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Ontology Driven Information Base Facts Retrieval

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Abstract: ***Decision-making is the task of every pinnacle management in an organization, and that they want relevant and meaningful information to help in taking choices. Retrieval of meaningful data is a task for powerful selection-making. due to lack of domain knowledge, significant records remains hidden in the database itself. Selections made out of inappropriate and meaningless information every so often leads to irreparable harm and recognition. To retrieve relevant statistics it is vital to have background understanding about the area. Heritage know-how inside the form of ontology is an essential source of records. The paper presents a solution for meaningful records retrieval by using the use of area ontology as a domain information which famous all the meaningful facts from the database to assist in taking selection.***

Keywords: Ontology, Decision-making, Domain knowledge, Meaningful information, Background knowledge, Information retrieval, Business intelligence.

1. Introduction

Statistics retrieval (IR) is the pastime of acquiring statistics assets applicable to an information need from a group of information assets. The means of the time period information retrieval can be very vast. Simply getting a credit score card out of your wallet so you can type in the card.

Statistics as according to person need from the resources .domain expertise.

Performs an essential position in retrieving the understanding base data. To retrieve the meaningful statistics, area expertise within the shape of ontology is an effective manner.

Ontology is an specific specification of conceptualization. Ontology performs a big position in knowledge control. Ontology describes the facts about specific domain inside the shape of ideas and relations. Ontology lets in information to be saved in human as well as system readable format [1].Ontology is considered as a backbone of semantic web. problem of semantic heterogeneity in semantic net is solved via the use of ontology. Ontology extensively utilized to explore the semantic relationship between the standards& to symbolize the heritage information about the domain in various net related records retrieval strategies. Background expertise plays an essential role in retrieval of relevant and meaningful information to fulfill the want of decision maker to take the decision. Selection making is executed in each organization to clear up the troubles through the usage of commercial enterprise intelligence method.

Commercial enterprise intelligence (BI) is the set of techniques and equipment for the transformation of raw facts into meaningful statistics. The time period enterprise intelligence represents the equipment and systems that play a key position inside the strategic making plans method of the business enterprise. These systems allow a employer to acquire, keep, get entry to and analyze corporate records to aid in choice-making. Choice-making is a crucial assignment of each organization. To make the decisions it's miles necessary to have applicable and meaningful information. To retrieve the meaningful records from the database it's miles important to have know-how approximately that domain. almost it isn't always usually viable that someone has expertise approximately every domain. due to this retrieving meaningful facts from the big database is a tough task.

To make effective decisions it's far necessary to have significant information. In proposed approach ontology is used as history understanding of domain to retrieve the applicable facts. in this manner ontology will help the statistics retrieval gadget to retrieve meaningful statistics from the database.

Rest of the paper is organized as follows: phase 2 offers an overview of the related work; section three gives the proposed method and phase four concludes the proposed method.

2. Related Work

Ontology is a popular area of studies in recent times. Specially it's far used in the place of synthetic intelligence. Because of lack of semantics, traditional key-word primarily based technique in statistics mining limits in locating the relevancy and understanding the consumer need. Ontology has given a brand new ray of desire to conquer the challenges of information mining. Use of ontology as a site understanding repository discovered too much promising within the diverse records mining tasks which include statistics retrieval, statistics extraction, classification, clustering, recommender's gadget, link prediction and many others.

Kaushal Giri, in [2], has given a function of ontology in semantic web. The growing volume of facts to be had on the net makes information retrieval a tedious and hard venture. Researchers are now exploring the possibility of making a semantic net. The imaginative and prescient of the semantic web introduces the next era of the net via setting up a layer of device-comprehensible records. Ontology used in assisting records exchange procedure, mainly with semantic internet. Predominant benefit of ontology is that it provides the facts in human in addition to device readable format. Mohammad Mustafa Taye, in [3], has given brief review approximately ontology and semantic web. Fundamental

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ideas, structure and the primary programs of ontology and semantic internet offered. Many applicable terms are explained for you to offer a basic knowledge of ontology's. Assessment and information approximately the running of semantic web is given. Semantic internet is evolved on the premise of ontology. Ontology is considered as a spine of semantic internet. Semantic web represents information extra meaningfully for human beings and computer systems i.e. in system readable layout and allows and permits annotating, discovering, publishing, advertising and composing offerings to be automated.

Dou et al., in [4], presented various ontology based strategies in semantic statistics mining. How ontology's are beneficial in bridging the semantic gaps, offering previous understanding and constraints are explained. Function of ontology's in mining obligations which include facts extraction, clustering, category, recommendation and link prediction is given. Detailed dialogue completed on why ontology has the strength to assist semantic data mining and how formal semantics in ontology's may be included into the statistics mining method.

Mishra and Jain in [5], given a observe of various approaches and gear on Ontology. Numerous ontology primarily based methods are discussed in element. also diverse equipment used for the construction of ontology are given. Additionally comparative take a look at approximately the operating of equipment performed in the long run.

Tao, in [6], has given personalized ontology model for used for internet records amassing. the existing traditional method become not able to retrieve the records as in line with user want. Proposed ontology primarily based model represents user historical past knowledge for customized net information gathering. This version constructs user personalized ontology's via extracting international know-how and coming across person background understanding from user local example repositories. The proposed ontology model is evaluated by evaluating it against with benchmark fashions in internet statistics collecting. The experimental assessment proved that ontology-based totally version is advanced and promising in comparison to other models.

Wang et al., in [7], has given an ontology primarily based method for affiliation rule mining. the existing conventional technique cannot resolve the trouble of useless rule mining and immoderate concreteness of guidelines. With a view to solve above problems better, affiliation rule mining based totally-on ontology is used with the traditional apriori algorithm. Experimental results proved that ontology primarily based technique stepped forward the performance of apriori set of rules.

Yongqing and Yan, in [8], have given an ontology primarily based method for association rule mining. The Apriori set of rules is the excellent recognised affiliation rule mining algorithm, whose objective is to discover all co-incidence relationships among information gadgets. Overall performance of Apriori set of rules degrades with the scale of records. to triumph over this hassle ontology is used to represent the area knowledge which exhibits relationships between concepts. With the area know-how, the search area and counting time is decreased, so know-how discovery can be improved efficiently and significant hierarchical guidelines may be located.

Rudy et al., in [9], has given an ontology based approach for enhancing computerized type of net pages. Various challenges and issues on existing ontology based totally method are discussed. Because the wide variety of net information growing day by day, it's miles impossible to categories the complete net information manually without help of computerized aid. Consequently to assist users to retrieve statistics relevant to their want ontology is used as a site understanding repository. Experimental evaluation proved that use of ontology improves accuracy as compared to existing technique.

Sundaramoorthy et al., in [10], has given an ontology primarily based method for type of person history. users browsing records is used to meet the consumer need by way of classifying person especially class. Existing method degrades the overall performance due to loss of semantic knowledge about the consumer query. Consequently ontology is used to understand the user query semantically. Experimental consequences proved that personalization the use of such ontology and semantic produce effective consequences.

Fang et al., in [11], has given an ontology based computerized class and ranking for net files. Ontology based totally method used to solve the trouble of training datasets and semantic complexity among words in traditional system mastering algorithms. Issues of preceding works on ontology based category consisting of ontology construction and ranking of categorized documents also mentioned. The experimental consequences proved that ontology based type algorithm achieves better precision and remember as compared with traditional tactics.

Nadana and Shriram, in [12], has given an ontology primarily based clustering algorithm for records retrieval. Because of lack of semantic know-how traditional K-means algorithm fails in locating the words which can be syntactically one of a kind but semantically identical. Ontology is used with the K-means set of rules to combine the heritage expertise. Ontology is used to locate the pages with words that are syntactically specific but semantically similar. Experimental assessment proved that ontology primarily based technique outperforms than the traditional k-means algorithm.

Fernandez et al., in [13], has given an ontology primarily based technique for semantically enhanced information retrieval. Traditional records retrieval system is keyword based totally; as a result it has confined capabilities in semantic know-how with consumer need. To cope with this trouble searching by using that means i.e. semantic search is introduced. Proposed comprehensive semantic seek model extends traditional IR version to deal with the challenges of big and heterogeneous web environment, and integrates the blessings of each key-word and semantic based search. Additionally an progressive rank fusion approach is used to decrease the undesired effect of know-how sparseness.

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Experimental reviews proved that ontology based totally technique improve the efficiency of conventional keyword based approach by means of lowering search space, understanding sparseness and semantic complexity of facts.

Xiudan and Yuanyuan, in [14], has given an ontology primarily based method for statistics extraction gadget in E-commerce web sites. conventional information extraction device is primarily based at the dictionary, rule-based totally extraction technology and hidden markov model. existing method fails in extracting the records because of lack of semantic information. Ontology technology is used to construct the wrapper, after which extract the information from web website online. Experimental consequences and analysis proved that, the technology of information extraction based totally on ontology is not mature. Particularly for the ontology, there are still quite a few guide works, and the development stays to be in addition studied.

Revoredo et al., in [15], has given a probabilistic ontology based technique for semantic link prediction in a network. Because of semantic complexity in conventional gadget gaining knowledge of set of rules, there may be an uncertainty in link prediction. For this reason probabilistic ontology based approach used to offer the information about the domain to help in link prediction. In such schemes, numerical graph-primarily based functions and ontology-primarily based capabilities are computed; then both functions are given as an input into a gadget studying set of rules where prediction is completed. Experimental effects proved that ontology based model outperforms than current prediction approach.

Caragea et al., in [16], has given an ontology primarily based approach for capability friendship hyperlink prediction in Live Journal social network. Existing approaches used in prediction cannot capture the semantic similarity of the statistics. Hence the performance of the machine learning set of rules degrades. To overcome this problem ontology used as a training dataset to help gadget learning algorithm. The experimental assessment showed that ontology primarily based approach improves the overall performance of machine gaining knowledge of classifier on the project of predicting hyperlinks in the social community.

Augusto et al., in [17], has given ontology based totally recommender system. Conventional recommender technique is primarily based on keyword matching technique. Current approach fails whilst there's no equal key-word even though there may be a semantic dating between the words. Subsequently ontology based totally recommender device is proposed. Targeted discussion on the ontology based approach and the technical problems in it given.

Kadima and Malek in [18], has given an ontology based approach for a personalization of a recommender system in social network. Discussion technical issues and feasible answer raised via integration of an ontology-based totally semantic user profile inside hybrid recommender gadget is given.

Martin et al., in [19], has presented a framework for enterprise intelligence software using ontology-based totally type. Every enterprise desires know-how approximately their competitors to survive higher. One of the facts repositories is net. Retrieving unique required information for business cause is a hard process in recent times. Therefore ontology is used to capture precise records through the usage of web semantics for the choice making purpose. A framework for business intelligence primarily based on ontological category is developed for retrieving the particular statistics from the internet right here ontology act as a manual i.e. background information repository to assist enterprise intelligence process.

Zhan et al., in [20], mentioned blessings of ontology's in real time records get right of entry to. How the ontology's are beneficial in actual time statistics access is given. Additionally highlights the importance of a data integration layer in a business intelligence device and the benefits that the usage of ontology as statistics description formalism and question interface, can carry to the machine. Trouble of an ontology mapping and enrichment is mentioned. also centered on how the usage of ontology's brings the advantages in the place of conversation, inter-operability and expertise control.

Ontology based techniques in records mining strategies given superior performance. Use of ontology as a heritage know-how repository solved the troubles of semantic complexity, time complexity, lack of training datasets and relevancy of effects as much as tons greater volume. Ontology as a site information repository finds promising in meeting the choice makers need.

3. Proposed Approach

Within the proposed technique ontology is used as domain know-how to improve the relevancy of information retrieval from the database so that it will get extra significant statistics. Use of ontology as a site understanding in diverse data mining strategies located effective for enhancing the precision of facts retrieval.

Architecture of proposed KBIR method is shown in figure three.1. Proposed machine specifically includes three devices i.e. semantic query engine. Transformation unit and query processing unit respectively.

Domain ontology O and database D are given primarily. Domain ontology represents the set of concepts, relations and attributes of that domain. Mathematical representation of ontology is as follows:

$O = \{C, R, H, P, A\}$
Where, C: Set of Concepts
R: Set of Relations
H: Hierarchies between Concepts
P: Set of Attributes or Properties
A: Set of Axioms or Rules

Database is nothing but a set of tuples. Tuples contains the set of attributes. Attributes represents information about specific domain

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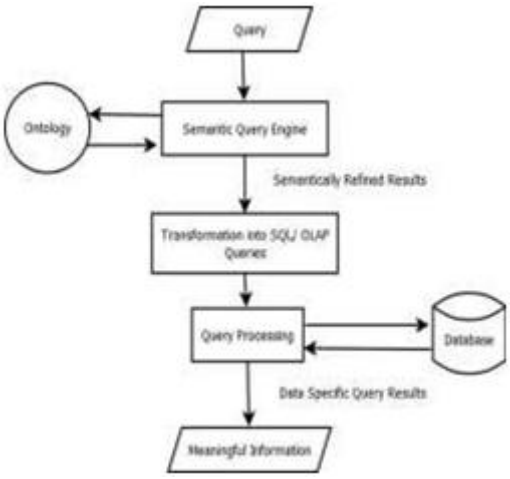

Figure 1: Architecture of Proposed Prototype

Semantic query engine is used to method the SPARQL queries. SPARQL is a records query language used to retrieve and manage statistics saved in ontology.

choice maker‘s wishes are without delay represented in the form of SPARQL query. After coming into the query, semantic question engine will generate the consequences with the assist of ontology. Generated effects are semantically greater outcomes.

$$f_x(q, O) \Rightarrow S$$

Wherein, is a semantic query engine function, which takes i.e. SPARQL question and i.e. ontology as an input & gives S i.e. semantically better data as an output? SPARQL question is entered by way of consumer to retrieve the records as per his want. query q fired on ontology O by way of using semantic query function. Transformation characteristic converts semantically superior effects into the square queries. Semantically greater consequences generated by using semantic question engine are robotically transformed into square or OLAP queries via the usage of transformation feature.
Query processing engine is used to system the in which takes output of feature as an enter & offers i.e. square / OLAP query as and our means of the transformation function. Queries generated by way of transformation. Features are then applied on the database that's commonly consisting of a historical or monetary statistics approximately the enterprise. Significant data is then used for decision making.

Table 1: Sample Database

Product_Name	*Purchase_Date*	*Quantity*	*City*	*Price (1 item)*
MacBook	12/02/2015	3	Mumbai	56,000
Samsung Tablet	23/07/2015	7	Pune	20,000
MacOs	15/06/2015	4	Nagpur	9,000
Iphone	12/09/2015	5	Pune	46,000
Ipod	02/09/2015	7	Nasik	8,000
RedMiPowerbank	09/03/2015	5	Pune	7,000
I Os	22/04/2015	8	Aurangabad	7,000
Samsung drives	27/06/2015	4	Pune	15,000
Sony earphones	11/02/2015	3	Nagpur	1,400
I watch	18/08/2015	9	Mumbai	25,000
Samsung Mobile	17/01/2015	2	Pune	25,000
Fablet	12/06/2015	3	Mumbai	18,000
I band	12/03/2015	4	Nagpur	25,000
Apple TV	12/07/2015	5	Mumbai	96,000
HTC Smartphone	12/02/2015	6	Pune	35,000
Samsung Watch	12/08/2015	9	Nagpur	21,000

Table 2: Results of traditional approach

Product_Name	*Purchase_Date*	*Quantity*	*City*	*Price (1 item)*
MacBook	12/2/2015	3	Mumbai	56,000
MacOs	15/06/2015	4	Nagpur	9,000
Iphone	12/9/2015	5	Pune	46,000
MacOs	12/3/2015	3	Aurangabad	12,000

$$f_z(q_{sql}, D) \Rightarrow M$$

Where f(q,D) is a query processing function, which takes q i.e. output of transformation function and database D as an input & gives M i.e. meaningful information as an output.

Example: Let us consider the database about the selling details of particular company in year 2015 given below in Table 1. Find out the market of all the products of Apple Company.

SQL Query:
SELECT * FROM Sales
WHERE Product_Name= _MacBook‘ OR Product_Name= _MacOs‘ OR Product_Name= _Iphone‘;

Table 3: Results using Proposed Approach

Product_Name	Purchase_Date	Quantity	City	Price (1 item)
MacBook	12/02/2015	3	Mumbai	56,000
MacOs	15/06/2015	4	Nagpur	9,000
Iphone	12/09/2015	5	Pune	46,000
Ipod	02/09/2015	7	Nasik	8,000
IOs	22/04/2015	8	Aurangabad	7,000
Iwatch	18/08/2015	9	Mumbai	25,000
Iband	12/03/2015	4	Nagpur	25,000
AppleTV	12/07/2015	5	Mumbai	96,000

In traditional approach, SQL query is directly fired on the database. Query used to retrieve the all information regarding the sales of apple products is as follows:

In proposed approach, ontology is used to represent the background knowledge about the domain. Ontology stores the information about the product of Apple Company by using the sales relationship. Information stored by ontology

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in the form of subject, object and predicate is as given below:

Apple Sales Mac Book, Apple Sales MacOs etc.
SPARQL query language is used to retrieve meaningful information from the ontology. PREFIX is used to give the path of the location of the ontology. Prefix variable such as foaf is used to store the value of the path.
Select clause is used to select the triplet related to the concept.

To filter unnecessary data from ontology where clause is used.

SPARQL Query:

```
PREFIX
foaf: <http://www.semanticweb.org/ontologies/2015/7/untitled-ontology-24#>

SELECT ?Product
WHERE {

foaf:Applefoaf:Sales_Relationship ?Product
```

4. Conclusion

KBIR is the method of retrieving meaningful facts from the database. Meaningful information remains hidden inside the database due to inadequate history expertise. To conquer this assignment ontology driven technique is introduced. Involvement of ontology will give promising and superior effects than traditional approach

In future paintings awareness might be on development of computerized creation of area ontology. As information is growing enormously, due to this guide construction of ontology is a too much hard job. Therefore there's need of a few automatic functionality to construct the ontology mechanically.

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