A Fuzzy Query Mechanism for Human Resource Websites

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Abstract. Users' preferences often contain imprecision and uncertainty that are difficult for traditional human resource websites to deal with. In this paper, we apply the fuzzy logic theory to develop a fuzzy query mechanism for human resource websites. First, a storing mechanism is proposed to store fuzzy data into conventional database management systems without modifying DBMS models. Second, a fuzzy query language is proposed for users to make fuzzy queries on fuzzy databases. User's fuzzy requirement can be expressed by a fuzzy query which consists of a set of fuzzy conditions. Third, each fuzzy condition associates with a fuzzy importance to differentiate between fuzzy conditions according to their degrees of importance. Fourth, the fuzzy weighted average is utilized to aggregate all fuzzy conditions based on their degrees of importance and degrees of matching. Through the mutual compensation of all fuzzy conditions, the ordering of query results can be obtained according to user's preference.

Keywords: Fuzzy Query, Fuzzy Weighted Average, Human Resource Websites.

1 Introduction

In traditional human resource websites [1,2,3,4,5], users must state clear and definite conditions to make database queries. Unfortunately, users' preferences often contain imprecision and uncertainty that are difficult for traditional SQL queries to deal with. For example, when a user hopes to find a job which is near Taipei City and pays good salary, he can only make a SQL query like "SELECT * FROM Job WHERE (Location='Taipei City' or Location= 'Taipei County') and Salary $\geqq$ 40000". However, both 'near Taipei City' and 'good salary' are fuzzy terms and cannot be expressed appropriately by merely crisp values. A job which locates in 'Taoyuan County' with salary of 50000 may be acceptable in user's original intention, but it would be excluded by the traditional SQL query. SQL queries fail to deal with the compensation between different conditions. Moreover, traditional database queries cannot effectively differentiate between the retrieved jobs according to the degrees of satisfaction. The results to a query are very often a large amount of data, and the problem of the information overload makes it difficult for users to find really useful information.

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Hence, it is required to sort results based on the degrees of satisfaction to the retrieved jobs. Computing the degree of satisfaction to a job needs to aggregate all matching degrees on individual conditions (e.g. location, salary, industry type, experience, education etc.). It is insufficient for merely using the ORDER BY clause in SQL to sort results based on some attribute. In addition, traditional database queries do not differentiate between conditions according to the degrees of importance. One condition may be more important than another condition for some user (e.g. salary is more important than location in someone's opinion). Both the degree of importance and the degree of matching to every condition should be considered to compute the degree of satisfaction to a job. We summarize the problems of traditional human resource websites as follows.

- Users' preferences are usually imprecise and uncertain. Traditional database queries are based on total matching which is limited in its ability to come to grips with the issues of fuzziness.
- In users' opinions, different conditions may have different degrees of importance. Traditional database queries treat all conditions as the same importance and can not differentiate the importance of one condition from that of another.
- The problem of information overload makes it difficult for users to find really useful information from a large amount of query results. Traditional database queries do not support the ordering of query results by aggregating the degrees of matching to all conditions (i.e. no compensation between conditions).

To solve the mentioned problems, we apply the fuzzy logic theory [15] to develop a fuzzy query mechanism for human resource websites. First, a storing mechanism is proposed to store fuzzy data into conventional database management systems without modifying DBMS models. Second, a fuzzy query language is proposed for users to make fuzzy queries on fuzzy databases. User's fuzzy requirement can be expressed by a fuzzy query which consists of a set of fuzzy conditions. Third, each fuzzy condition associates with a fuzzy importance to differentiate between fuzzy conditions according to their degrees of importance. Fourth, the fuzzy weighted average is utilized to aggregate all fuzzy conditions based on their degrees of importance and degrees of matching. Through the mutual compensation of all fuzzy conditions, the ordering of query results can be obtained according to user's preference.

2 The Fuzzy Query Mechanism for Human Resource Websites

Applying the fuzzy logic theory to develop fuzzy queries on human resource websites, there are two issues that should be addressed:

- A storing mechanism is required to represent and store fuzzy data. It should be applied directly to existing databases without modifying DBMS models. Moreover, it should not only deal with the continuous and numerical fuzzy data but the discrete and lexical fuzzy data.
- A fuzzy query language is required to make fuzzy queries on fuzzy databases. The degrees of importance should be considered to differentiate between fuzzy conditions. The query results should be sorted by mutual compensation of all fuzzy conditions.