

Introduction of Implementation of Direct and Indirect Discrimination rules for Prevention of Larger data in Data Mining.

^[1]Ashwini C. Gote, ^[2]Shrikant.D. Zade, ^[3]Namrata Khade.

^[1] Student, ^[2] Asst.Proff. PIET, ^[3] Asst.Proff. PIET

^[1]ashwini808.gote@gmail.com, ^[2]cdzshrikant@gmail.com, ^[3]namrata.khade@rediffmail.com

Abstract

Data mining is most necessary technology for extracting useful knowledge and valuable data in large collection of information. There having some negative social aspects about data processing such as invasion, potential privacy, and potential discrimination. The latter consist of affair or unequally treating people on the basis of their cast, religion or specific community. Automatic knowledge collection and data processing techniques such as classification rule mining have paved the way to making automated decision, like loan granting or denial, insurance or premium computation etc. If the given data sets having with discriminatory (sensitive) attributes like gender, race, religion, community, etc. For this reason, antidiscrimination techniques including discrimination discovery and prevention are introduce in data processing. Discrimination either direct or indirect. Here, we tried for solution to prevent discrimination in data processing and will try to bring new techniques applicable for direct and indirect discrimination prevention separately at the same time. We discussed how to clean training data sets and outsourced data sets in such a way that direct/indirect discriminatory decision rules are converted to non discriminatory classification rule. Also we bring new metrics to gauge the utility of planned approaches and compare these approaches. The proposed techniques are effective at removing direct/indirect discrimination biases in the original data sets while preserving data quality.

Index term- Antidiscrimination, data mining, direct and indirect discrimination prevention.

I.INTRODUCTION

In our society study shows discrimination is deter mental treatment of an individual person on the based of there membership in a certain group or category. It involves prohibited to members of one group opportunities that are available to another groups. Here, list of antidiscrimination acts, which are laws specially designed to preventing discrimination on the basis of such attributes(race, religion, gender, nationality, disability, marital status, age and community) in a numerous settings such as (e.g training access to public service, credit and insurance loan granting). For example the European union impliments the principle of equal treatment between men and women within

the access to and supply of goods and services in [3] or in matters of employment and occupation in [4]. If there having some laws against discrimination, all of them are reactive not

proactive. The technology will add proactively to legislation by contributing by discrimination discovery and prevention techniques. A large amount of data is collected by credit card companies, bank and insurance agencies. Thus, these collected data are auxiliary by companies for decision making purpose in data mining techniques. The association and or classification rules can be used in making the decision for loan granting and insurance computation. Discrimination can be direct and indirect. Direct discrimination consists of rules or procedures that explicitly mention minority or disadvantaged groups based on sensitive attributes related to group membership. Indirect discrimination consists of rules or procedures that, while not explicitly mentioning discriminatory attributes, intentionally or unintentionally could generate discriminatory decisions. When decisions are made based on sensitive attributes, Direct Discrimination occurs. While decisions based on non-sensitive attributes, Indirect Discrimination occurs.

Basic definition Some basic definitions related to data mining. After that, we elaborate on measuring and discovering discrimination.

- A data set is a collection of data (records) and their attributes. Let DB be the original data set.
- An item is an attribute along with its value, e.g., Race = black.

II. RELATED WORK:

In this section, we discussed the state of the art approaches dealing with the antidiscrimination in data mining. However, we observe in recent literature, the issue of antidiscrimination is not attended by the several authors.

Despite the wide deployment of information systems based on data mining technology in decision making, the issue of antidiscrimination in data mining did not receive much attention until 2008

The two new algorithms were proposed to identify association rules to extract information from large database in 1994[2]. But data privacy was not supported by those algorithms.

Hence new privacy preserving data mining algorithms were specified with the general survey of data mining models[3]. Eventually proposed a systematic framework for measuring discrimination to investigate whether evidence of discrimination can be found in given set of decisions[4]. The conceptual study regarding discrimination presence was done. Next to that to achieve classification with no discrimination is been achieved by introducing a sampling scheme for making data discrimination free instead of relabeling the dataset[5].

The discrimination-aware classification problem is illustrated and motivated. In this way discrimination free dataset concept came into picture. But simply removing the sensitive attribute from the training dataset does not solve the problem, due to the so called indirect discrimination rules[6]. Indirect discrimination rules are based on non-sensitive attributes. Though removal of sensitive attributes does not solve the problem of discrimination free dataset. A classification model based on direct as well as indirect discrimination is been introduced which is learnt on biased training data but works impartially for future data[7]. After study of discrimination introducing anti-discrimination in the context of cyber security; a new discrimination prevention method based on data transformation was introduced. That method considered several discriminatory attributes and their combinations to propose some measures for evaluating the proposed method in terms of its success in discrimination prevention and its impact on data quality [8].

III. EXISTING WORK

During the investigation in the recent state-of-the art literature, we identified some of the issues. First, the literature focus on the attempt to detect discrimination in the original data only for one discriminatory item and also based on a single measure. In the current discrimination discovery methods consider each rule individually for measuring discrimination without considering other rules or the relation between them. In this paper we also take into account the relation between rules for discrimination discovery, based on the presence or absence of discriminatory attributes. In discrimination prevention, the other major antidiscrimination aim in data mining consists of introducing patterns that do not lead to discriminatory decisions even if the original training data sets are biased. Three approaches are used:

- 1) Preprocessing:- The dataset is been transformed to new dataset which is discrimination free i.e. as the name suggests, preprocessing is done on the dataset before applying any rule.[1]. So that the results generated would be discrimination free.
- 2) In-processing:- the different algorithms which works on dataset needs to be changed so that the discriminatory dataset will give discrimination free results.[1]. Likewise, in-processing cannot use standard data mining algorithms as it is dependent on special featured algorithms to give discrimination free results.
- 3) Post-processing:- In spite of changing original data set or changing mining algorithms, modify the resulting mined data set [1]. In post processing, modified mined data set can be shown publically not original resulting data set. Hence data holder can have rights to mine the data.

1. Direct Discrimination Measure

Pedreschi et al. translated the qualitative statements in existing laws, regulations, and legal cases into quantitative formal counterparts over classification rules and they introduced a family of measures of the degree of discrimination of a PD rule. One of these measures is the extended lift (e lift). Direct discrimination consists of rules or procedures that explicitly mention minority or disadvantaged groups based on sensitive discriminatory attributes related to group membership. Discriminatory (sensitive) attributes like gender, race, religion, etc.,

2. Indirect Discrimination Measure

The purpose of indirect discrimination discovery is to identify redlining rules. In fact, redlining rules indicate Biased rules that are indirectly inferred from nondiscriminatory items (e.g., Zip = 10451) because of their correlation with discriminatory ones.

4. Conclusion and future work:

Along with privacy, discrimination is a very important issue when considering the legal and ethical aspects of data mining. It is more than obvious that most people do not want to be discriminated because of their gender, religion, nationality, age, and so on, especially when those attributes are used for making decisions about them like giving them a job, loan, insurance, etc.

The purpose of this paper was to develop a new preprocessing discrimination prevention methodology including different data transformation methods that can prevent direct discrimination, indirect discrimination or both of them at the same time. To attain this objective, the first step is to measure discrimination and identify categories and groups of individuals that have been directly and/or indirectly discriminated in the decision-making processes; the second step is to transform data in the proper way to remove all those discriminatory biases. Finally, discrimination-free data models can be produced from the transformed data set without seriously damaging data quality. The experimental results reported demonstrate that the proposed techniques are quite successful in both goals of removing discrimination and preserving data quality.

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