Aim:

The aim of this paper is to explore graph database structure that can support effective storage structure for peoples' connected information, to study efficient searching algorithm that can find the relationship from separated person nodes and to provide deductive reasoning for defining the indirect relationship among persons

Why?

Most of the relationship searching researches have been developed based on the predefined relationship among every node using existing graph traversal algorithms.

Therefore, this proposed system is wanted to develop for searching relationship based on the personnel information of separated nodes stored in graph database.

relationships between person nodes are not predefined and separated person nodes with respective personnel information are only created in this paper. Predefining every relationship among person nodes such as Father, Mother, Eldest\_Daughter, Younger\_Sister, Husband, Wife, etc is time consuming and impossible in practical. Therefore, consanguine relationship between related persons (relatives) and same infonnation between unrelated persons (not relatives) will be searched based on the personnel information (attributes) of person nodes. To do this searching, Personnel Relationship Searching Algorithm is utilized in this paper. Based on searching Algorithm result and predefmed deductive reasoning prolog rules, the final personnel relationship will be deduced by using Personnel Relationship Deduction Algorithm.

is necessary and essential to find related information between persons to trace and discover the criminal cases (searching personnel relationship between A and B for the case like missing MH370 flight) to explore the properties of certain person for corruption case to exchange information among people

Related Work

mostly in social network like Facebook to search relationship between social network members by improving the classical ACO algorithm

ind short paths in students' social network using local information about their immediate contacts s

moving of daughters to their husbands' house because of marriage and to know consanguine relationships oftwo people who do not live in the same house.

using graph traversal algorithms through the predefined relationships between nodes in graph database.

Problem in our paper: Hihlight Is that : Person nodes are separately created with no predefined relationships among them where relationships may be direct links, links with one or more intermediate persons and disconnected persons.

Proposed System

PHOTO OF PROPOSED SYSTEM

he proposed framework include three parts; graph storage structure, graph searching and reasoning.

1)For storage structure, the personnel information is stored as graph structure with persons as nodes by using Ne04j graph database.

2)For graph searching, the user needs to provide two persons' names to search their relation using Personnel Relationship Searching Algorithm results are relationship types such as father, daughter, brother, wife, etc

3) For reasoning, Personnel Relationship Deduction Algorithm is used to define the final relation for given two persons using the deductive reasoning prolog rules. The final output of the proposed system can be one of the following; family members (e.g; father, son, sister, ...) or Relatives (e.g; son in law, khamekhamet, grandmother. .. ) or general relationship (e.g; same group ofwork organization, nationality, religion, ...).

1 Neo4j

4j graph database is utilized to store personnel information. It can deliver well performance when handling highly interconnected data compared to traditional relational database

A graph database is the storage of graph-oriented data structures with nodes, edges, and properties to represent and store data. It is an occurrence based and schema less. Store data and relationships as they are encountered [9]. It can store complex and dynamic relationships of highly connected data like personnel infonnation. Storage is optimized for the traversal of the graph, without using an index when following edges. Fast deep traversal instead of slow SQL queries that span many tables joins. Graph databases are used in many application domains like Social Networking and Recommendations, Calculating Routes, Network and Cloud Management, Master Data Management, Geospatial, Bioinformatics, Content Management, Security and Access Control

Both nodes and relationships can hold any desired properties called key-value pairs. It has no rigid schema, node-labels and relationship-types can be defmed arbitrary by users. **It** is reliable and fast for managing and querying highly connected data. It is a powerful traversal framework for high-speed graph queries

Ne04j graph database is a browser based command driven client, like a web-based shell environmen

PHOTO OF ATTRIBUTES

2) Graph search algorithm

This searching focuses on matching every domain (or) attributes of each node for given two persons' names.

For example, the searching algorithm starts matching one of the given values with every property (attributes such as name, occupation, address, father name, mother name, sibling name, etc.) of each node. The search results may be list of nodes that match in one of those properties.

Case 1 searches direct relationship,

Case 2 searches indirect relationship

Case 3 searches relationship between two persons who are not relatives. ased on same properties such as same occupation, same organization, and same hobby

Case 4 defines for general relationship between given two persons. roup of religion or nationality or race or marital status.

3) Deductive Algorithm

Reasoning is the process of forming conclusions and judgments from facts or premises. It is the ability to coherently think from perceived premise to a logical conclusion

Deductive reasoning, also called logical deduction is the process of reasoning from one or more general statements (premises) to reach a logically certain conclusion

After searching the common node or intermediate nodes that are related to given two persons, the final relationship is defined by using the deductive reasoning algorithm.

For example,

1 - if the matched domain is relative or consanguine, types of relatives will be defined.

2 - If matched domain is on specific attributes like work or organization, the co-worker or friend relation will be defined.

3- If the matched domain is on general attributes like religion or nationality, the same group of religion or nationality will be defined.

*A Deductive Database*

Deductive database is a database system that can make deductions based on rules and facts. It includes procedures for defining deductive rules which can infer information called intensional database and the facts loaded in the extensional database.

B. . *Prolog (Programming with Logic)*

Prolog is a general purpose logic programming language associated with artificial intelligence and computational linguistics. It is declarative: the program logic is expressed in terms of relations, represented as facts and rules. This language has been used for theorem proving, expert systems, as well as natural language processing. It is well- suited for specific tasks that benefit from rule-based logical queries such as databases searching, voice control systems, and template filling.

There are two types of clauses: facts and rules. A rule is ofthe form: Head :- Body and is read as "Head is true if Body is true".

he followings are the sample prolog rules: John is the father of Susan -7 father (John,Susan). John is the husband of Martha -7 husband (John,Marthas).