International Journal of Engineering and Technical Research (IJETR)
ISSN: 2321-0869 (O) 2454-4698 (P), Volume-3, Issue-7, July 2015

Review on "Fuzzy Querying based on GEFRED model"

Annu Rani, Sandeep Jaglan

***Abstract*— Fuzzy relational data bases have been extensively studied in a academic level. Regrettably, the repercussions of this works on the practical plan are insignificant. Medina et al. has residential a server named with fuzzy SQL, that supports flexible queries and base on a theoretic model called GEFRED Model. This server have been planned in PL/SQL language under Oracle database managing systems. For modelling the flexible queries along with the concept of fuzzy attribute, an addition of the SQL language known as fuzzy SQL has been define. The FSQL language extend the SQL language, used to conserve the flexible enquiries, along with a lot of fuzzy concepts. The FRDB is made-up has already been well-defined by the user. Inside the paper, we spread out the effort of medina et al. to represent a fresh design of fuzzy DBMS based on the GEFRED model. This design is established on the model of weak coupling with the DBMS Oracle. It documents, in certain, the explanation, the management and the examination of FRDB in FSQL language.**

Index Terms*— *Fuzzy Data Base, Fuzzy SQL, Fuzzy SQL server, GEFRED MODEL.

I. INTRODUCTION

Databases are a very significant component in computer systems. Because of their rising number and volume, good and precise ease of access to a database becomes even more essential. Organizations work with very huge data collections mostly stored in relational databases. Linguistic terms are attractive for data mining, analysis, propagation and decision making. The research area of fuzziness in Data Base Management Systems (DBMS) has resulted in a number of models intended at the representation of defective information in Data Bases, or at enabling non-particular queries (often called flexible queries) on predictable database schemas. Though, few works have been done from a convenient point of view.

The works of Medina *et al*. has been emphasized who introduced the GEFRED model in 1994 and its related language named FSQL. This language represents new concepts such as comparators, attributes, constants, etc. all comes with fuzzy. The thesis proposal is to execute a new structural design of the Fuzzy Relational DBMS (FRDBMS) based on the GEFRED model. This structural design is based on the weak coupling standard with the RDBMS SQL Server. The research area of fuzziness in Data Base Management Systems (DBMS) has resulted in a number of models aimed at the representation of faulty information in DataBases (DB), or at enabling non-particular queries (often called flexible queries) on conventional database schemas [1, 2]. Though, few works have been done from a convenient point of view. The mainstream of these works used the fuzzy sets formalism to model the linguistic terms as "moderate", "means" and to value the predicates as well as such terms. The important idea in these works consists in extending the SQL language and adding a additional layer to the relational DBMS to calculate the fuzzy predicates [3]. The use of this language is throughout a software named Fuzzy Query (FQ) [10]. Even though it solved a number of problems linked to the flexible queries modeling, FQ presents a number of limits: (1) it allows only the flexible querying of FRDB, (2) the FRDB is believed already implemented underneath Oracle, (3) the implementation of the DB is completed manually by the user, (4) FQ is not appropriate in practice for FRDB made up of more than ten tables. In this review paper, we propose a different design of the Fuzzy Relational DBMS (FRDBMS) based on the GEFRED model. This design is based on the weak coupling standard with the RDBMS Oracle. This FRDBMS offers all functionalities of a standard DBMS, in particular the depiction, the management and the querying of FRDB. Further this beginning, this paper includes different phases. Phase 1 represents the basic concepts of FRDB. Phase 2 represents the architectures previously used for the flexible querying modeling. Section 3 represents the architecture type of FRDBMS. Section 4 represents our new architecture of the FRDBMS as well as its accomplishment. Section 5 makes an estimation of this work and gives some potential perspectives of it.

II. GENERAL DEFINITIONS

A. *Database*: A typical database is a organised with collection of information (records or data) stored in a computer.

B. *Fuzzy Database*: This database is a database which is capable to deal with uncertain or incomplete information using fuzzy logic.

C. *Fuzzy Logic*: Fuzzy logic is derived from fuzzy set theory by Zadeh (1965) dealing with analysis that is estimated rather than correctly deduced from standard predicate logic. It can be consideration of as the application side of fuzzy set theory dealing with well attention out real world expert values for a compound problem.

D. *Fuzzy Attribute*: In a database perspective, a fuzzy attribute is an attribute of a row or entity in a database, included with a fuzzy data type, that allows storing information of fuzzy. From time to time, if a typical attribute permits fuzzy queries, then this is also known as fuzzy attribute, since it have only particular of the fuzzy attribute depiction.

Annu Rani, Computer Science and Engineering, N.C. College of Engineering, Israna Panipat, India
Sandeep Jaglan, Computer Science and Engineering, N.C. College of Engineering, Israna Panipat, India

E**.** *Flexible Query***:** A query which have weakly defined limitations and conditions. Generally, the limitations of this generous of queries are modeled as fuzzy sets. The outcomes of this query are permitted to partially match the conditions of the query.

F**.** *FRDB*: FRDB is an addition of the relational database. This extension introduces fuzzy predicates under shapes of linguistic terms that, over the time of a flexible querying, allows to have a range of answers (each one with a membership degree) in order to offer to the user all intermediate variations between the completely satisfactory answers and those completely dissatisfactory .

G**.** *FRDBMS***:** It is an extension of the relational DBMS in order to treat, store and interrogate imprecise data.

The FRDB Models: Two broad approaches are possibilistic model and the similarity relation based model. These models are considered in a very simple shape and consist in adding a degree, usually in the intermission [0, 1], to each tuple. They permits retaining the homogeneity of the data in DB. The main models under both approaches are Prade-Testemale, Umano-Fukami, Buckles-Petry, Zemankova-Kaendel and GEFRED of Medina *et al*... This last model constitutes an eclectic synthesis of the various models published so far with the aim of dealing with the problem of representation and treatment of fuzzy information by using relational DB.

III. FUZZY SETS

This theory was first introduced by Lotfi A. Zadeh3 in 1965. The original interpretation of fuzzy sets arises from a generalization of the classic concept of a subset extended to embrace the description of "vague" and "imprecise" notions. This generalization is made considering that the membership of an element to a set becomes a "fuzzy" or "vague" model. In the case of some components, it could not be clear if they belong to a set or not. Then, their membership may be measured by a degree, commonly known as the "membership degree" of that element to the set, and it takes a value in the interval [0, 1] by agreement. Using typical logic, it is only probable to treaty with evidence that is totally true or totally false; it is not possible to handle information inherent to a problem that is imprecise or imperfect, on the other hand this type of information holds data that would allow a better solution to the problem. In classic logic, the membership of an element to a set is represented by 0 if it does not belong and by 1 if it does, having the set {0, 1}. but, in fuzzy logic, it is prolonged to the interval [0, 1]. Therefore, it could be said that fuzzy logic is an extension of the classic systems (Zadeh, 1992). Fuzzy logic is the logic behind approximate reasoning instead of precise reasoning. Its significance lies in the point that many types of human reasoning, particularly the reasoning based on common sense, are by nature approximate. Note the great potential that the usage of involvement grades signifies by permitting something qualitative (fuzzy) to be expressed quantitatively by means of the membership degree.

A fuzzy set could be well-defined more properly as:

Fuzzy Set: A over a universe of discourse X (a finite or infinite interval within which the fuzzy set can take a value) is a set of pairs:

$A = \{A(x) / x: x \in X, A(x) \in [0, 1] \in \Re\}$

where mA(x) is called the membership degree of the element x to the fuzzy set A. This degree ranges between the extremes **0** and **1** of the dominion of the real numbers:

mA(x) = 0 indicates that x in no way belongs to the fuzzy set A,

and *mA(x) = 1* indicates that x completely belongs to the fuzzy set A.

Note that *mA(x) = 0.5* is the greatest uncertainty point.

Sometimes, instead of giving an exhaustive list of all the pairs that make up the set (discreet values), a definition is given for the function mA(x), denoting to it as characteristic function or membership function. The universe X may be called *underlying universe* or underlying domain, and in a more generic way, a fuzzy set *A* can be considered a function m*A* that matches each element of the universe of discourse X with its membership degree to the set *A*:

$A(x)$: X→ [0, 1]

The universe of discourse X, or the set of considered values, can be of these two types:

- Finite or discrete universe of discourse { } X = $x1, x2,..., xn$, where a fuzzy set *A* can be represented by:

$A = 1 / x1 + 2 / x2 + ... + n / xn$

Where mi with $i = 1, 2, ..., n$ represents the membership degree of the element *xi*. Normally, the elements with a zero degree are not listed. Here, the + does not have the same significance as in an arithmetical sum, but rather, it has the meaning of aggregation, and the / does not signify division, but rather the association of both values.

- Infinite universe of discourse, where a fuzzy set *A* over X can be represented by:

$$A = \int A(x) / x \quad (4)$$

Actually, the membership function m*A*(*x*) of a fuzzy set *A* expresses the degree in which *x* verifies the category specified by *A*.

Linguistic Label is that word, in natural language, which states or classifies a fuzzy set that may or may not be formally defined. With this definition, we can assure that in our everyday life we use several linguistic labels for expressing abstract concepts such as "young," "old," "cold," "warm," "inexpensive," "expensive," and so onward. Basically, a linguistic variable is a variable that may have fuzzy values. A linguistic variable is characterized by the name of the variable, the underlying universe, a set of linguistic labels, or how to generate these names and their definitions. The intuitive definition of the labels not only varies from one to another person depending on the instant, on the other hand also it differs with the framework in which it is applied. For example, a "high" person and a "high" building do not measure the same.

IV. USEFULNESS OF FUZZY LOGIC IN DATABASE CONTEXT

Database querying process by the two valued realization of Boolean algebra is not adequate and offers solution based on the fuzzy logic because the fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual "true or false" logic. It contracts with perceptive that is approximate rather than precise to solve problems in a way that more resembles human logic. Fuzzy queries have emerged in the last 25 years to deal with the necessity to

soften the two-valued Boolean logic in relational DB. A fuzzy query arrangement is an boundary to consumers to acquire information from database using (quasi) natural language verdicts. Several fuzzy query executions has been suggested, causing in a little dissimilar languages. Even though there are specific differences according to the particularities of different executions, the response to a fuzzy query verdict is usually a grade of histories, categorized by the grade of equivalent.

The research on fuzzy databases has been developed for about 20 years and concentrated mainly on the following areas:

1. Fuzzy querying in classical database
2. Fuzzy queries on fuzzy databases
3. Extending classical data models in order to achieve fuzzy databases
4. Fuzzy data mining techniques

The querying with imprecision, contrary to classical queries, permits the operators the usage of fuzzy linguistic tags (also named linguistic terms) and express their preferences to better qualify the data they wish to get. An example of a flexible query, also known as fuzzy query in this framework, would be "list of the *young* workers, employed in branch with *huge budget*." The query comprises the fuzzy linguistic labels "*young*" and "*big budget*." These labels are words, in regular language, that precise or recognize a fuzzy set.

The research area of fuzziness in Data Base Management Systems (DBMS) has resulted in a number of models aimed at the representation of imperfect information in Databases (DB), or at enabling non-precise queries (often called flexible queries) on conventional database schemas. The essential idea in these works consists in extending the SQL language and adding a supplementary layer to the relational DBMS to evaluate the fuzzy.

V. PROBLEM STATEMENT

Fuzzy relational data bases have been extensively studied in a theoretical level. Unfortunately, the repercussions of these works on the practical plan are negligible. The majority of these works used the fuzzy sets formalism to model the linguistic terms as "moderate", "means" and to value the predicates including such terms. Medina et al. have developed a server known as fuzzy SQL, supporting flexible queries and based on a theoretic model called GEFRED. This type of server has been automated in PL/SQL language beneath Oracle database management systems. To model the flexible queries and the concept of fuzzy attributes, an addition of the SQL language named fuzzy SQL has been defined. The FSQL language prolongs the SQL language, to maintain the flexible queries, within several fuzzy perceptions. The FRDB is supposed has already been defined by the user. In this proposal, we extend the work of medina et al. to implement a software layer which will convert FSQL queries to the SQL queries. This design is built on the concept of weak coupling with the DBMS SQL Server.

The following are the purposes of this paper:

- To facilitate the user a powerful and easy to use data mining tool which allows him to query data from databases by using linguistic expressions in order to improve the quality of selection process.
- To propose a new architecture of FRDBMS based on the GEFRED model which makes use of weak coupling concept with the Oracle DBMS.

To construct a prototype by the addition of a layer around a classic RDBMS SQL Server while supposing that the user already implements the FRDB manually.

REFERENCES

[1] Bosc P. and Pivert O., "SQLf: A Relational Database Languageb5n6for Fuzzy Querying," Computer Journal of IEEE Transactions on Fuzzy Systems, vol. 3, no. 1, pp. 80-89, 1995.
[2] Bosc P., Lietard L., and Pivert O., "Bases de Donnees et Flexibilite: Les Requetes Graduelles," Computer Journal of Techniques et Sciences Informatiques, vol. 7, no. 3, pp. 355-378, 1998.
[3] Bosc P. and Pivert O., "SQLf Query Functionality on Top of a Regular Relational Database Management," in Proceedings of Knowledge Management in Fuzzy Databases, Heidelberg, pp. 171-190, 2000.
[4] Buckles P. and Petry E., "A Fuzzy Representation of Data for Relational Databases," in Proceedings of Fuzzy Sets and Systems, USA, pp. 213-226, 1982.
[5] Galindo J., Medina M., Pons O., and Cubero J., "A Server for Fuzzy SQL Queries," in Proceedings of Lecture Notes in Artificial Intelligence (LNAI), USA, pp. 165-175, 1998.
[6] Galindo J., "Tratamiento de la Imprecision en Bases de Datos Relacionales: Extension Del Modelo y Adaptacion de los SGBD Actuales," Doctoral Thesis, Universidad de Granada, 1999.
[7] Galindo J., Aranda M., Caro L., Guevara A., and Aguayo A., "Applying Fuzzy Databases and FSQL to the Management of Rural Accommodation," Tourist Management Journal, vol. 23, no. 6, pp. 623-629, 2002.
[8] Galindo J., Urrutia A., and Piattini M., Representation of Fuzzy Knowledge in Relational Databases, IEEE Computer Society, 2004
[9] Galindo J. "New Characteristics in FSQL: A Fuzzy SQL for Fuzzy Databases," Computer Journal of WSEAS Transactions on Information Science and Applications, vol. 2, no. 2, pp. 161- 169, 2005.
[10] Galindo J., "Le Serveur FSQL and FQ," http: www.lcc.uma.es/personal/ppgg/FSQL.html, 2008.
[11] Galindo J., Urrutia A., and Piattini M., Fuzzy Databases: Modeling, Design and Implementation, Idea Group Publishing,Hershey, 2006
[12] Grissa A., Ben Hassine A., and Ounelli H., "Extended_FSQL_Server: A Server for the Description and the Manipulation of FRDB," in Proceedings of the 4th International Multi Conference on Computer Science and Information Technology (CSIT), Jordan, pp. 454- 464, 2006.
[13] Medina M., Pons O., and Vila A., "An Elemental Processor of Fuzzy SQL," Computer Journal of Math Ware and Soft Computing, vol. 1, no. 3, pp. 285-295, 1994