



Privacy Preservation in Data Mining by Using Normalization and Transformation Technique

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Abstract—Data mining is the process in which we extract the useful patterns and knowledge from the large amount of databases. Data mining has attracted a big deal of attention in the IT industry and in society in recent years, due to the availability of large amount of data and the imminent need for converting such data into useful information and knowledge. This information and knowledge can be used for the applications like fraud detection, ranging from market analysis, customer retention to production controls and science exploration. Data mining generally viewed as the result of the natural evolution of information technology. Now a day's everyone wants to store their data or information in the online media. When this stored data is transferred from one place to another we require privacy preserving techniques because different types or hackers or attackers can disclose our private data. In our work we provide two level securities by using normalization and transformation technique. For performing the clustering operation we use k means clustering technique.

Keywords:—Data mining, privacy preservation, k-means clustering, normalization.

1. INTRODUCTION

Data mining is the process in which we extract the useful patterns and knowledge from the large amount of databases. Now a days the databases are very large which consists of so much information but what we want to find is the relevant data from large amount of databases or want to find some interesting patterns which becomes very difficult with normal database management systems but with the use of data mining techniques we can find the hidden patterns and knowledge from large database system. So conclusion is that data mining as the knowledge mining, pattern extraction etc. But before applying the data mining techniques we need to apply some other processes which we known as pre-processing of data. Although data mining is one of the step involved in process of knowledge discovery but still it becomes more popular by name then that. The data mining techniques are also used on Bio-Database for analysing and acquiring the different relations in the food condition of market or

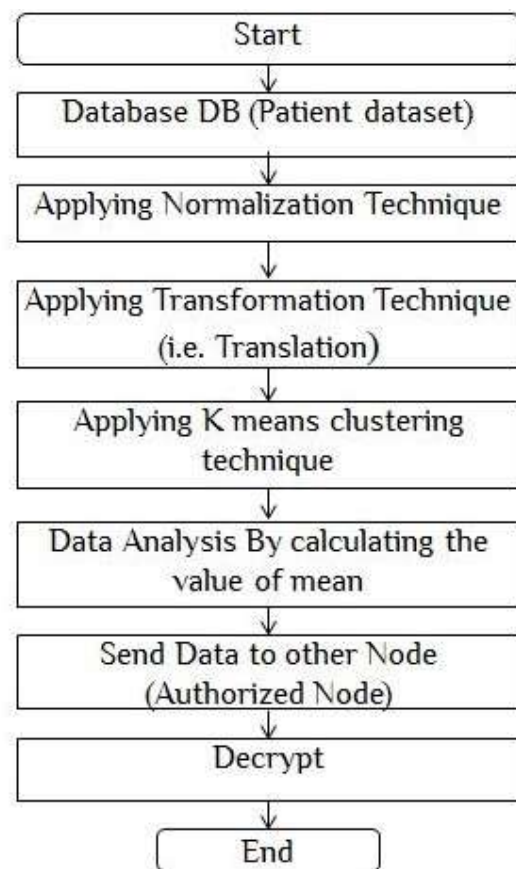
environmental conditions and many other conditions to find the relations which can tell the cause of any disease at very early stage so that proper precautions can be taken. Bio-Database is the collection of information of medical science which contains the information about the patients, diseases and cause of diseases and many more things which are related to the medical science but this database of Bio-Database contains very huge amount of data or the information which is not easy to analyse and also finding out some useful information from that is also very difficult. We use data mining techniques in order to get some useful information from this huge amount of database. Medical science and market analysis is a field where large amount of data is gathered and collected from many sources now the challenge is to find the appropriate information and pattern from that data so that it can be used for further research to find some valuable results for the patients and customers but security is the major issue we should be very careful while sending data from one place to other otherwise it may create some harmful effects. This thesis work is mainly to provide privacy to such type of data so that the information remains safe while transferring data from one place to other. In this thesis work we are going to concentrate on finding the valuable information or patterns or relations between many things from large dataset which can be of any field and then security will be our major concern while transferring data from one environment to other environment for which we will use data modification techniques which will provide security to database and ensures secure transformation of valuable data.

2. PROPOSED WORK

Data mining is the process which is used to extract useful patterns and information from large databases. In this work we are going to take a database that is patient dataset. We now discuss about security issues as while communicating the data from one place to other we need to provide security to our database. When we need to communicate this

important data with the admin first we need privacy as there are possibilities that someone in between the communication of data may change this important data which will cause many hazards so in order to secure our communications from intruders, we will modify our data. In our work we provide two level securities by using normalization and transformation technique.

Flow Chart:-



3. IMPLEMENTATION AND RESULTS

In implementation work, we are taking the patient database (i.e. patient dataset) that contains four number of attributes like age, weight, height and class then we apply the min max normalization technique and translation transformation technique with the help of Weka data mining tool for providing the highest two level privacy. For analyzing the data we use the K means clustering technique and implemented this work with the help of Weka data mining tool. Min Max Normalization Technique: Min Max

normalization technique is an important normalization technique in which we transform the original data values into the specified range of values. In this technique for mapping a value v of an attribute from the given range $[\min_A, \max_A]$ to a new range $[\text{new_min}_A, \text{new_max}_A]$. Its computation is given by the following formula:-

$$\left[\frac{(v - \min_A) (\text{new_max}_A - \text{new_min}_A)}{(\max_A - \min_A)} \right] + \text{new_min}_A$$

Table 1
 Patient Dataset

S. No.	Age(in year)	Weight(in kg)	Height (in feet)	Class
1	2	15	2.1	1
2	10	18	4.6	1
3	20	49	4.9	1
4	25	65	6.1	1
5	12	42	4.8	1
6	30	59	5.9	1
7	20	49	5.7	1
8	18	68	6	1
9	32	71	5.9	1
10	28	52	5.3	1
11	26	51	5.7	1
12	31	48	5.0	1
13	17	53	5.5	1
14	30	57	5.9	1
15	15	64	5.1	1
16	23	55	5.6	1
17	37	70	5.9	1
18	30	61	6.1	1
19	24	54	6.0	1
20	16	67	5.6	1
21	13	62	4.8	1
22	19	73	5.7	1
23	34	82	5.8	1
24	20	77	6.1	1
25	42	47	5.8	1

After inserting the patient dataset table 2 into the Weka data mining tool, the table contains four numbers of attributes like (age, weight, height and class attribute). Initially we

are not selecting any attribute in our database (Figure 1)

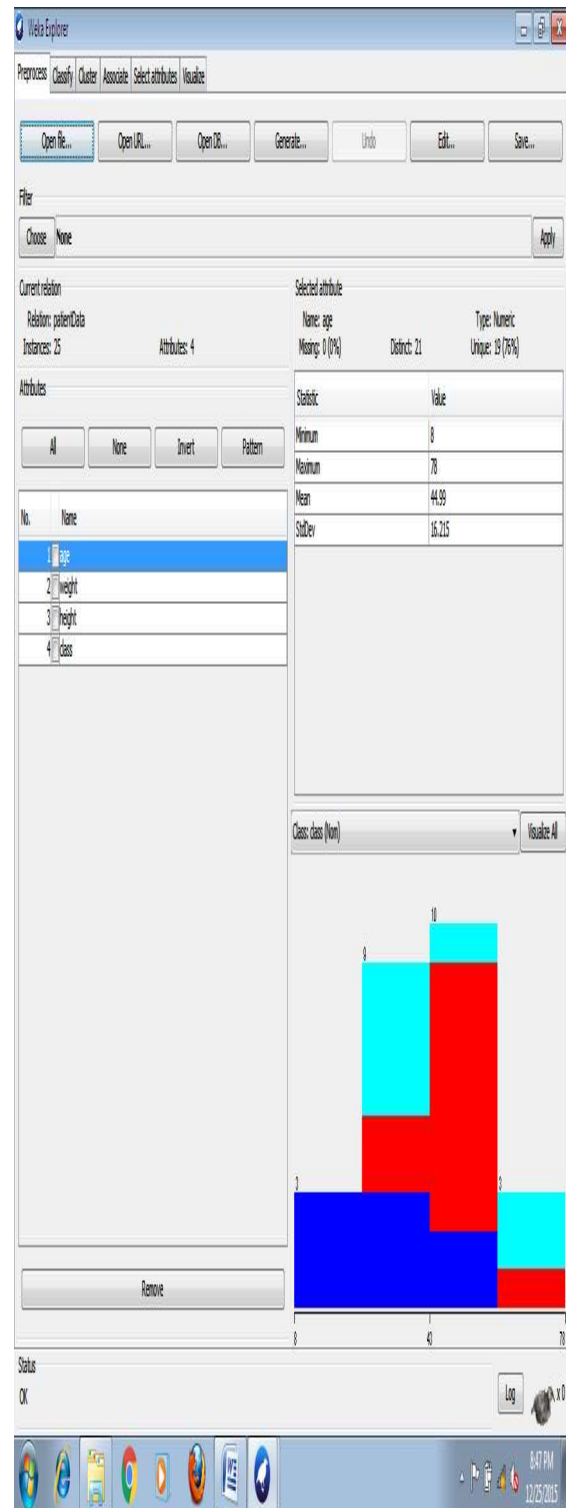


Figure 1. Runtime information of weka tool

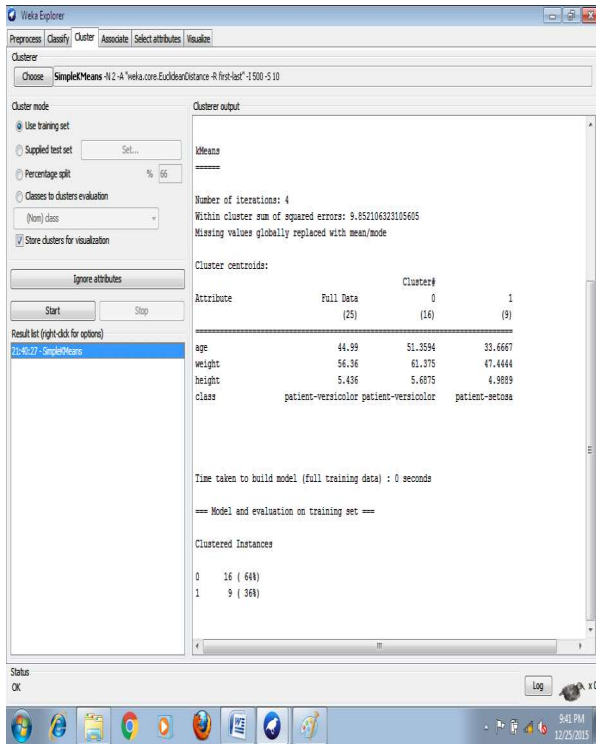


Figure 2. Runtime information after performing k means clustering.

4. COMPARISON

Obtained results have been compared with the base paper [1] in which author has proposed privacy preservation in data mining based on min_max normalization technique. Proposed approach provides two level security and transforms the original data values into privacy- preserved data maintaining the inter relative distance among the data. The comparison between the base paper and proposed method (for attribute age) is shown in table 2 and its graph is shown in figure.

Table 2 Comparison Table

S.No.	Original data Values	Base Paper	Proposed System
1	2	10	9
2	10	33	23
3	20	62	40.5
4	25	76	49.5
5	12	39	26.5
6	30	90	58
7	20	62	40.5

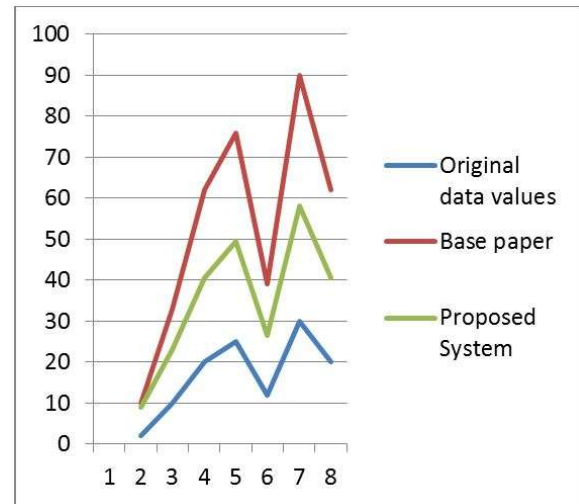


Figure 3:- Comparison Graph

5. CONCLUSION AND FUTURE WORK

In this work we have dealt with normalization and transformation technique to preserve data privacy. Our approach convert the original data values into the privacy- preserved data maintaining the inter relative distance among the values. Our work have proven that performing the k- means clustering technique on the distorted data values produces same clustering results as original data values. So we can say we have succeeded for achieving both accuracy and privacy. We have tested this approach for the numerical data set.

In future work of this proposed approach is to extend the same over categorical data values and apply other techniques or approaches for preserving the privacy. We can also extend this work by using the concept of distributed database in order to preserve privacy and for providing fault tolerance.

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