Tourism Management System Using Case-Based Reasoning

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Abstract

The purpose of this system is to develop a decision support system that can support the decision making to people who has to deal with essential information for visiting places. The main objective of this system is to assist people in making information enquiry cases by providing prompt recognition and giving respective correct information about the travel plan. This aim achieved by developing a classified system based on Case-based reasoning for travel choosing case. This methodology presents a foundation for a new technology of building computer aided diagnoses system. This technology directly addresses the problems found in the Artificial Intelligence (AI) techniques. To retrieve match case and similar cases from the case base that is similar to the user's query by using inductive retrieval algorithm. This system using CBR will assist the user to quickly diagnose the system, and thus provide pre-decision making.

1. Introduction

In human, the ability are limited to distinguish the facts and to carry out deep reasoning, we find ourselves confronted by uncertainty which is a result of the need for information, in particular, inaccuracy of measurements. The idea of Case-based reasoning has strong appeal because it is recognized that much of human expertise is experienced based and CBR is considered to capture this idea [5]. The main concept that characterized CBR is that expertises in a particular field is collected as a repository of cases, and each experience and solution or outcome is confined and archived in the case base for reuse and future reference [2].

Tour Plan Chooser usually solves new diagnostic problems by comparing them to previously seen cases. Conceptually, CBR methodology mirrors the type of reasoning from experience employed by previous choosers. This in turn provides the suitable tour choice in the right time on the user. The main idea of focusing on choosing tour plan cases is the fact that almost all people who live in a world are fond of traveling when they have leisure time. Essentially, people wish to make a suitable travel plan according to their available time and current enough money. This system is used to focus mainly on CBR that can assist the diagnosis of tour plan cases to draw equal case and similar cases on the chosen fields to make a pre-decision making.

We organize our paper as the following sections: In section 2, we present the related work concern with our system and we explain the concept of Case-based reasoning in section 3. We also present architecture of the system in section 4 and we introduce the development of system using CBR in section 5 and we conclude our conclusion in section 6. We intended to introduce this paper for describing how Case-based reasoning technique can be used in the Tourism Management System to attain available and correct cases on the given data at the right time.

2 Related Works

CAREFUL focuses on the first two steps of a Case-based reasoned, which are the case and problem representation and the case retrieval. The retrieval process proceeds in two steps. First the problem specification and case filtering step, which guides the operator in specifying the problem and identifies potentially interesting cases, and second the selection step that chooses the nearest cases. CBR implementation has mainly targeted on medicine for disease classification [4]. In this paper, we have implemented tourism management system for choosing an accurate tour plan for a tourist who gets confused with the parameters with which he has to deal with; factors like how much time is needed, what are essentials to be done for visiting a place, how to get there, how much money to spend, etc. System Administrator no needs to answer the same question many times and provide the users with an answer without the admin's intervention. It aims to automate the process of replying to the user's questions, by identifying relevant ones that have already made by others users and are stored in system's case-base.

3 Introduction to Case-based Reasoning

In most literatures Case-based reasoning (CBR) is defined as the problem-solving paradigm where past experiences are used to guide problem solving [1].

3.1 CBR Cycles

At the highest level of generality, the four processes; Retrieve, Reuse, Revise and Retain may describe a general CBR cycle [8];

- Retrieve the most similar case or cases
- Reuse the information and knowledge in that case to solve the problem
- Revise the proposed solution
- Retain the parts of this experience likely to be useful for future problem

Solving a new problem requires retrieving one or more previously experienced cases, reusing the case in one way or another, revising the solution based on reusing a previous case, and retaining the new experience by incorporating it into the existing knowledge-base (case-base). Each one of these four processes involves a number of more specific steps, as illustrated in Figure 1

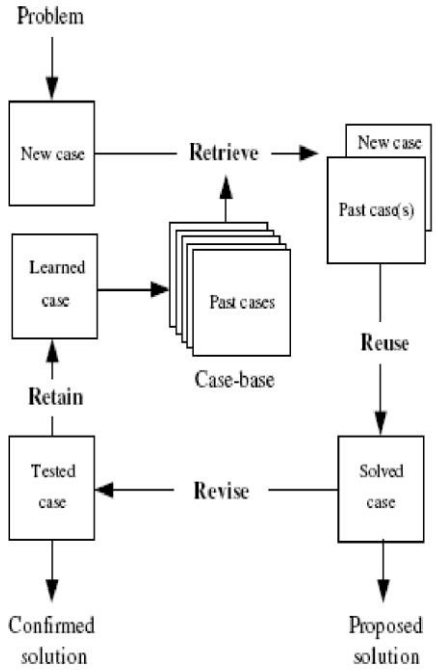

Fig 1.CBR Cycle

At the top of the Figure 1, an initial description of a problem defines a choosing a tour plan a new case. This new case is used to retrieve a case from case base. Through reuse the retrieved case is combined with the new case into a solved case, i.e. a proposed solution to the initial problem. This solution is tested for success - through the revise process, e.g. by being evaluated by a specialist or applied to the real world environment and repaired if failed. During retain process, useful experience is retained for future reuse, and the case base is updated by alteration of some existing cases or by a new learned case.

3.2 Case-Based Reasoning Techniques

3.2.1 Case Representation

A case is "a contextualized piece of knowledge representing an experience that teaches a lesson fundamental to archiving the goal of the reasoner". Typically, there are three major parts of a case [6]:

- Problem description : the state of the world while the case is happening and what problem needed solving at the time
- Solution : the stated or derived solution to the problem
- Outcome: the resulting of the above major parts of a case.

3.2.2 Case Indexing

An index is computational data structure that can be held in memory and also can search quickly [3]. In general, databases use index to speed up retrieval of data. Information in a case can be two types:

- Indexed information use for retrieval.
- Unneeded information that may provide information to user but not use in retrieval.

3.2.3 Case Retrieval

Case retrieval is a process that a retrieval algorithm retrieves the most similar cases to the current problem. Case retrieval requires a combination of searching and matching. In general, two retrieval techniques are used by the major CBR application: nearest-neighbor retrieval algorithm and inductive retrieval algorithm.

3.2.3.1 Inductive Retrieval

Inductive retrieval algorithm is a technique that determines which features do the best job in discriminating cases and generates a decision tree type structure to organize the case in memory [7]. This approach is very useful when a single case feature is required as a solution, and when that case feature is dependent upon others. Here is completed decision tree (see Figure.2) generated from the data in Table 1-1[7].The task is to predict the status of a loan from features of the loan applicant (income, job status and repayment).

Table 1-1. Four Loan Cases (Example)

Case No	Loan Status	Monthly Income	Job Status	Payment
Case 1	Good	$2000	Salaried	$200
Case 2	Very Bad	$4000	Salaried	$600
Case 3	Very good	$3000	Waged	$300
Case 4	Bad	$1500	Salaried	$400

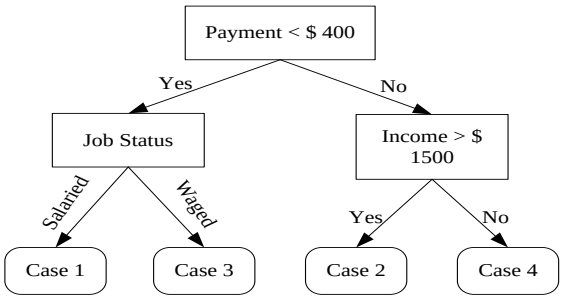

Fig 2. The Completed Decision Tree

Table 1-2. A target Case

Case No	Loan Status	Monthly Income	Job Status	Payment
Case X		$1000	Salaried	$600

If a target case were presented as shown in Table 1-2, to determine the loan status of the target case, the algorithm would traverse the decision tree and search for the best matching case. For the given the loan payment, the algorithm first selects the left branch. After this, the algorithm traverses to the node (Income>$ 1500) and selects the left branch according the monthly income. We can therefore predict that the best matching case is Case 4. This suggestion that the loan prospect is bad because Case 4's outcome is bad.

4 Architecture of Proposed System

The architecture of propose system implements tour plan using Case-based reasoning. This system has two sides, administrator and user. When the user makes an enquiry to the system, he/she enter query concerning tour plan information. Information is retrieved from the Case-based by inductive retrieval method. The system replies appropriate answer.

From administrator side, admin can add new tour plan case, reuse old case in the case based, revise that case and finally retain in the case base.

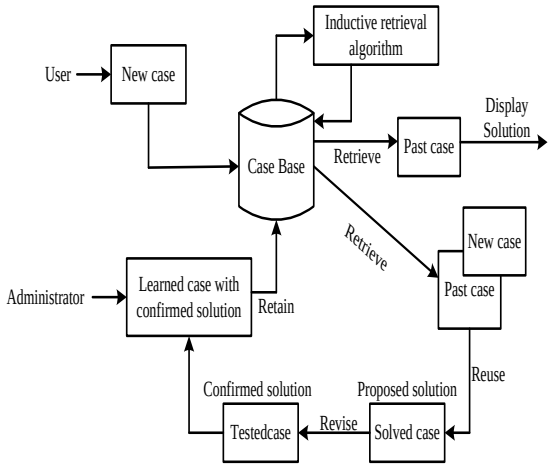

Fig.3 Proposed System Architecture

4.1 Process Flow of the System

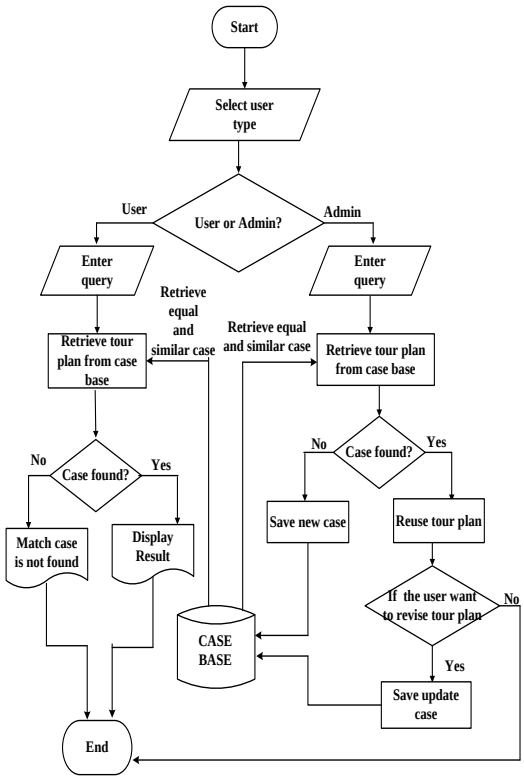

Fig.4 System flow for proposed the system

In this section, we give the specific descriptions about the processes of the system by means of system flow chart with CBR process. This system has two sides, admin and user sides. When the user makes an enquiry to the system, he/she can see past case that can be equal case and similar case with the current one. If one or more equal and similar cases

are not found for new case, the system will show message that equal and similar case are not found to the user.

If there is no similar case, this user question is reviewed by admin and admin will insert new information and save new case in the Case-base. If the admin want to update the old tour plan case, the admin has to enter that case number. The system searches and retrieves the related information to admin to reuse and revise the case. And then it saves the update tour plan case in Case-base. Therefore that case will be available when similar enquiry makes in future and the Case- base also becomes satisfied with the user enquiries as much as possible.

5 Implementation and Experimental Results

User can get the required information by identifying relevant ones that have already asked by other users and are stored in system's case base. This approach consists on saving new cases by administrator in a case base. If it found, the system answers automatically the user by giving him the stored case. A key step of this system consists of calculating equal and similarity cases. Retrieving similar case is done by comparing data fields that are located at the root node and child node levels. For example, in our system, transport name is root node level and local transport name is child node level. Testing has been done repeatedly by using different queries for accuracy and efficiency. If the user takes the following query:

Query-Case
Base Station- ChaungTha – NgweChaung
Day - 6 days – 5 nights
Transport Type- Saloon
Local Transport- Motorcycle
No. of days to hire
Local transport - 3

In response to the query, the following equal case were retrieved from case bases.

Retrieved equal case
Base Station - ChaungTha – NgweChaung
Day- 6 days – 5 nights
Transport Type - Saloon
Local Transport - Motorcycle
No. of days to hire
Local transport - 3
Total Cost - 39000

The following similar cases are also retrieved from case bases.

Retrieved similar case1
Base Station - ChaungTha – NgweChaung
Day - 6 days – 5 nights
Transport Type - Saloon
Local Transport - Rowing Boat
No. of days to hire
Local transport - 2
Total Cost - 35000

Retrieved similar case2
Base Station- ChaungTha – NgweChaung
Day - 6 days – 5 nights
Transport Type - Saloon
Total Cost - 30000

Table 1-3 Case Table in the System

casetable : Table

caseid	locationname	totalday	transportname	noofpeople	localname	nc
case1	-NgaPaLi-KamTharYar	-2-2	Ven Car	0		0
case10	-MaungMaKan-SatSae	-2-2	Ven Car	0	RowingBoat	2
case100	-ChaungThar-NgweSaung	-2-4	Ven Car	0		0
case101	-ChaungThar-NgweSaung	-2-4	Ven Car	0		0
case102	-ChaungThar-NgweSaung	-2-4	Ven Car	0		0
case103	-ChaungThar-NgweSaung	-2-4	Ven Car	0		0

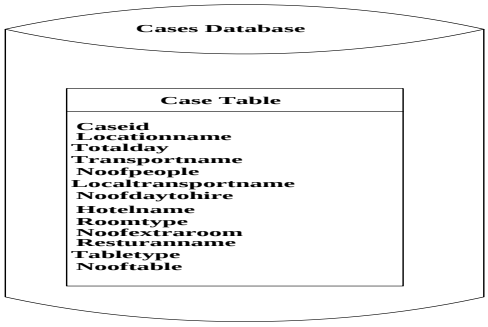

Fig.5 Data Fields in the Case Table

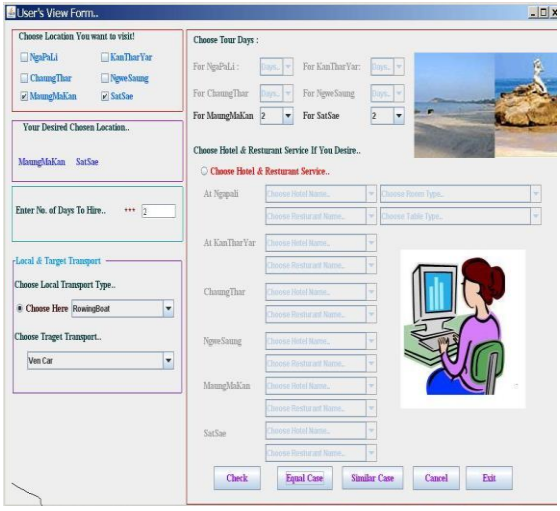

Fig.6 User View Form

User searches equal and similar cases from user's view form.

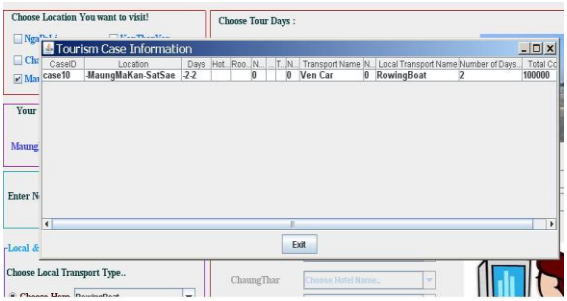

Fig.7 Result of Equal Case

Result view when the equal case is found**.**

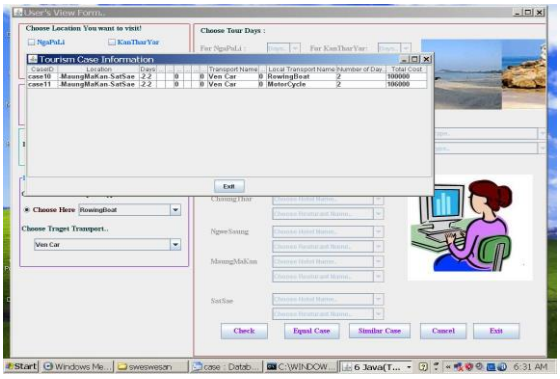

Fig.8 Result of Similar Cases

Result view when the similar cases are found.

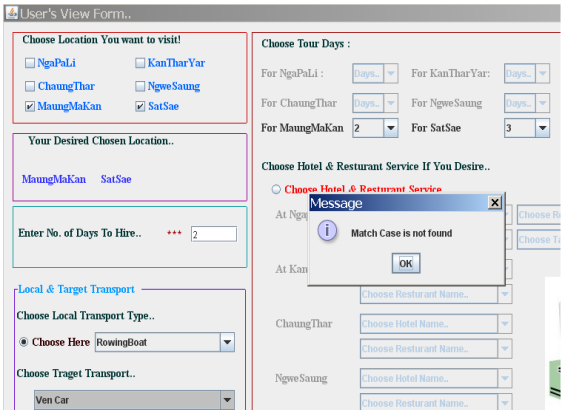

Fig.9 Result of no equal case

Warning message form when equal and similar cases are not found.

Tourism Management system can help address equal and approximate case as well as the problems the user faced with the choice of suitable case according to his current conditions. Users can get many advantages by using this system. The new case is created as a new solution and is added to the case base for future use and duplicates the updated case.

6 Conclusion

This system presents a solution to assist user in information enquiry case by providing prompt recognition and giving respective correct information. The solution presented utilizes the computer science field of artificial intelligence. This is realized through Case based reasoning. The CBR approach appears to have some advantages concerning system development if compared with other knowledge-based methods. CBR diagnosis can be used as an aid to guide them and make sure that they don't look important possibilities. CBR reduces the need for knowledge acquisition to establish how to characterize cases. The aim of case-based tourism management system is that to assist someone being exposed to choosing efficient tour plan which are relevant to his current chosen conditions and to give a relevant pre-decision making about the traveling case based on the facts available in the case base.

7. Reference

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