Chapter XXII
Applying Fuzzy Data Mining to Tourism Area

R. A. Carrasco
Universidad de Granada, Spain

F. Araque
Universidad de Granada, Spain

A. Salguero
Universidad de Granada, Spain

M. A. Vila
Universidad de Granada, Spain

ABSTRACT

Soaring is a recreational activity and a competitive sport where individuals fly un-powered aircrafts known as gliders. The soaring location selection process depends on a number of factors, resulting in a complex decision-making task. In this chapter, we propose the use of an extension of the FSQL language for fuzzy queries as one of the techniques of data mining that can be used to solve the problem of offering a better place for soaring given the environmental conditions and customer characteristics. The FSQL language is an extension of the SQL language that permits us to write flexible conditions in our queries to a fuzzy or traditional database. After doing a process of clustering and characterization of a large customer database in a data warehouse, we are able to classify the next clients in a cluster and offer an answer according to it.

INTRODUCTION

We can define data mining (DM) as the process of extracting interesting information from the data in databases (DBs). According to Frawley, Piatetsky-Shapiro, and Matheus (1992), discovered knowledge is interesting when it is novel, potentially useful, and nontrivial to compute. A series of new
functionalities exists in DM, which reaffirms that it is an independent area: a high-level language for the discovered knowledge and for showing the results of the user’s requests for information (e.g., queries), its efficiency for large amounts of data, its handling of different types of data, and so forth. Another chapter of this volume includes an introduction to fuzzy data mining methods by Feil and Abonyi.

At present, we have an FSQL (fuzzy structured query language) server available for Oracle© Databases that allows us to query a fuzzy or classical database with FSQL. FSQL is an extension of SQL that permits us to write flexible conditions in our queries to a fuzzy or traditional database (Galindo, Urrutia, & Piattini, 2006). In this book, the reader can find another chapter by Urrutia, Tineo, and González studying the SQLf and FSQL languages. There is another chapter of this volume including a review of flexible querying written by Kačprzyk, Zadrożny, de Tré, and de Caluwe.

The use of data mining processes will help us to find patterns, features, and in general the knowledge we are looking for. In fact, to find the features, patterns, and so forth, we have used functional dependencies (FDs) and gradual dependencies (GRDs; Cubero & Vila, 1994) because they reflect immutable properties in a DB, hence helping us discover the knowledge we want. We have used an extension of FSQL, called dmFSQL, for this purpose, that is, to obtain FD on a practical level. Besides extending an FSQL server to handle different types of data and to be used as a useful tool for other DM process, we utilized clustering and fuzzy classification (Carrasco, Galindo, Vila, & Medina, 1999; Carrasco, Vila, & Araque, 2006; Carrasco, Vila, & Galindo, 2003).

Now, in this chapter, we discuss the use of dmFSQL to solve some real tourism businesses problems. This area needs a data mining system tailored to its needs because it involves managing very large databases holding data with very concrete meaning.

As pointed out by Lexhagen (2005), tourism businesses should try to develop more value-added services aimed to support the customer in the postconsumption phase. The goal is to build up strong customer relationships and loyalties, which may provide continuous buying behavior. Some examples of ICT value-added services that a tourism enterprise can offer are the automatic categorization of user travel preferences in order to match users up with travel options (Gretzel, Mitsche, Hwang, & Fesenmaier, 2004) or search engine interface metaphors for trip planning (Xiang & Fesenmaier, 2005).

Soaring is a recreational activity and competitive sport where individuals fly un-powered aircrafts known as gliders. The pilots of these gliders have had to sharpen their good meteorological sense to maximize their soaring experience. The selection of the best zone to fly in is directly related to a pilot’s skill. Soaring pilots get their lift from one main source: atmospheric instability. The more instability, the more height gained by pilots. The problem is that instability implies turbulences and novel pilots can be injured. We use the data recorded by the GPS (Global Positioning System) devices of pilots for discovering regularities and patterns to predict and select worthy zones to fly in for pilots depending on their characteristics. In order to provide information to predict patterns and trends more convincingly and to analyze a problem or situation more efficiently, an integrated DSS (decision support system) designed for this particular purpose is needed.

A DSS for adventure practice recommendation can be offered as a postconsumption value-added service by travel agencies to their customers. Therefore, once a customer makes an online reservation, the travel agency can offer advice about adventure practices available in the area that the customer may be interested in. Due to the high risk factor accompanying most adventure sports, a regular information system is far from being accurate. A more sophisticated ICT system is required in order to extract and process quality information from different sources. In this way, the customer can be provided with true helpful assistance to be aided in the decision-making process.
Related Content

Two Meta-Model for Object-Role Modeling
Dave Cuyler and Terry Halpin (2005). *Information Modeling Methods and Methodologies: Advanced Topics in Database Research* (pp. 17-42).
[www.igi-global.com/chapter/two-meta-model-object-role/23007](https://www.igi-global.com/chapter/two-meta-model-object-role/23007)

The Impact of Conflict Judgments between Developers and Testers in Software Development

Managing Organizational Hypermedia Documents: A Meta-Information System
Woojong Suh and Heeseok Lee (2002). *Advanced Topics in Database Research, Volume 1* (pp. 250-266).
[www.igi-global.com/chapter/managing-organizational-hypermedia-documents/4331](https://www.igi-global.com/chapter/managing-organizational-hypermedia-documents/4331)

Metrics for Data Warehouse Quality
[www.igi-global.com/chapter/metrics-data-warehouse-quality/9210](https://www.igi-global.com/chapter/metrics-data-warehouse-quality/9210)