IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 1 Issue 6, August 2014.
www.ijiset.com
ISSN 2348 – 7968

A methodology for direct and indirect Discrimination prevention in data mining

S.R.Rathnapriya[1], J.Jebathangam [2], Dr.A.Muthukumaravel[3],

[1]Research Scholar, Department of Computer Science, VELS University, Chennai, Tamilnadu, India.

[2]Assistant Professor, Department of IT, VELS University, Chennai, Tamilnadu, India.

[3]Professor & Head, Department of MCA, Bharath University, Chennai, Tamilnadu, India.

ABSTRACT

Data mining is an increasingly important technology for extracting useful knowledge hidden in large collections of data. There are, however, negative social perceptions about data mining, among which potential privacy invasion and potential discrimination. The latter consists of unfairly treating people on the basis of their belonging to a specific group. Automated data collection and data mining techniques such as classification rule mining have paved the way to making automated decisions, like loan granting/denial, insurance premium computation, etc. If the training data sets are biased in what regards discriminatory (sensitive) attributes like gender, race, religion, etc., discriminatory decisions may ensue. For this reason, antidiscrimination techniques including discrimination discovery and prevention have been introduced in data mining. Discrimination can be either direct or indirect. Direct discrimination occurs when decisions are made based on sensitive attributes. Indirect discrimination occurs when decisions are made based on non sensitive attributes which are strongly correlated with biased sensitive ones. In this paper, we tackle discrimination prevention in data mining and propose new techniques applicable for direct or indirect discrimination prevention individually or both at the same time. We discuss how to clean training data sets and outsourced data sets in such a way that direct and/or indirect discriminatory decision rules are converted to legitimate (nondiscriminatory) classification rules. We also propose new metrics to evaluate the utility of the proposed approaches and we compare these approaches. The experimental evaluations demonstrate that the proposed techniques are effective at removing direct and/or indirect discrimination biases in the original data set while preserving data quality.

INTRODUCTION

In sociology, discrimination is the prejudicial treatment of an individual based on their membership in a certain group or category. It involves denying to members of one group opportunities that are available to other groups. There is a list of antidiscrimination acts, which are laws designed to prevent discrimination on the basis of a number of attributes (e.g., race, religion, gender, nationality, disability, marital status, and age) in various settings (e.g., employment and training, access to public services, credit and insurance, etc.). For example, the European Union implements the principle of equal treatment between men and women in the access to and supply of goods and services in or in matters of employment and occupation. Although there are some laws against discrimination, all of them are reactive, not proactive. Technology can add proactively to legislation by contributing discrimination discovery and prevention techniques.

ISSN 2348 – 7968

Services in the information society allow for automatic and routine collection of large amounts of data. Those data are often used to train association/classification rules in view of making automated decisions, like loan granting/denial, insurance premium computation, personnel selection, etc. At first sight, automating decisions may give a sense of fairness: classification rules do not guide themselves by personal preferences. However, at a closer look, one realizes that classification rules are actually learned by the system (e.g., loan granting) from the training data. If the training data are inherently biased for or against a particular community (e.g., foreigners), the learned model may show a discriminatory prejudiced behavior. In other words, the system may infer that just being foreign is a legitimate reason for loan denial. Discovering such potential biases and eliminating them from the training data without harming their decision making utility is therefore highly desirable. One must prevent data mining from becoming itself a source of discrimination, due to data mining tasks generating discriminatory models from biased data sets as part of the automated decision making. In it is demonstrated that data mining can be both a source of discrimination and a means for discovering discrimination.

LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, ten next steps are to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system the above consideration r taken into account for developing the proposed system. More specifically, our major contributions are summarized as follows:

- We present a home-aware community model and extend the centrality concept from a single node to a group of nodes. Unlike existing community models, each community home in our model is assumed to have a throw box to store and transmit messages.
- We present a rule of optimal opportunistic routing through a theoretical analysis. We design a reverse Dijkstra algorithm to determine the optimal relays and compute the minimum expected delivery delay. Based on this, the CAOR algorithm can achieve the optimal opportunistic routing performance.
- We turn the routing in $|V|$ mobile nodes into a routing in $|L|$ ($|L| \ll |V|$) community homes by virtue of the home-aware community model. Moreover, we prove that the simplification will not sacrifice the routing performance. As a result, the network scale and the maintaining costs are reduced significantly.
- We first design the CAOR algorithm for the case that each home has a real throw box. Then, we extend it to the case of virtual throw box by letting the members of a community with high centralities to act as the home of this community. Simulation results show that it can achieve a nearly optimal performance.

EXISTING SYSTEM

In Existing system the initial idea of using rule protection and rule generalization for direct discrimination prevention, but we gave no

ISSN 2348 – 7968

experimental results. We introduced the use of rule protection in a different way for indirect discrimination prevention and we gave some preliminary experimental results. In this paper, we present a unified approach to direct and indirect discrimination prevention, with finalized algorithms and all possible data transformation methods based on rule protection and/ or rule generalization that could be applied for direct or indirect discrimination prevention. We specify the different features of each method. Since methods in our earlier papers could only deal with either direct or indirect discrimination, the methods described in this paper are new.

PROPOSED SYSTEM

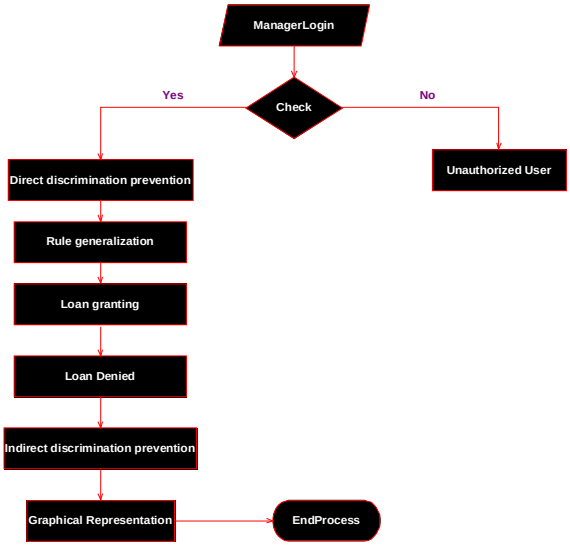
We propose new utility measures to evaluate the different proposed discrimination prevention methods in terms of data quality and discrimination removal for both direct and indirect discrimination. Based on the proposed measures, we present extensive experimental results for two well known data sets and compare the different possible methods for direct or indirect discrimination prevention to find out which methods could be more successful in terms of low information loss and high discrimination removal. The approach is based on mining classification rules (the inductive part) and reasoning on them (the deductive part) on the basis of quantitative measures of discrimination that formalize legal definitions of discrimination.

SYSTEM DESIGN

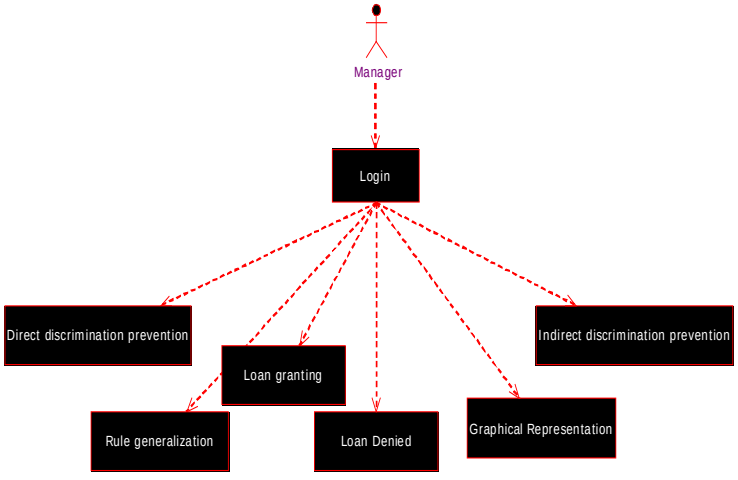
The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of the input data to the system, various processing carried out on these data, and the output data is generated by the system.

Data Flow Diagram:

(Manager):

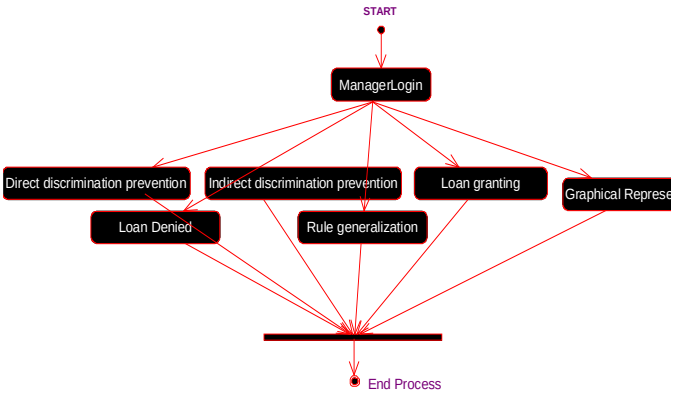


UsecaseDiagram (Manager)

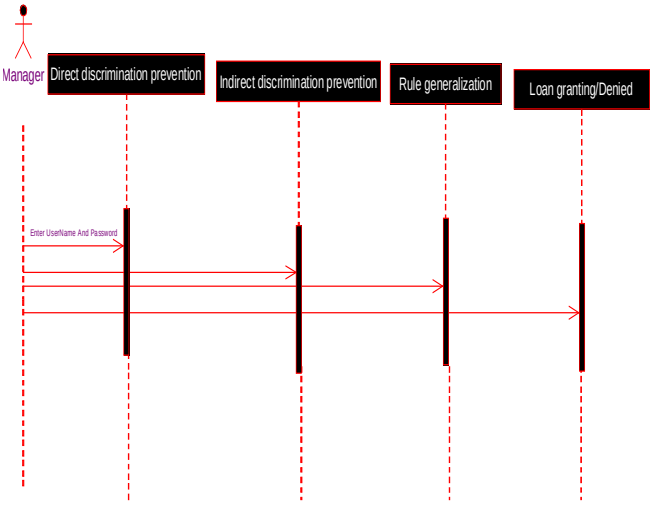


ACTIVITY DIAGRAM: (Manager)

ISSN 2348 – 7968



Sequence Diagram (Manager)



Greedy Algorithm:

A **greedy algorithm** is a mathematical process that recursively constructs a set of objects from the smallest possible constituent parts. Recursion is an approach to problem solving in which the solution to a particular problem depends on solutions to smaller instances of the same problem.

Greedy algorithms look for simple, easy-to-implement solutions to complex, multi-step problems by deciding which next step will provide the most obvious benefit. Such algorithms are called greedy because while the optimal solution to each smaller instance will provide an immediate output, the algorithm doesn't consider the larger problem as a whole. Once a decision has been made, it is never reconsidered.

The advantage to using a greedy algorithm is that solutions to smaller instances of the problem can be straightforward and easy to understand. The disadvantage is that it is entirely possible that the most optimal short-term solutions may lead to the worst long-term outcome. Greedy algorithms are often used in ad hoc mobile networking to efficiently route packets with the fewest number of hops and the shortest delay possible. They are also used in machine learning, business intelligence (BI), artificial intelligence (AI) and programming.

MODULES DESCRIPTION

- Profile-Based Personalization
- Generalizing User Profile
- Online Decision
- Privacy Protection in PWS System

OBJECTIVES

- Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.
- It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

ISSN 2348 – 7968

- When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow

RESULT:

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

- Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.
- Select methods for presenting information.
- Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- ❖ Convey information about past activities, current status or projections of the Future.
- ❖ Signal important events, opportunities, problems, or warnings.
- ❖ Trigger an action.
- ❖ Confirm an action.

References

[1] R. Agrawal and R. Srikant, "Fast Algorithms for Mining Association Rules in Large Databases," Proc. 20th Int'l Conf. Very Large Data Bases, pp. 487-499, 1994.

[2] T. Calders and S. Verwer, "Three Naive Bayes Approaches for Discrimination-Free Classification," Data Mining and Knowledge Discovery, vol. 21, no. 2, pp. 277-292, 2010.

[3] European Commission, "EU Directive 2004/113/EC on Anti-Discrimination," http://eur-lex.europa.eu/LexUriServ/ LexUriServ.do?uri=OJ:L:2004:373:0037:0043:EN:PDF, 2004.

[4] European Commission, "EU Directive 2006/54/EC on Anti-Discrimination," http://eur-lex.europa.eu/LexUriServ/= LexUriServ.do?uri=OJ:L:2006:204:0023:0036:en:PDF, 2006.

[5] S. Hajian, J. Domingo-Ferrer, and A. Martı´nez-Balleste´, "Discrimination Prevention in Data Mining for Intrusion and Crime Detection," Proc. IEEE Symp. Computational Intelligence in Cyber Security (CICS '11), pp. 47-54, 2011.

[6] S. Hajian, J. Domingo-Ferrer, and A. Martı´nez-Balleste´, "Rule Protection for Indirect Discrimination Prevention in Data Mining," Proc. Eighth Int'l Conf. Modeling Decisions for Artificial Intelligence (MDAI '11), pp. 211-222, 2011.

[7] F. Kamiran and T. Calders, "Classification without Discrimination," Proc. IEEE Second Int'l Conf. Computer, Control and Comm. (IC4 '09), 2009.

[8] F. Kamiran and T. Calders, "Classification with no Discrimination by Preferential Sampling," Proc. 19th Machine Learning Conf. Belgium and The Netherlands, 2010.

[9] F. Kamiran, T. Calders, and M. Pechenizkiy, "Discrimination Aware Decision Tree Learning," Proc. IEEE Int'l Conf. Data Mining (ICDM '10), pp. 869-874, 2010.

[10] R. Kohavi and B. Becker, "UCI Repository of Machine Learning Databases," http://archive.ics.uci.edu/ml/datasets/Adult, 1996.