication between groups of people
- Facilitates the sharing of information
- Supports collaboration and coordination between people
- Supports group decision tasks

Group Decision Support Systems or GDSS is a hybrid type of DSS that allows multiple users to work collaboratively in group work using various software tools. Examples of group support tools are: audio conferencing, bulletin boards and web-conferencing, document sharing, electronic mail, computer supported face-to-face meeting software, and interactive video [4].

2.2.3 Document-driven DSS

Document-Driven DSS is the newest field in Decision Support. Document-driven DSS integrates a wide range of storage and processing technologies in order to provide complete document retrieval and analysis to assist in decision making. Document-Driven DSS focuses on the retrieval and management of unstructured documents in a variety of electronic formats which cannot be standardized easily. It is

designed to convert documents into precious business data. In general, there are three main categories of data used in document-driven DSS [5]:

i. Oral (i.e. transcribed conversations);
ii. Written (i.e. catalogs, reports, memos, e-mail and other correspondence);
iii. Video (i.e. TV commercials and news reports).

2.2.4 Data-driven DSS

Data-driven DSS focuses on the access to and manipulation of a time series of internal and external company data. Unlike document-driven DSS, data-driven DSS is used only for data that is standardized. Majority of data-driven DSSs are targeted employers of a company- managers, staffs and product or service suppliers. Data-driven DSS is used in database query in order to seek specific answers for specific purposes. Therefore, the data used in data-driven DSS must be standardized to provide accurate answers. There are three crucial elements required in order to produce a successful data-driven DSS [6]:

i. A process that carefully gauges the short- and long-term decision support needs of the business and what is required to meet those needs;
ii. A flexible, step-by-step plan for growth;
iii. A centralized data warehouse that can deliver a single, comprehensive, and up-to-date picture of the enterprise that all levels of the organization can access as needed.

2.2.5 Knowledge-driven DSS

Knowledge-driven DSSs or 'knowledgebase' suggests or recommends actions to be taken by the users particularly the management. It provides specialized problem-solving expertise which is stored as rules, facts, procedures, or in similar structures. These expertise contains knowledge on a particular domain, understanding of problems occurred within the domain, and skills in solving some of these problems. These systems store and apply knowledge for a variety of specific business problems. These problems include classification and configuration tasks such as loan approval, help desk support, risk management and application of company policies. A knowledge-driven DSS does not replace human decision makers in contrast to decision automation which uses some of the same technologies [7].

Knowledge-driven DSS supports access to relevant information during problem solving. The system and the user can access to the relevant data in order to solve a problem occurred. For instance, the system need to know what is the preference of the user in order to make suggestions to solve the particular problem. Besides, knowledge-driven DSS also supports problem recognition and problem structuring. It also supports problem formulation and analysis. A knowledge-based DSS contains an inference engine and knowledge based management system to provide expert assistance to the user to solve problem.

2.3 Benefits of Decision Support System [8]

i. Improves personal efficiency
ii. Expedites problem solving
iii. Facilitates interpersonal communication
iv. Promotes learning or training
v. Increases organizational control
vi. Generates new evidence in support of a decision
vii. Creates a competitive advantage over competition
viii. Encourages exploration and discovery on the part of the decision maker
ix. Reveals new approaches to thinking about the problem space

2.4 Decision Support System versus Expert System

Table 2.1 Decision Support System versus Expert System

Decision Support System	Expert System
• Aids in problem solving by allowing manipulation of data and models by the users. DSS do not learn from user.	• Allows experts to 'teach' computers about their field so that the system may support more of the decision making process for less expert decision makers.
• DSS most often contain equations that the system uses to solve problems or update reports immediately, and the users makes the final decisions on the basis of	• An expert system works from a much larger set of modeling rules, uses concepts from Artificial Intelligence to process and store the knowledge base & scans base to

the information.	suggest a final decision through inference.
• DSS only supports the decision making process & a human user is required to weigh all the factors in making a decision.	• ES must acquire knowledge from an expert and apply a large but standard set of probability based rules to make a decision in a specific problem setting.
• DSS does not replace human decision makers.	• ES replaces human decision makers.

2.5 Rule-based System

Rule-based programming model emerged as people wish to implement system that appears to think and reason like human beings, which in this case, the domain expert. Rules are a form of representation of a domain expert's knowledge and therefore are called rule-based. Rules are written as a set of if-then statements which explains the basis for expert systems that are being used widely in many fields. The idea of an expert system is that the knowledge of an expert is encoded into the rule set. When exposed to the same data, the expert system AI will perform in a similar manner to the expert. Beside rules, another essential component of rule-based system is the facts.

There are two types of rule-based, which are: forward chaining and backward chaining. In the forward chaining system, initial facts will be the starting of the set of rules, followed by the rules to draw new conclusions (or take certain actions) when given those initial facts. Whereas in backward chaining, which is the opposite of forward chaining, the rule will start with some hypothesis (or goal) that user is trying to

prove, followed by rules that would allow user to conclude that hypothesis, in another words, setting new sub goals to prove as you go.

Relatively, rule-based systems are simple model that can be adapted to any number of problems. Yet, as with any AI, a rule-based system has its own strengths as well as restrictions that must be taken into account before deciding that it is the right technique to use for a given problem. All in all, rule-based systems are only viable for problems for which any and all knowledge in the problem area can be written in the form of if-then rules and for which this problem area is not large. If the problem area is too large and there are too many rules, it can be difficult to maintain the system and one can suffer a performance hit from that.

2.5.1 Forward Chaining

Forward Chaining is the data-driven method technique in rule-based system. In a forward chaining system the facts in the system are represented in a working memory which is continually updated until a goal is reached. Rules in the system represent possible actions to take when specified conditions hold on items in the working memory. The conditions are usually patterns that must match items in the working memory, while the actions usually involve adding or deleting items from the working memory [9].