# Superior Seclusion over Confirmation of K-Nearest Neighbor Enquiry on Spatial Network

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*Abstract*—Safety measure is budding to be a vital aspect to be taken into our mind due to the eternally altering earth of worldwide facts communications, low-priced Internet connections, and fast-budding technology development. One of the elementary prerequisite is security since many of world wide computing seems to be not secured. When the information takes a trip via Internet it has a wide variety of intermediate points and it gets easily hacked despite of many safety techniques. Generally a customer when screens for an particular data, the search section is the area where the customer enter his query for which the customer needs to get the particular data While surfing the customer information such as IP address of the customer, region of customer will be stored in the outside people owned server. Since many of the outside people owned servers does not provide elevated security  for user information such as area when gets hacked by some unauthenticated person then it will cause several sufferings to the authorized customer. The key idea is to focus on the safekeeping of the user. Combination of Hilbert space filling transformation and Voronoi Network provide better results when compared with existing techniques in this domain.

*Keywords*—   *Hilbert Curve, Voronoi Network, Hilbert filling Transformation.*

## I.INTRODUCTION

Locality based Services is termed as one of the backbone in development of human community .Spatial databases act as an repository for storing locality based information .Commercial servers are used to hold on spatial databases. Cyber crime is a boning technology with a huge people interested in hacking of some external member information. External member information when gets used by unauthorized person show the way to an insecure environment .Consequences faced by the people due security lacking includes illegal use of external member information. In these conditions, it is highly important to focus on pre cautions necessary to protect the consumers. The existing methodology implements Network Voronoi diagram. The objective of Network Voronoi is to provide low-level security by means of its internal structure. To provide enlarged security the proposed work applies Hilbert Transformation methodology over the Network Voronoi as a result enlarged level of security is provided to user data. Searching for concealed patterns from large data storage locations is formalized as Data mining. SDM(Spatial Data mining) is the process of discovering fascinating and unexplored, potentially useful patterns from large spatial data warehouses.SDM is used to find implicit and explicit regularities, relations between spatial data and non-spatial data. Data is termed as raw fact that provides certain kind of data to the user. A special kind of data is the spatial data. Data that deals with the positions and dimensions is defined as spatial data. Spatial databases are specialized medium for storing spatial data. Geographical objects are represented by means of their position and dimensions. The facts related to objects are interpreted in the form of spatial data. Spatial data appears in the form of raw item or complete information that determines the geographic position of features and determines whether position is either natural or constructed manually .There are two main forms of a spatial data .Spatial Data may be either continuous or discrete. Discrete means non continuous objects represent an area. Continuous means collectively objects represent an area.

Spatial databases are specialized databases that have wide variety of applications such as Multimedia, Geographical Information System and Designing and Manufacturing. Spatial databases manipulate process, store and retrieve spatial data. It classifies efficiently the attributes of an object. The attributes of an object can either be spatial or non-spatial. A spatial database uses a special type of data structure called as indexing .Indexing is of two types Single and Multiple Dimension Indexing. Tree data structure is used in construction of Spatial Databases. Trees mainly implemented are $B^+$ tree and R tree.

Outsourcing is interpreted as spending to some arbitrator for finishing a particular work. The arbitrator in turns select people for the end of the work. The method of handling geospatial data gets easier by the Information Holder by creating a new contract handling environment. The information holder (IH) substitute the management of its database to a third-party Cloud Utility Provider, the Utility Provider (UP) is responsible for classifying the data, responding to the client queries, and upgrading the data on requests from the IH's. A mobile patron used to send their questions to UP's, now submitted questions to UP and retrieve results from UP directly. For example, Migrating Bing Maps partners with Tele Atlas, a major provider of base electronic navigable maps, to provide web mapping services for the public. In this case, Tele Atlas is the IH, and Bing Maps is the access provider (UP)[1]Cloud computing is a network of networks providing remote access to a set of fragmented IT assets and offers expandable assets depending on the needs of the user due to which the expenditure of the user spent in terms of installation ,maintenance gets reduced for the Information Holder.
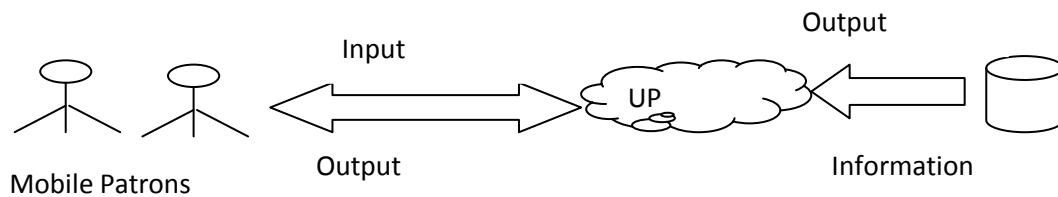


Figure 1 Database Outsourcing Architecture

Most exciting area in field of study is cloud computing. Due to its wide variety of properties and a special property named as "any time any where access" it sounds high in the field of Research and Development. Although database outsourcing provides information holder with a more efficient, economical, and flexible solution, it also introduces new concerns. The query authenticity concern means to ensure that the query results returned by UP are still reliable. As Utility Provider UP is not the real possessor of the data, it might return incorrect results to mobile consumers out of its own interests, for example, an UP which hosts collection of cafés might favor some that pay more commercial fees. Moreover, an UP might return suboptimal results to query clients by applying flawed or substandard algorithms in order to save estimation resources. Therefore, providing a mechanism that allows clients to authenticate the precision and completeness of the query result is necessary. Specifically, correctness means all data returned by UP originate from IH without any forgery and the query result is matching to that computed by IH. Completeness means all qualified results have been included by UP in the result set.

## II. **RELATED WORK**

The Literature Survey deals with detail explanation of the various techniques that exist in the field of spatial data mining related to Authentication of the User and the Query Processing. The first paper to deal with is the Spatial Query Integrity with Voronoi Neighbors that aims on the popularity of location-based services [12] and the abundant usage of smart phones and GPS-enabled devices, the necessity of outsourcing spatial data has grown rapidly over the past few years. Meanwhile, the fast a rising trend of Cloud storage and Cloud computing services has provided a flexible and cost-effective platform for hosting data from businesses and individuals, further enabling many location-based applications. Nevertheless, in this database outsourcing paradigm, the authentication of the query results at the client remains a challenging problem. The existing method focus on the OSDB model and propose an efficient scheme, called VN-Auth, which allows a client to verify the correctness and completeness of the result set .

The second most paper to deal with is the Authentication of K Nearest Neighbor Query on Road networks that deals with Outsourcing spatial databases [1] to the cloud provides an economical and flexible way for data owners to deliver spatial data to users of location-based services. However, in the database outsourcing paradigm, the third-party service provider is not always trustworthy, therefore, ensuring spatial query integrity is critical. Therefore, providing a mechanism that allows clients to authenticate the correctness and completeness of the query result is necessary. The existing approaches cannot verify both the distance and the shortest path to the K-NN results simultaneously the proposed uses a network Voronoi diagram-based verification approach that utilizes the network Voronoi cell of each result object to verify the correctness and completeness of the K-NN result with regard to both distance and path. Here comes necessity of understanding the term Network Voronoi. The paper elaborates the concept in the paper Indexing Network Voronoi diagrams. A special and complicated diagram the Network Voronoi diagram [2] and its variants have been extensively used in the context of numerous applications in road networks, particularly to efficiently evaluate various spatial proximity queries such as K-NN and closest pair. Although the existing approaches successfully utilize the network Voronoi diagram as a way to partition the space for the specific problems, there is little emphasis on how to efficiently find and access the network Voronoi cell containing a particular point or edge of the network On using index structures on network Voronoi diagrams that enables exact and fast response to a query in road networks. The existing index structures, treats a network Voronoi cell as a simple polygon, and yield inaccurate results due to the network topology, and fail to scale to large networks with numerous Voronoi generators. Voronoi-Quad-tree is used to overcome the drawbacks of the existing method.

There is a major area to concentrate is the query processing means the way of processing the entities. One of the important papers for query processing is Authenticated Multistep Nearest Neighbor Search the importance of authenticated query [6] processing increases with the amount of information available at sources that are untrustworthy, unreliable, or simply unfamiliar. This is the first work addressing authenticated retrieval from such sources using the multi-step k-NN framework. The direct integration of optimal NN search with an authenticated data structure incurs excessive communication overhead. To overcome communication overhead C-AMN, a technique that addresses the communication-specific aspects of NN can be used and it also reduces the overhead that occurs due to transmission overhead. The next focus on the significance of the partially materialized digest scheme that explains the concepts of the outsourced database model, [10] a data owner publishes the database through a third-party server; the server hosts the data and answers user queries on behalf of the owner. Since the server may not be trusted, or may be compromised, users need a means to verify that answers received are both authentic and complete, that the returned data have not been tampered with, and that no qualifying results have been omitted. A result verification approach for one dimensional query, called PMD that applies to both static and dynamic databases can be used. PMD uses separate indexes for the data and for their associated verification information, and only partially materializes the query.

The term assurance is one that deals with level of privacy an authority can provide to a consumer. Query Access Assurance deals with correct results are obtained without any falsification on taking into account the paper Query Access Assurance in Outsourced Databases that deals with a parameter Query execution assurance [15] is an important concept in defeating lazy servers in the database as a service model. The process of extending query execution assurance to outsourced databases with multiple data owners is highly inefficient. To cope with lazy servers in the distributed setting, the proposed QAA that focuses on I/O-bound queries. The goal in QAA is to enable clients to verify that the server has honestly accessed all records that are necessary to compute the correct query answer, thus eliminating the incentives for the server to be lazy.

## III.    PROPOSED MODEL

The main idea of the project is to progress the security of the user and to focus on efficient retrieval of answers to the queries. There are different security techniques presented in the field of Computer Security. Focusing on the security of the user with respect to field of spatial mining. The initial perspective is the MBR (Minimum Bounding Rectangle) then follows many other techniques that lead to low level security. The brief outline of the existing techniques provides a clear understanding of the whole project work. The first and oldest methodology is the Minimum Bounding Rectangle that deals with security by storing the user locality information in the n number of smaller bounding rectangles. The information is stored in the form of circular entities within the bounding rectangles. The objects are arranged spatially and exact locality of the entity within the boundary is straightforwardly identified by computing the midvalues of the rectangle, hence once the exact position of the entity gets identified leads to insecurity.

When the unauthorized people gets the position of a subscribed user then the user needs to face wide range of the problems. Thus MBR provides a very unaccepted level (very low-level) of protection to the user. The next is the important concept that is implemented in the existing method the Network Voronoi .According to mathematical perspective Voronoi is a technique of dividing a region into uneven parts and storing the information in uneven parts. The Voronoi diagram on comparing with MBR provides high level of security by storing the information within an uneven polyhedron arrangement the exact location of the object cannot be determined due to uneven shape of the Network Voronoi. The technical description of the Network Voronoi is interpreted as think about a group distinct entities say S={fl,f2,...fm }in a area A, the Network Voronoi diagram of A, denoted as NVD(F), splits the field of A into k disjoint zones, such that each entity pj in F belongs to only one zone and every point in that zone is closer to pj than to the other entities of F. The region around pj is called the Voronoi polygon or Voronoi unit of pj, denoted as NVC(pj).Therefore, the Voronoi diagram of P is union of all Voronoi cells NVD (P) = {NVC (P1), NVC (P2)….NVC (Pk)} and a common edge is edge is shared by the adjacent members. The Voronoi diagram is used in the existing work to represent the locality detail in the form of entities stored in different zones within entire area. The Query retrieval process is an essential concept that has to be resourcefully resolved in terms of correctness and completeness of the solution set. The K-NN classification algorithm is utilized on the existing system for retrieving the data as per user demand. A small number of drawbacks arises when K-NN is implemented. The drawbacks can be resolved by using BK-NN (Reverse K-NN).

## Step1: Key Creation / Query Gathering

Initially, the keys are produced and passed over an network. Information Holder (IH) obtains a set of private and a public key through a key generation centre. The private key is top secret and is accessed only by IH, whereas the public key is accessible by all patrons. By utilizing the private key, the IH sends the data to UP which is used for query processing .The queries are gathered from the user and based on query the data processing take place on spatial networks and the queries will be then be authenticated by using the BK-NN classification algorithm by getting the details from the neighbors.

## Step2: Forming the Spatial Arrangement

The establishment of Clients, Server and the Query Resolver forms the network. The network formation is done by using the data mining tools in the java domain The user is the one who queries to the network for gathering the information. The server is the one who stores and gives the information present in their datacenter. The server stores the locality information in the format of Network Voronoi diagram. The query resolver is the one who gathers the queries from the user and will retrieve the results for those queries from the servers.
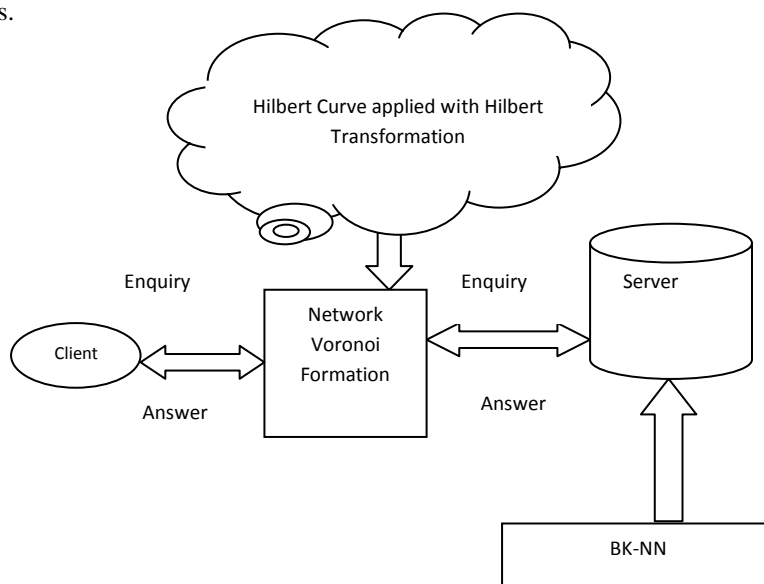


Figure 2 System Diagram

**Step3 Applying Hilbert Curve applied with Transformation over Network Voronoi Diagram**

Hilbert curve identifies a set of feasible solution for the given input and is special called as space filling curve. Hilbert transformation is the process slightly transforming a certain important values by performing the transformation the security to the user locality information is assured. The continuous investigate process leads to a solution that by applying the Hilbert curve along with Hilbert transformation over the Network Voronoi diagram provides high privacy to the user. The user data remains confined. Hilbert curve is a distinct curve that is highly amalgamated in its structure that leads to fused calculation .Hilbert transformation is used to store series of values in the curve over the Network Voronoi diagram. The transformation prevents the not permitted user from receiving the exact value. Therefore the security of the user is guaranteed and thereby prevents the releasing out of the extremely protected information and in today current surroundings security plays important role in different fields. Security must be ensured in every regular activities of the user. Voronoi Painter is a specialized tool developed in the field of the data mining. The tool is one designed based on java language in the Spatial Datamining field. It needs has a wide variety of functions. One important function is the distance function that computes distance between two different geographical locations. Both latitude and longitude is used for the distance calculating function. The precision of the digits place a important rule in the calculation of the values.

The flow diagram gives clear pictorial representation how the control and data flows take place within the system architecture
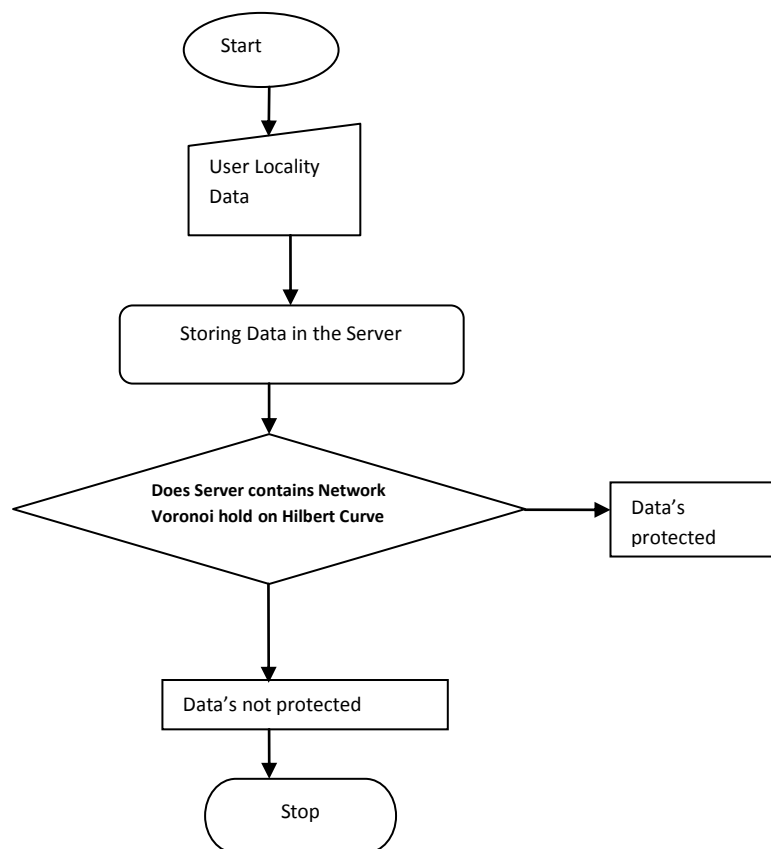


Figure3 Flow diagram for Security

**Step 4 Result Retrieval Process**

The main theme is to focus on spatial mining which means extracting spatial data from spatial databases The retrieval process is defined as method of getting the result for an input data query. The user when inputs the query in search panel the searching technique implemented in the existing system is Nearest Neighbor. The technique K-NN gives nearest entities for a particular entity and K defines no of entities that should be present in the result set. K-NN has a small number of deficiencies in processing query such as1) Noisy data preset in the result set 2) High Computation time 3) Speed is Minimum 4) Highly Dependent on Training data .The above drawback leads to ineffective query processing. The planned system uses RK-NN (Reverse K-Nearest Neighbor) technique for retrieving spatial results for the given spatial query. The bidirectional K-NN (RK-NN) take search to the next level and produces accurate results. The proposed algorithm over comes the drawback of the K-NN. The advantages of RK-NN include 1) Eliminates Noisy data 2) Less time complexity 3) Speed is maximum 4) Memory Usage is minimum. The proposed system provides enhanced results when compared to the existing system in terms of proficient query retrieval process.

## IV. EXPERIMENTAL RESULTS

The evaluation is an important task that focuses on evaluating a system ability based on the performance metrics. The proposed system on comparing with existing system provides better results based on the parameters such as Security and method of getting the result set. Security is said to be offered to a particular person when the locality information of the user is confidentially maintained only when the locality information does not gets to the unauthorized people. User who access the Internet is provided the privacy when the user details stored in the server is not get released out of the server to the antisocial people. Security implementation gets proved only when the process of applying Hilbert Transformation on the Network Voronoi gets clearly identified. The location of a particular place is always identified by its latitude and longitude. Securing a location is done by applying Hilbert Transformation on both longitude and latitude values of that location.



Figure 4 Values before Transformation

In the above figure gives the clear image of the original latitude and longitude values of the various geographical locations. Security is assured by transformation of both latitude and longitude values of the location.
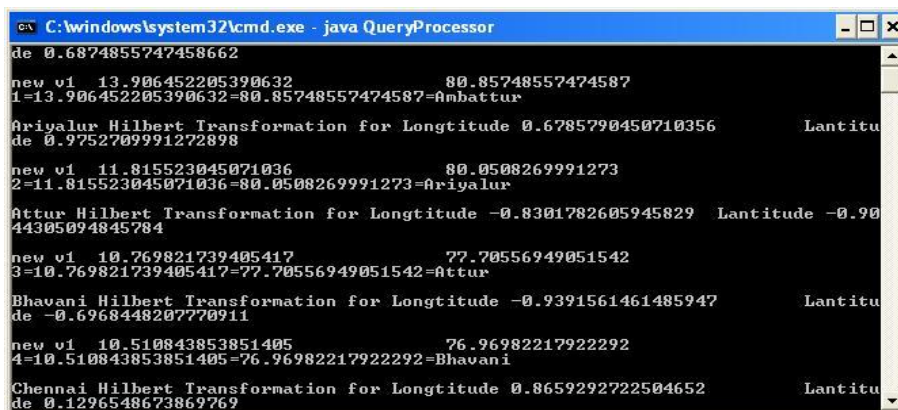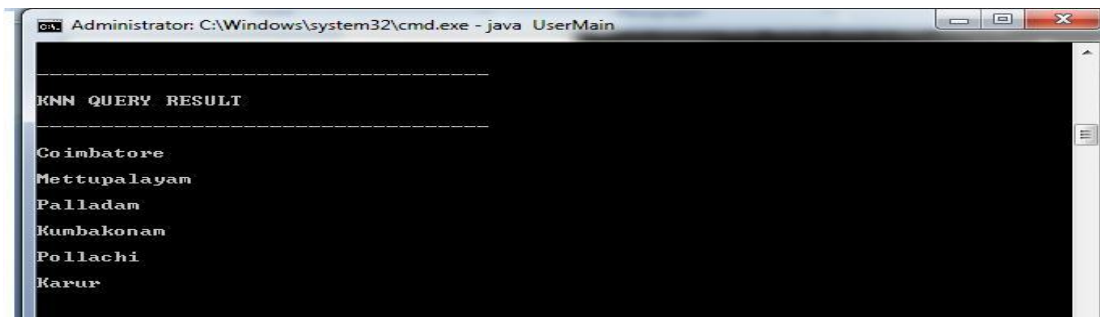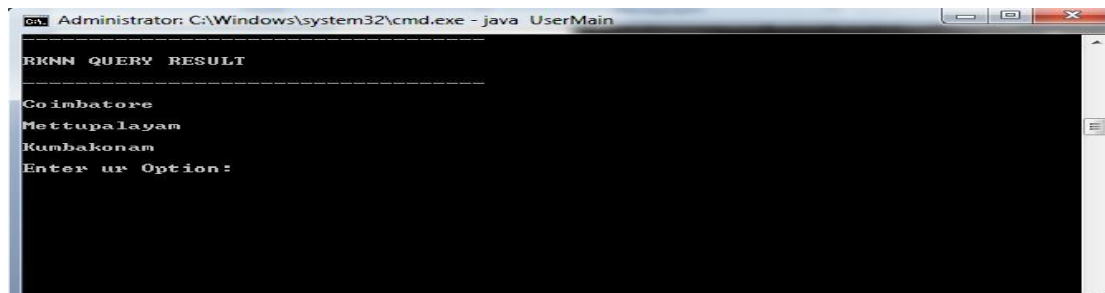


Figure 5 Values after Transformation

In the above figure gives the clear image of the transformed latitude and longitude values of the various geographical locations.



Figure 6 K-NN   Method

In the above figure, the result set produced by implementing K-NN is neatly represented. Comparing the result retrieval rate and accuracy of the proposed system and the existing technique is essential. When comparing the K-NN with RK-NN .The RK-NN eliminates the noisy data and produces most accurate results by moving to the next level iteration.



Figure 7 RK-NN Method

In the above figure, the result set produced by implementing RK-NN is clearly represented. The planned system uses RK-NN (Reverse K-Nearest Neighbor) technique for retrieving spatial results for the given spatial query. The bidirectional K-NN (RK-NN) take search to the next level and produces accurate results. The proposed algorithm over comes the drawback of the K-NN.

## V.    CONCLUSION AND FUTURE SCOPE

In existing work, the query verification problem for k-nearest-neighbor queries on road networks in cloud environment is implemented. While existing approaches proposed in this domain cannot verify both the distance and the shortest path to the K-NN results simultaneously, a network Voronoi diagram-based verification approach that utilizes the network Voronoi cell of each result object to verify the correctness and completeness of the K-NN result is implemented with regard to both distance and path. To retrieve the better results than the K-NN classification algorithm, the RK-NN classification algorithm is implemented in the work. The user privacy is also guaranteed by introducing the method called Hilbert transformation in which the user's exact location information will be hidden from the hackers by transforming it to some other format. The performance evaluation conducted proves that the proposed method assures better result in terms of time complexity, memory consumption and VO size than the existing work.

## ACKNOWLEDGEMENT

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