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A Survey on Strategies Developed for Mining Functional Dependencies

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ABSTRACT: This paper details about various methods prevailing in literature on strategies developed for mining functional dependencies. Efficient discovery of functional and approximate dependencies of partition is discussed in detail. An efficient algorithm for discovery functional and approximate dependencies called TANE is examined. Mining functional dependencies from data and Depth first algorithms and influencing for AFD mining are examined in detail. Polynomial time queries over inconsistent databases with functional dependency and foreign keys are reviewed. This survey would promote a lot of research in the area of mining functional dependencies.

KEYWORDS: Functional Dependency, Depth-First Algorithm, Foreign Key, Data Anonymization, Information Mining.

I. INTRODUCTION

Several authors have undergone many survey and created their algorithms in securing moving object data. The main objective is that is to hide the spatio-temporal data to the anonymous user. The major reason is that to protect the isolated data. Since data privacy preserving is been our major goal we can do various research in this field. Ghinita et al. [44][2009] considered two conceal mechanisms in which an adversary background knowledge of maximum speed to infer more specific location information. Based on the velocity of the movement of the object the attacker could assume that the object is under a particular movement as an example if Alice is walking on the road based on her velocity of speed the attacker could find that Alice is waling if she is driving a car the attacker could find that she is driving. So based on the velocity based adversary knowledge the trajectory data could be predicted. So Ghinita considered two types of attacks: (1) the initiative without back ground information more on sensitive location map. (2) The initiative with such background information. In the first case, the privacy requirement is not allow to an attacker to diagnose the user location in the sub-region in the pretext region. In the second case, the privacy requirement direct that the probability of association between the user and the location. She consider two types of transformation on trajectory databases, temporal and spatial cloaking. The author planned two alternatives in achieving temporal cloaking: request deferral and postdating. The space and time error are generated in the temporal cloaking and spatial cloaking. In this for the low velocity the request are safe but in the case that the velocity increase the request are deferred/postdated. As the velocity increases the request for temporal data should be processed while moving. Correlation-based adversary knowledge: In this data publishing most of the attacker uses this correlation-based adversary knowledge because the attacker attain by correlating the timestamps of the user. The attacker finds the highest probability of the user location by forward motion and the backward motion model during a period of time the attacker correlates the user location by their movement. Jin et al [45], implemented two protocols for publishing the data. In the first they cluster the location of the users and then the data is published if the forward breach probability is below the user-defined threshold. Then they recluster the data at a period of time and find out the backward breach probability, by correlating forward breach probability and backward breach probability the data is published if the data does not reach the user-defined threshold. But these approaches are more effective to defend against the attacks but not to stop it.
II. EFFICIENT DISCOVERY OF FUNCTIONAL AND APPROXIMATE DEPENDENCIES G PARTITION

In this paper, the author gave a new approach to find FDs, with partitioning the sets of rows with respect to their attribute values. These partitioning will inturn make us easy and very efficient to work with it and the rows also can be identified easily. The efficient in practice is a new algorithm which is been used in these experiments. By this algorithm, the author shown that the running time is been increased in the several orders of magnitude over the previously published result and also the author said that these algorithm will be applicable also for a larger databases.

III. TANE: AN EFFICIENT ALGORITHM FOR DISCOVERY FUNCTIONAL AND APPROXIMATE DEPENDENCIES

In this paper, the author defines about the discovery of FDs, which uses an important database analysis technique called TANE, an efficient algorithm for finding FD’s from large database. TANE is an algorithm which is based on partitioning or splitting the rows that will inturn decide the validity of the FD’s. This will make easier and an efficient way while the same thing dealing with FDs. In this paper, the experimental result shows that the algorithm TANE is fast internms of practice. For a bench mark DB the running times are improved by several magnitudes among the previous works. The algorithm which was defined is also useful in the case of larger datasets.

IV. MINING FUNCTIONAL DEPENDENCIES FROM DATA

In this paper, the author proposes an efficient rule discovery algorithm called FD-Mine which is used for mining functional dependencies from data. The author identified the equivalence among the attributes by using Armstrong’s axioms for FDs that is used to decrease the size of the dataset and the number of FDs to be checked. The author initially described four effective pruning rules which inturn reduces the size of space allocated to search i.e., search space. The number of FDs that is to be verified is decreased by skipping the search for FDs that are implied logically by FDs which is been discovered already. The author also presented the FD-Mine algorithm that incorporates the four pruning rules to the mining process. The FD-Mine algorithm described in this paper, shows that the pruning does not inturn will loss the useful information. In this paper, the author put forth the future work can also done to extend the FD-Mine algorithm inorder to discover other data dependencies like multi-valued dependencies and conditional dependencies . And the FD-Mine approach may be applied to the data cleaning phase of datamining, inturn to reduce the size of a relation without losing any useful information.

V. DEPTH FIRST ALGORITHMS AND INFLUENCING FOR AFD MINING

In this paper, the author mentioned that the task of searching a powerset lattice is part of many problem domains. The algorithm Approximate Functional Dependencies (AFDs) is used for finding lattices which uses bottom-up breadth first search (BU-BFS). In this paper, the author introduces a part of the MOLS framework which is an method used for managing and utilizing gathered information about the status of rules in the lattice. These gather information has some limited agility with BU-BFS. The ability of depth first search (DFS) algorithm is used inorder to infer the information is also been explored in this paper. The paper focus on algorithms that is motivated by the idea which improves performance from an algorithm is more likely to persist as users make different approximation measured. In this paper, the author presented a machine independent evaluation where difference in the performance can be attributed to the algorithm directly.

VI. POLYNOMIAL TIME QUERIIES OVER INCONSISTENT DATABASES WITH FUNCTIONAL DEPENDENCY AND FOREIGN KEYS

In this paper, the author addressed the problem of efficient computing consistent answers to queries over relational databases that may be inconsistent to FDs and foreign key constraints which is obtained from repaired databases repair strategy. The author considered a particular set of FD known as canonical and a repair strategy that has only tuple updates and insertions are also allowed to restore the consistency. The tuples can be inserted when the foreign key are validated. The author proposed an approach that allows us to obtain a unique repaired database that may be computed
in polynomial time. The author also identified the classes of constraints that has a consistent answers to particular classes of conjunctive queries that can be computed in polynomial time.

```sql
SQL> select * from employ;
TID ID NAME JYEAR WAGES SUPUSR
---- ----------- ------ ------- -------
1 E1 AAAAA 2001 5000 Carol
2 E2 BBBBB 2005 4000 Alex
3 E3 CCCCC 2009 2500 Blent
4 E4 DDDDD 2013 1000 King
```

```sql
SQL> select * from tb_edetails;
TID PH_NUMBER ADDRESS GENDER
---- ------------- ---------------
1 7788594455 Alexion Road Male
2 887794455 Carol Road Female
3 988874455 Red wood road Male
4 997894455 Rosewood road Female
```

In these tables, TID is assigned as primary key in `EMPLOY` table and TID is used as foreign key in `TB_EDETAILS` table. Using these tables and primary key constraints we can identify the FD’s in the table through the java program.

VII. CONCLUSION AND FUTURE WORK

This paper detailed about various methods prevailing in literature on strategies developed for mining functional dependencies. Efficient discovery of functional and approximate dependencies of partition is discussed in detail. An efficient algorithm for discovery functional and approximate dependencies called TANE is examined. Mining functional dependencies from data and Depth first algorithms and influencing for AFD mining are examined in detail. Polynomial time queries over inconsistent databases with functional dependency and foreign keys are reviewed. This survey would promote a lot of research in the area of mining functional dependencies.

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