2. Generalization

It is the process of generalizing attribute separately. Using generalization the correlation between attribute is lost..

3. Suppression

Suppression is used to prevent the membership disclosure in the k-anonymity thus it be an assignment technique of placing * for the attribute values instead of their original values. This suppression technique is used in the quasi identifier fields to preserve the individual data

4. Bucketization

In Bucketization SAs are separated from the QIs by doing the random permutation on the SA values in each bucket. The anonymized data is collection of buckets, those bucket undergo the permutation on sensitive attribute values. Bucketization does not prevent membership disclosure. Bucketization requires the clear separation of SA and QI attributes and it breaks the attribute correlation between them.

5. Slicing

Slicing is a technique in which data is divided into vertical partition and horizontal partition. Vertical partition is a group of attributes in column based on correlationship among attribute. Horizontal partition is a group of tuples into buckets. In each bucket, each column consists of randomly permitted value.

6. Literature Survey

This section highlights the different methods which are previously used for anonymization. Also discuss some advantages and limitation of these systems. Privacy preserving data analysis and collaborative data publishing has received considerable attention in current years as promising approaches for sharing data while preserving individual privacy.

Period	Total Reference Collected	Paper Related To Generalization	Paper Related To Anonymization	Paper Related To Bucketization	Paper Related To Slicing
Privacy Technique Initiation on 2004					
2004-2008	10	4	5	-	-
2009-2010	15	5	8	1	-
2011-2014	14	2	4	2	2

Keyword	Content Type	Range of Publication Year	Author
Comparative Analyses of Privacy Preserving Technique	1) Conference Publications	From 2004 to 2014	All Author
	2) Journals and Magazines		
	3) Books and eBooks		
	4) Early Access Articles		

Sr. No	Name of Resource	Total No of Journal Preceeding	No.of Journal Proceeding on generalization	No. of Journal Proceeding on Anonymization	No.Of Journal Preceeding On Bucketization	No.Of Journal Preceeding on Sliding
1	IEEE Xplore Digital Library	08	02	04	02	01
2	IEEE Xplore Conference Paper	31	09	12	02	02
3	Springer Link	07	-	-	-	-
4	ACM Digital Library	08	01	03	02	01
5	Advanced Search	02	02	-	-	-
6	Other	05	02	02	02	01

Paper 1: ANGEL Technique published in IEEE 2009 [1]

In this paper [1] author has developed new anonymization technique that is that is effective in generalization in privacy protection but it able to retain significantly more as micro data. ANGEL(Anatomy and Generalization on Multiple Sensitive) is relevant to any monotonic principles . Author shows that ANGEL provides itself sophisticatedly to the hard problem of bordering publication. In generalization can issue only restricted marginal, ANGELM method can be used to publish any marginal with strong privacy guarantees.

To develop this approach they have use k-anonymity, data distribution, E-M generalization, anonymization principle and monotonicity. They also establish the privacy guaranty with generalization and anonymization algorithms.

Definition 1 (k-anonymity): E satisfies k-anonymity if every Equivalence Class in E comprises at least k tuples.

Definition 2 (SA-distribution): Given a multiset S of sensitive values, the SA-distribution in S is considered by a pdf

Definition 3 (E-M Generalization modeling): A generalization of a microdata table T can be effectively represented as a pair of E and M, denoted by (E,M).

Definition 4 (Anonymization principle): An anonymization principle is a constraint on an SA-distribution. A generalization (E,M) satisfies the principle if the SAdistribution of every EC in E satisfies the constraint.

Definition 5 (Monotonicity): An anonymization principle is monotonic if the following is true: given any two multisets of sensitive values S1 and S2 whose SA-distributions obey the principle, the SA-distribution of the union S1 ^{U} S2 also obeys the principle.

Paper 2: Slicing published in IEEE in year 2012 [2]

This paper [2] presents a new technique slicing which undergoes horizontal and vertical partitions of the data. Paper shows that slicing provide better data utility than generalization. Slicing can work efficiently on high-dimensional data and it can also be used for attribute disclosure protection. Slicing partitions attributes into columns which undergoes generalization, and divide tuples into buckets.

Paper 3: Privacy-Preserving for Anonymous and Confidential Databases in IEEE in year 2011 [3]

This system [3] is develop without knowing John and Harish content of tuple and database, inserted tuple is checked for K-anonymity. Author has proposed two protocols based on suppression and generalization. These protocol based on cryptographic assumption. This paper provides theoretical analyses to proof and experimental results to show their efficiency. This paper has data anonymization techniques to address the problem of privacy.

Paper 4: Privacy Preserving Research for Sensitive Attributes in Data in IEEE in year 2011 [4]

In this system they have develop a new generalization principle that effectively limits the risk of Multiple Sensitive Attributes privacy disclosure in re-publication. The results show that algorithm has higher degree of privacy protection and lower hiding rate. This approach the below definitions for execution

Definition 1(Identifier) Identifier can uniquely identify a single individual attribute such as name, id etc.

Definition 2(Quasi-identifier) Quasi-identifier cans connection with external data sources which can identify individual attribute such as age, sex etc.

Definition 3(Sensitive Attribute) Sensitive Attribute contains the properties of private dataset, such as disease doctor's salaries.

Definition 4(Generalization) Generalization is a popular methodology of privacy preservation. It divides the tuple into QI-group, and then transforms the QI values in every group to a uniform format.

Definition 5(QI group) For a micro data table T(j), a QI-group is a subset of the tuples in T(j), which have the same generalized value for each non-sensitive attribute.

Definition 6(Signature) Let QI* be a QI group in T*(j) for any j. The signature of QI* is the set of distinct sensitive values in QI*.

Definition 7(Candidate Update Set) Suppose a is an element in the domain of attribute A, its candidate update set is the union of same elements in dom(A), such that a has non-zero update probability to it.

Paper 5: Slicing Models in IEEE in year 2013 With ICCTET [5]

This paper [5] has given suppression slicing is done by suppressing any one of the attribute value in the tuples and then perform the slicing. Thus utility is maintained with minimum loss by suppressing only very few values and privacy is maintained by random permutation. The next model is Mondrian slicing in this the random permutation is done with all the buckets not within the single bucket. Thus same utility of the original dataset is maintained. This approach use slicing, data publication, bucketization and generalization in the database.

7. Comparative Studies

Paper	*Observation*	*Remarks*
ANGEL:[1]	The last experiment on this approach gives comparison results when ρ(Anonymization principle) is 10-diversity (0.2-closeness). In all cases, releasing marginal always reduces reconstruction error. The improvement becomes more obvious when a marginal has a lower dimensionality.	This paper proposes angelization as a new anonymization technique for privacy preserving publication, which is applicable to any monotonic anonymization principle.
Slicing [2]	Workload experiments shows that slicing preserves data more accurately than Generalization. Slicing is better than Bucketization in workload consist of sensitive attribute. Experiment shows better performance with Slicing technique. Drawback of Bucketization is overcome by slicing.	A Slicing is a privacy-preserving technique for data publishing. Drawbacks of Bucketization and Generalization are overcome by Slicing. Slicing protects against privacy threat. Data characteristics is analyzed before anonymization of data.

Privacy-Preserving for Anonymous and Confidential Databases [3]	Some observation are done. 1: If none of the tuples in the chunk matches the User tuple, then the loader reads another chunk of tuples from the k-anonymous DB. Note the communication between the prototype and User is mediated by an anonymizer (like Crowds) and that all the tuples are encrypted. 2: The experiments confirm the fact that the time spent by both protocols in testing whether the tuple can be safely inserted in the anonymized database decreases as the value of k increases. Intuitively, this is due to the fact that the larger the k is, the smaller the witness set. Fewer are the partitions in which table T is divided Consequently, fewer protocol runs are needed to check whether the update can be made. Further, we report that the experiments confirm the fact that the execution times of Protocols	This paper proposed two secure protocols to check K-anonymous database for anonymity when a new tuple is inserted. With the use of proposed protocol new database become K-anonymous, query result returned by user is also K-anonymous. Privacy of provider never be affected by any query. As long as the database is updated properly using the proposed protocols, the user queries under our application domain are always privacy-preserving.
Privacy Preserving Research for Sensitive Attributes in Data [4]	Experiments generate original dataset T with 50k records, comprising Name, Gender, Age, Zip code, Disease and Doctor attributes. Disease attribute is self-defined which contains seven categories of diseases and every one is a candidate update set, a total of 60. Name, Gender, is categorical attributes and Age, Zip code are numerical attributes, Disease and Doctor are multiple attributes. In this experiments, name as the identifier of individuals which is suppressed in publishing table, Gender, Age, Zip code as the quasi-identifier.	This paper presents an analytical study that various inference channels of publishing of dynamic multiple sensitive attribute dataset and discuss how to avoid such inferences. As a second step, It provides an efficient algorithm that improving the limitations of previous studies, which adequately protects privacy and has low Number of Counterfeits.
Slicing Models [5]	In the tuple partitioning algorithm takes two phases. In the first phase tuples are partitioned into buckets. The tuple partition algorithm is defined by modifying the Mondrian algorithm for better performance and security. All results got on satisfactory level.	This paper has two enhanced techniques to preserve the privacy in data publishing. Thus the both techniques will preserve the membership disclosure and provide more utility than the existing system. The diversity checks in the Mondrian and suppression slicing will ensure that these techniques will satisfy privacy requirement of l-diversity.

8. Conclusion

This paper having lot of enhanced techniques to preserve the privacy in data publishing. Drawback of Generalization and Bucketization is overcome by Slicing The diversity checks in the Mondrian and suppression slicing will ensure that these techniques will satisfy privacy requirement of l-diversity. Basically slicing is the important technique with all available methodologies like data publication, bucketization and generalization in the database.

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