Chapter 11
Towards an Improved Hotel Reservation System:
A Fuzzy Approach to Improve Service Industries

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ABSTRACT

This chapter presents a tool that distinguishes selects and supplies, among all products with similar characteristics that appear in the catalogue of a company, the product that better adapts to the necessities of the users. In order to achieve this, it uses a search system based on fuzzy logic techniques, being able to handle vague information or of difficult specification and thus making possible to administer to the tool by means of rules of "common sense," which talk about indefinite amounts. A fundamental aspect that provides great flexibility to the application is that the system can be modified and adjusted by the expert in real time. This allows changing quickly the output product set and without stopping the operation of the system based on the necessities of the company. The results are codified in XML format, facilitating the interoperability between systems and allowing the execution of the tool in multiple operative systems, as they only have to process the generated content. The possibility of displaying the clients the products that they are looking for, directly responding to their necessities, guiding and advising them in the purchase that are ready to make, is a competitive advantage that the company must not let escape.

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1. INTRODUCTION

Kenteris, Gavalas and Economou (2009) stated that the convergence of IT and communications technologies and the rapid evolution of the Internet have been some of the most influential factors in tourism that have changed travelers' behavior. The hotel industry is one of the leading stakeholders in the tourism sector. This industry has been influenced by the internet in a deep way. Normally, hotels that have a purchase site online where they offer a catalogue, requires that the client searches the whole site looking for the service he or she desires. This forces the client to know some concrete aspects of the service to make successive searches in the different categories in which the products or services supplied by the company are included. How to deliver relevant information to both potential and existing customers has become an important task for the hospitality industry (Xiang et al. 2007), which, in many cases, is based on artificial intelligence techniques (Schiaffino & Amandi, 2009).

On the other hand, in order to model human logic in a mathematical way within computer environment, we resort to the so-called fuzzy logic, which allows expressing different values or levels of truth for a certain concept. This means that it is not codified in the binary form false/true, but in a similar way to the human reasoning, with rules like "if...., then...", using the theory of fuzzy logic and sets. The fuzzy or diffuse logic transforms inputs into outputs, a fuzzy set into another one. The rules of a fuzzy set define a set of zones that are overlapped, relating a complete series of inputs to another complete series of outputs.

Taking full advantage of fuzzy logic theories and expert systems, in this work authors present an architecture that support hotel reservation systems. The computer application of these theories is shaped in the denominated Expert Systems based on fuzzy knowledge, which use previously the information provided by experts in each concrete field. This way, the system works with flexibility responding to hotel reservation systems. Thanks to these systems we can model the knowledge of an expert in a certain field and construct therefore the necessary rules to respond to the concrete necessities of a client. In the following section we introduce the theory of fuzzy logic and sets and its application within the denominated expert systems.

2. KNOWLEDGE-BASED SYSTEMS

2.1. Fuzzy Logic

The fuzzy logic, or rather, the fuzzy logics, are basically multivalued logics that amplify the statements of the classic logics. The classic logics impose the values false or true to their statements and this way they model satisfactorily a great part of "the natural" reasoning. But the human reasoning really uses values that they do not have to be necessarily "so determinist". By means of the fuzzy logic, we can formulate mathematically slight knowledge like "a little cold" or "very hot", so that they are processed by computers quantifying vague human expressions, such as "very high" or "shining light". This way, the way the human being thinks can be applied to the programming of computers, sensors, Chips, etc. (Lee, 1990; Hájek & Godó, 1997).

This logic allows to thus quantify the imprecise descriptions that are used in the language and the gradual transitions in the household-electric devices like going from "dirty water" to "clean water" in a washing machine, being able to adjust the washing cycles through sensors. The ability of the fuzzy logic to process partial values really has been helpful for engineering.

In conclusion, fuzzy logic create mathematical approaches in the resolution of certain kinds of problems, producing exact results from vague data, being for that reason specially useful in electronic and computer applications.

The application of the "diffuse" or "fuzzy" adjective is due to the fact that the values that