New Technique for Discrimination Prevention using Data Mining

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***Abstract* — Data mining is a progressively more important technology for extracting useful data from large amount of data. There are unfavorable social viewpoint about data mining, among which potential privacy intrusion and possible discrimination. The latter consists of unjustly dealing with people on the basis of their belonging to a peculiar group. Automatic data set and data mining approaches such as classification rule mining have covered the way to making computerized decisions, like loan accepting/denial. If the training data sets are limited in what regards discriminatory attributes like religion, gender, race, etc., discriminatory decisions may ensue. For this cause, antidiscrimination approaches including discrimination detection and prevention have been introduced in data mining. Discrimination can be either direct or indirect. Direct discrimination appears when judgments are made based on responsive attributes. Indirect discrimination appears when decisions are made based on no sensitive attributes which are strongly associated with prejudiced sensitive ones. In this paper, we tackle discrimination avoidance in data mining and recommend new techniques useful for direct or indirect discrimination prevention individually or both at the equivalent time. We confer how to clean teaching 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. The experimental calculations reveal that the suggested techniques are impressive at removing direct and/or indirect discrimination biases in the initial data set while protecting data quality.**

***Index Terms*— Anti-discrimination, Data Mining, Direct and indirect discrimination prevention, Privacy, Rule generalization, Rule protection.**

I. INTRODUCTION

In sociology, discrimination is the harmful treatment of a sole based on their participation in a certain group. It includes refusing to members of one group opportunities that are available to other groups. There is a listing of anti-discrimination actions, where laws are designed to avoid discrimination on the basis of a number of attributes like religion, gender, nationality, disability etc in various fields like employment exercise, grant loan, credit and insurance, etc.

Although there are some laws against discrimination, most of them are reactive but not proactive. Technology can add proactivity to legalization by contributing discrimination detection and prevention techniques.

One must prohibit data mining from becoming itself a source of discrimination, due to data mining tasks automatically creating discriminatory models from biased data sets as part of the automated decision making. It is demonstrated that data mining can be both a origin of discrimination and a means for discovering discrimination.

II. LITERATURE SURVEY

Despite the large deployment of information systems on data mining technology in decision making, the problem of antidiscrimination in data mining did not receive much notice until 2008 [6]. Some proposals are oriented to the detection and portion of discrimination. Others pledge with the avoidance of discrimination.

The detection of discriminatory decisions was first suggested by Pedreschi et al. [6], [9]. The technique is based on mining classification rules (the inductive part) and reasoning on them (the deductive part) on the basis of significant measures of discrimination that describe legal definitions of discrimination.

In economics and social sciences, discrimination has been studied for over half a century. There are several decision-making tasks which lend themselves to discrimination, e.g. loan approval and selection of staff.

Three approaches are conceivable:

• Pre-processing: Reconstruct the source data in such a way that the discriminatory biases contained in the original data are removed so that no inequitable decision rule can be mined from the reconstructed data and apply any of the usual data mining algorithms. In this pre-processing approaches of data transformation and hierarchy-based simplification can be adapted from the privacy preservation literature [4], [5].

• In-processing: Modify the data mining algorithms in such a way that the resulting models do not include inequitable decision rules. For example, an another approach to cleaning the discrimination from the original data set is suggested in [3].

• Post-processing: Modify the consequential data mining models, as a replacement for cleaning the original data set or altering the data mining algorithms. For instance, in [7], a confidence-altering approach is suggested for classification rules inferred by the CPAR(Classification based on Predictive Association Rule) algorithm. Removing sensitive attributes from data solve the direct discrimination problem but fail to crack indirect discrimination. As declared in [5] there may be other attributes that are highly correlated with the other sensitive one. In this paper, we focus on discrimination prevention based on pre-processing, because the pre-processing approach seems the most flexible one.

III. PROPOSED WORK

The propose work concentrate on discrimination prevention based on pre-processing, because the pre-processing approach seems the most flexible one: it does not have need of changing the typical data mining algorithms, not like the in-processing approach, and it permits data publishing (rather than just knowledge publishing), contrasting the post-processing approach. The propose work overcome the limitation based on pre-processing publish so far. In the propose work new data transformation methods are based on actions for both direct and indirect discrimination and can deal with numerous discriminatory objects. This propose approach gives assurance that the transformed data set is truly discrimination less. It includes measure to calculate how much discrimination has been removed with how much data loss has been obtained. Hence, the propose work approach to discrimination prevention is larger than in prior effort. Propose work present a joined approach to direct and indirect discrimination prevention, with decided algorithms and all probable data transformation methods that could be enforced for direct otherwise indirect discrimination prevention also specify the different features of each method. The propose methods developed new metrics that states which records should be changed, how many records should be changed, and how those records should be altered during data transformation. Also, innovative utility measures to evaluate the different future discrimination prevention methods in terms of data quality and discrimination elimination for direct and indirect discrimination together. Based on the proposed measures, present extensive experimental results and analyze the different probable methods for direct or indirect discrimination prevention to find out which methods could be more successful in conditions of less information loss and more discrimination elimination.

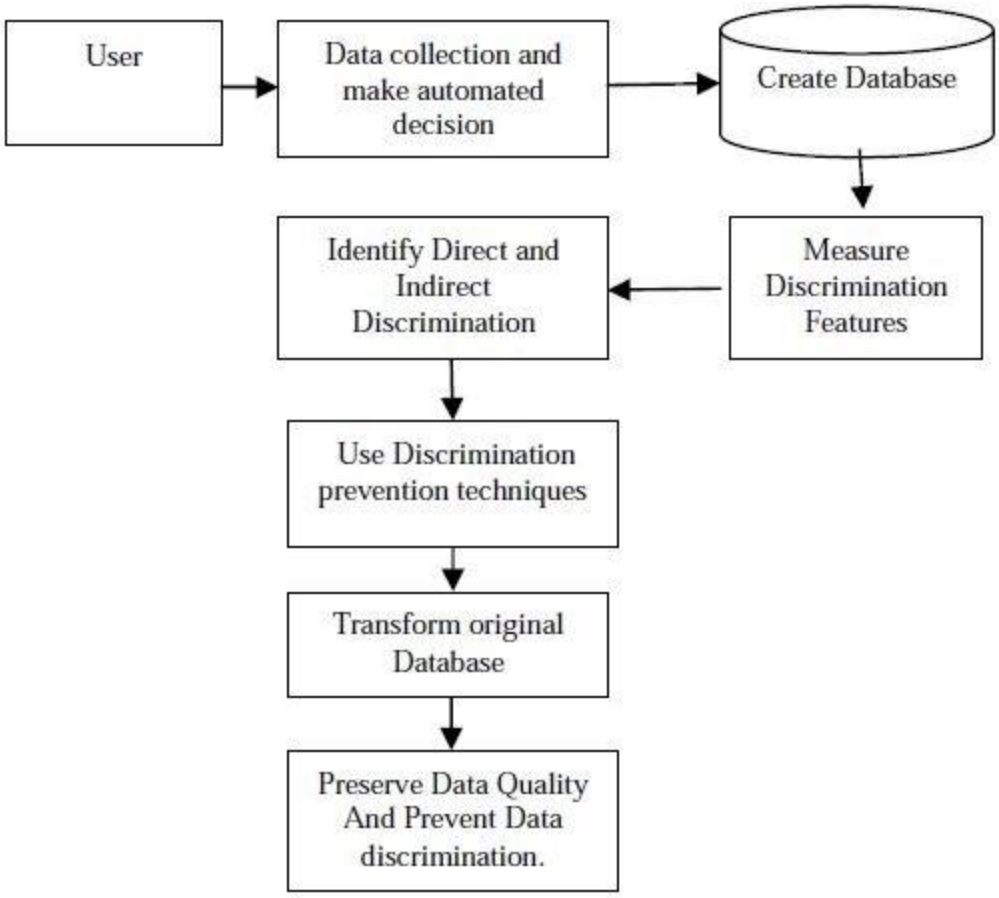

Fig-1: Flow Diagram

Proposed data transformation methods, rule protection and rule generalization are based on measures for mutually direct and indirect discrimination and it can also deal with a number of discriminatory objects. We demonstrate an integrated approaching to address and indirect discrimination prevention, on finalized algorithmic rule and all potential information shift ways confirmed rule protection and or convention generalization that could indirect discrimination prevention. We suggest fresh utility amounts to evaluate the different aimed favoritism prevention processes in terms by information quality and discrimination removal as some direct and indirect discrimination. Direct and indirect discrimination discovery includes identifying discriminatory rules and redlining rules. Using the above transformation methods effectively we can identify the categories and remove direct and indirect discrimination. Finally, discrimination less data models can be created from the transformed data set with no critically destructing data quality. Discrimination prevention techniques in conditions by information character and discrimination removal because some direct and indirect discrimination. The planned techniques are fairly successful in goals of eliminating discrimination with retaining data quality.

IV. SYSTEM ARCHITECTURE

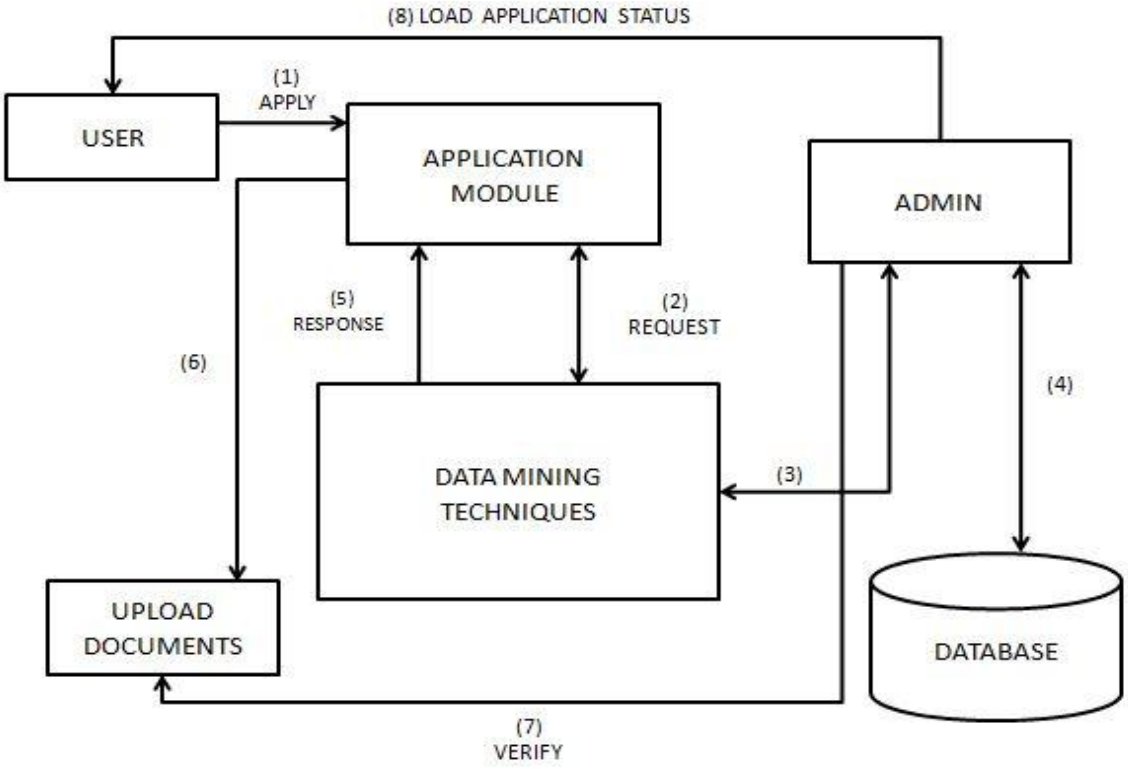

Fig-2: System Architecture

V. IMPLEMENTATION

The existing system is directly rejects applicants loan request without giving any explanation about rejection, to overcome this problem we develop our Idea/project. In our project we discussed with bank manager, and as per bank policies we have decided some attributes. In this we using two algorithms, APRIORI algorithm and K-MEANS Algorithm. With the use of K-MEANS we create clusters. Using APRIORI we find confidence and support. In this as per pin code we will cluster the application and in APRIORI association rule depends on attributes i.e. salary, address, property, etc. in our system instead of directly rejection of application, system will store applicant's application is held or pending. In manager side, system give applicant's application and as per association rule systems decision for that application i.e. chances of giving loan to applicant. In our project not fully reject the application and also not fully accept their loan application too, it will give the loan to the applicant as per their ability. This means we reduce discrimination in our project.

1. Design database structure and perform normalization
2. Create GUI for customer
    - Registration
3. Standardization for address (pin code, name etc.)
    - Add Check duplicates option in customer GUIs
4. Implement k-means algorithm to categorize customers with respect to area, loyalty
5. Implement apriori algorithm to find out discrimination
6. Design GUI for back end(Loan Application service)

- Add Statistics info about Applicants and discrimination

In our project we not fully remove discrimination, we just reduce. From our project Bank as well as applicant both has benefits.

VI. CONCLUSION & FUTURE SCOPE

The purpose of this project is to build up a fresh pre-processing discrimination prevention technology together with different data transformation methods that can prove indirect and direct discrimination or both of them at the similar time. To achieve this goal, the primary step of this methodology is to measure discrimination and recognize categories, on the basis of that groups of individuals that have been directly or indirectly discriminated in the decision making processes. The next step is to change data in the appropriate way to remove all discriminatory biases. Lastly data models without discrimination can be formed in such way that transformed data set without damaging data quality.

The central principle of this paper was to build up a innovative banking application for loan granting purpose on the basis of pre-processing discrimination prevention methodology together with dissimilar data transformation methods that can avoid direct and indirect discrimination at the same time without affecting original database. This will definitely helpful for maintaining privacy as well as security to the database by maintaining relationship between privacy preservation and discrimination prevention.

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