



# Privacy Preserving Data Mining Techniques Using Recent Algorithms

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**Abstract :** The privacy preserving data mining is playing crucial role act as rising technology to perform various data mining operations on private data and to pass on data in a secured way to protect sensitive data. Many types of technique such as randomization, secured sum algorithms and k-anonymity have been suggested in order to execute privacy preserving data mining. In this survey paper, on current researches made on privacy preserving data mining technique with fuzzy logic, neural network learning, secured sum and various encryption algorithm is presented. This will enable to grasp the various challenges faced in privacy preserving data mining and also help us to find best suitable technique for various data environment.

**Keywords:** Privacy Preserving Data Mining (PPDM); Privacy Preserving Data Publishing (PPDP); Secure Multiparty Computation (SMC); Cryptographic & Secured Sum Computation Algorithms;

## I. INTRODUCTION

There is a tremendous increase in the research of data mining. Data mining is the process of extraction of data from large repositories. The most important extent in research community is Privacy preserving data mining (PPDM). It is very much necessary to maintain a ratio between privacy protection and knowledge discovery. The goal is to hide sensitive item sets so that the adviser cannot extract the modified database. To solve such problems there are various algorithms presented by various authors universal. The major goal of this survey paper is to understand the existing privacy preserving data mining methods and to achieve efficiency. In the recent years there is a great growth in the research of data mining and it's a process of pulling out of data from large set of database. One of the most crucial topics in research society is privacy preserving data mining (PPDM). It is essential to manage a data between privacy protection and knowledge discovery technique. The actual aim is hide sensitive data set from the authorized people extract and modification of dataset from large database. To solve a recent trend problem there are various techniques such as algorithm is going to be presented in this paper with its each technique drawback and beneficial. The primary aim of this paper is to grasp the existing privacy preserving data mining techniques to achieve efficiency. Data mining is the technique of analyzing the data set from different perspectives and get the useful information and specially to discover the knowledge is the ultimate aim of the data mining technique. In recent years the large information or day to day activities and carried out as well as is be transferred over the internet as well as any type of social media. Different privacy preservation deserves the huge

attention over information and PPDM is a crucial technique in data mining where mining algorithms are incorporated. The importance of PPDM changes from different perspective because while express the data, the individual's identity and other crucial details should not get disclosed. Even though information will be lost due to privacy preservation surely damages the data utility. So PPDM, set of scales the substitution between data utility and privacy preservation by using various unique technique.

## II. PRIVACY PRESERVING DATA MINING

Privacy preserving data mining is going to be achieved in different ways specifically by using randomization methods, cryptography algorithms and anonymization methods. A modern survey on are being used on various methods using privacy preserving data mining are found [1] in which reviews major PPDM techniques based on merits and demerits on recent trends in PPDM. The current scenario privacy preserving data mining [2] propose some future research directions for research people. In [15] all techniques of PPDM is studied and analyzed and from the analysis of [3] cryptography, Random data perturbation methods does better than other existing methods and specially cryptography is the best technique for encrypt the sensitive data of large data set.

## III. PRIVACY PRESERVING DATA MINING (PPDM) METHODS

Many techniques have recently been proposed for privacy preserving data mining of multidimensional data set. Many privacy preserving data mining technologies are examined in [19] clearly and the benefits and drawbacks are

analyzed such as k- anonymity, l-diversity, t-closeness, classification, association rule mining are proposed and designed to prevent identification to preserve the primary sensitive information and several application of several techniques for preserving privacy on testing dataset are expressed [22].

In recent situation many number of methods have been proposed for modifying or transformation of data to preserving privacy which are much needed and an effective but without compromising security to hide the sensitive data. This paper express a complete detailed survey on recent algorithms which are proposed for achieving a privacy preserving data mining using fuzzy logic, Neural networks, and other asymmetric encryption methods and also comparisons are made to know the best to do further research.

### 3.1 Anonymization Algorithms

Anonymization methods have an important tool to preserve privacy when releasing sensitive data set from larger volume of data. Most survey says common type of attack for Anonymization Algorithms is based on PPDM and PPDP is presented in [6] and their data privacy are explained and [7] novel technique is called slicing is proposed, which protect the data set.

### 3.2 Perturbation Algorithms

Perturbation based PPDM method expresses random perturbation to individual values to preserve privacy before data are published. In [8] the use of truncated non negative matrix factorization with sparseness rules of data perturbations are discussed [10]. The most possible of using multiplicative random projection matrices for privacy preserving distributed data mining for computing statistical aggregates like the inner product matrix, correlation coefficient matrix, and Euclidean distance matrix from distributed privacy sensitive data is explored. The scope of perturbation-based PPDM to Multilevel Trust (MLT-PPDM) is expanded in [9] which are robust against diversity attacks with respect to the privacy goal. In [12] a kind of privacy preserving classification mining method based on the random perturbation matrix is proposed which is suitable to the data of character type, Boolean type, classified type and digital type. It protects privacy adequately and has high accuracy in the mining results.

### 3.3 Cryptographic & Secured Sum Computation Algorithms

Modern privacy preserving collaborative rules is shown in [32] with light weight transparency which uses a new technique. A new approach encryption algorithm with an efficient approach is proposed in [20] an efficient conjunctive query scheme is being used to achieve the privacy preservation in [16].

Secure k-means data mining approach in the distributed environment is discussed in [17] by binding the merits of both RSA public key cryptosystem and homomorphism encryption technique. The purpose of security multiparty computation is to allow parties to carry out distributed computing tasks in secure way. In [13] a survey is made in the basis of paradigm and notations of secure shared calculation and evaluating the issue of efficiency and the problems involved in designing highly effective protocols. Different efficient basic secure building blocks are fast secure matrix multiplication (FSMP), Secure Scalar Product (SSP), and Secure Inverse of Matrix Sum (SIMS) is studied in [14]. Secure multi-party-data-ranking rules are proposed in [27] which are secure in the semi-honest design. A new approach [23] uses both actual and idyllic model to provide fair enough security and privacy. A procedure to compute the secured sum with zero leakage probability is provided in [21] and a procedure that is protected under the semi-honest adversarial model as well as stronger non-disruptive spiteful model is provided in [5].

### 3.4 Fuzzy based PPDM

A set of fuzzy-based mapping techniques is compared in [18] in terms of their privacy-preserving property and their ability to retain the same relationship with other fields. In [26], a method to extract global fuzzy rules from distributed data with the same attributes in a privacy-preserving manner is proposed. In [15], a fuzzy c-regression method is to generated synthetic data generation procedure which allows third parties to do statistical computations with a limited risk of disclosure. Fuzzy clustering approach can achieve data anonymization without significant loss of information because it effectively merges similar records into clusters where each record is not distinguishable from others after within-cluster merging. A study on intuitionistic fuzzy clustering is made in [28] and the applicability of fuzzy k-member clustering to privacy preserving pattern recognition is studied in [11]. K-member clustering is a basic technique for achieving k-anonymization, in which data samples are summarized so that any sample is indistinguishable from at least k - 1 other sample. A fuzzy variant of k-member clustering is proposed in [4] with the goal of improving the quality of data summarization with k-anonymity. This method is also applied to collaborative filtering. In [29] a secure framework for privacy preserving fuzzy co-clustering is proposed for handling both vertically and horizontally distributed co-occurrence matrices. A method to hide fuzzy association rule is proposed in [24] using modified apriori algorithm in order to identify sensitive rules to be hidden.

### 3.5 PPDM with Neural Network Learning (NNL)

To understand the design of Bayesian network on distributed various data set is addressed in the paper [31] and [25] clearly. A typical simple privacy preserving set of rules for understand the arguments of Bayesian network of vertically divided databases or data set with better performance, complete privacy and accuracy is presented with a clear picture[34]. A probabilistic neural network (PNN) board machine for Peer to Peer data mining is discussed in [12]. The l-diversity concepts are combined with k-anonymity is discussed in [30]. The background information cannot be exploited to effectively attack the privacy of information and the data disclosure probability and information loss are possibly kept minor [35]. From this paper gives clear picture about the secure privacy algorithm.

## IV. COMPARISON OF RECENT RESEARCHES ON PPDM

Table 1 shows the all available PPDM methods for data mining to secure the data set. When we are transferring or exchanging the data set with fair enough security and also these methods ensures the various approaches [33] which are being used to obtain the cryptosystem. The following Table 1 shows the PPDM methods for supporting cryptography, Fuzzy logic and neural networks.

Table 1. Ppdm Methods

PPDM Methods	Techniques		
	Crypto graphy	Fuzzy Logic	Neural Network
Random perturbation	√	√	
k-anonymity	√	√	√
Horizontally partitioned Distribution	√	√	√
Vertically partitioned Distribution	√	√	√
Clustering	√	√	√
Classification	√	√	√
Association Rule Mining	√	√	√
Secured sum Computation	√	√	√
Aggregation	√	√	

## V. CONCLUSIONS

In this paper, broad survey has been done on various privacy preserving data mining algorithms Fuzzy logic, Cryptography and Neural network learning techniques is made. Various merits of various algorithms shown in Table 1 explore to identify the algorithms which have good

performance in terms of privacy and utility. This survey also helps researchers to understand the vital roles played by Fuzzy logic, neural network, Cryptography and secure sum computation methods in various PPDM methods and also to identify PPDM algorithms which are yet to be developed with better performance. It will lead to further researches to develop new and effective PPDM algorithms with high degree of privacy and lesser information loss. So from the above survey clearly express the problem of privacy preservation concern is security issue on data set over the media for sensitive typical data set.

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