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H-Onto: An Efficient Ontology Information Retrieval Method using Web Protege

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Abstract: *This article presents an efficient and unique ontology information retrieval using web protegeby taking into account the modelling, processing, and conversion of ontological knowledge into database search request components of ontology. It mainly focuses on the existing methodologies of ontology retrieval approaches in terms of loss of data and semantics, structural mapping and applicable to domain integrity. The main objective of this article is to apply the ontological approach on the dataset for retrieval of information to produce more efficient information retrieval from knowledge graph which is termed as H-Onto.*

Keywords: Ontology, Information Retrieval(IR), Protégé, RDF(Resource Description Framework), Semantics

I. INTRODUCTION

Information is introduced long back as a software programs that retrieves required information from a bunch of data. The programme assists users in locating the necessary data, but it does not directly return the questions' answers. It gives us the information of the presence of documents that may contain required information. Relevant documents are those that satisfy the user's request.Only pertinent document will be pulled up by the ideal IR system. The creation of a model for information retrieval from the collection of documents is the main objective of IR research.

Previously, information was retrieved from databases via laborious queries that would not always produce the desired results for the user. People began utilizing "RDF(resource description framework)" ontologies, which represent the data as relationships between the concepts in data, to get around this issue.

Ontology, to put it simply, is a collection of interconnected information that is described by ideas, qualities, and attributes of numerous other concepts.

RDF is a method of encoding ontologies in the form of graphs, with each ontology's instances of classes serving as the knowledge base. Ontologies are represented graphically by RDF, while their textual syntax is represented by TURTLE.

II. LITERATURE SURVEY

A semi-automated method [1] for creating a fundamental domain ontology to assist information retrieval (IR) activities is based on a developing reference library. The results are encouraging when implemented on a earth quake domain for query expansion application.

We used an ontology model to develop and implement a prototype system that spans the local geologic time scale of North America, based on available geology data [2]. The ontology will be more beneficial for data integration and search on the web if it is enhanced with more regional geologic time standards.

In the form of Linked Data, an insurance ontology[3] can serve as a shared, standardized vocabulary to facilitate communication and knowledge exchange between insurance partners. The Big Data[4] era's evolving business data needs have prompted vendors and research teams in semantic technology to work harder to meet customer demands by scaling up improvements in query access, performance, and inference added-value.

A multi-agent system by the name of SCKE[5] implements an process of a particular hospital system. It is carried out and the results on behalf of an individual, and it use technology to gather statistics and transmit data between hospitals in order to help users achieve their best usage. To better decide query accuracy, SCKE makes use of user verification

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and feedback[13]. Regardless of the quantity of inquiries, SCKE includes a good accuracy rate for performance evaluation.

The significance of investigating fresh methods to address current information retrieval problems was noted, and the viability of merging spread activation (SA)[6] and ontological models as a viable remedy was suggested.The SA algorithm, which can be used to retrieve spatial huge data and models the connected thought pattern in the human brain, is more promising[7].

The definition of ontology is "the description of collaborative learning." [8]. Ontology[14] is a set of assumptions that takes into account one's perception of what is considered a fact. Ontologies enable data with computer semantics[9] and make it easier to find, share, and integrate information. Information can be retrieved more readily by adding an ontological information layer on top of a current database.

By layering semantic knowledge and to use a mapping strategy on upper end of a database, OBSA (ontology based data access)[10] can offer extra capabilities without having any negative effects on the database. The spreading, access, and preservation of knowledge can all be supported by an ontology. Ontology generally comprises of hierarchical definitions[12] of important elements in a domain and explanations of each attributes. In addition to terminology, ontology also offers machine reasoning [11] regarding the semantics of the terms. When well-known technology is applied, a semantic layer that is in accordance with human thoughts and speech is produced.

III. METHODOLOGY

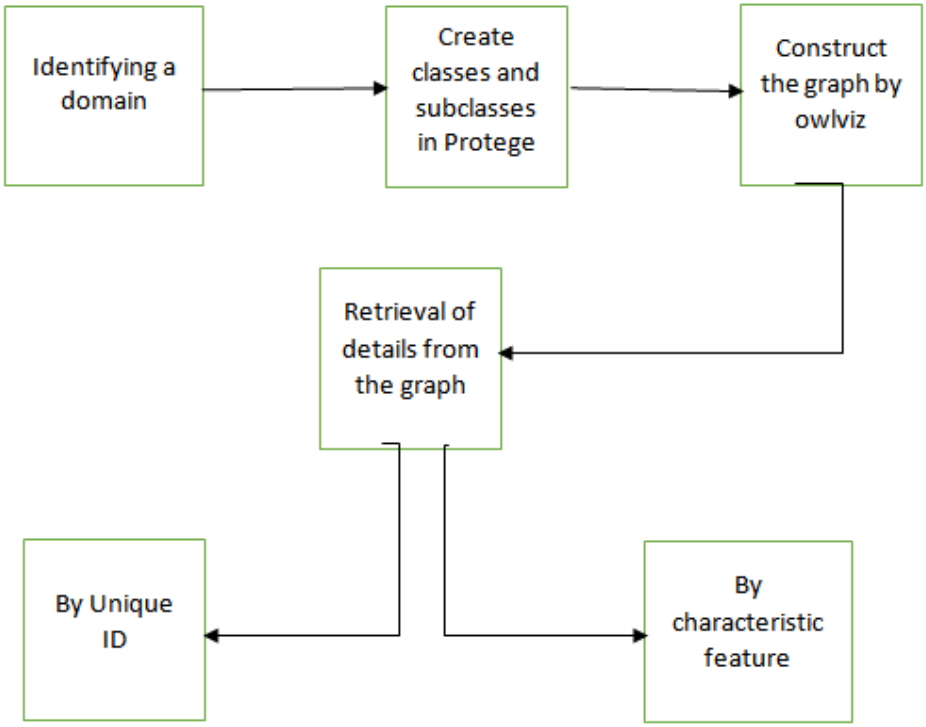

Figure 1: Retrieval from Ontology Graph termed as H-Onto.

A growing user community can develop representations and understanding applications using ontologies using Protégé, a freeware, and open standard. It is simple to create, publish, alter, and exchange ontologies using Web Protégé, an ontology application framework, enabling group viewing and editing.

The most recent OWL 2 Semantic Web Language is fully supported by Web Protégé. For both novices and specialists, the highly adjustable user interface delivers the ideal atmosphere. Licensing and rights, linked notes and debates, monitors, and email alerts are just a few of the many tools that facilitate collaboration. Various ontology upload and download formats are available, including RDF/XML, Turtle, OWL/XML, OBO, and others.

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IV. IMPLEMENTATION

The web version of protégé is installed and corresponding classes and sub-classes were created and tested.

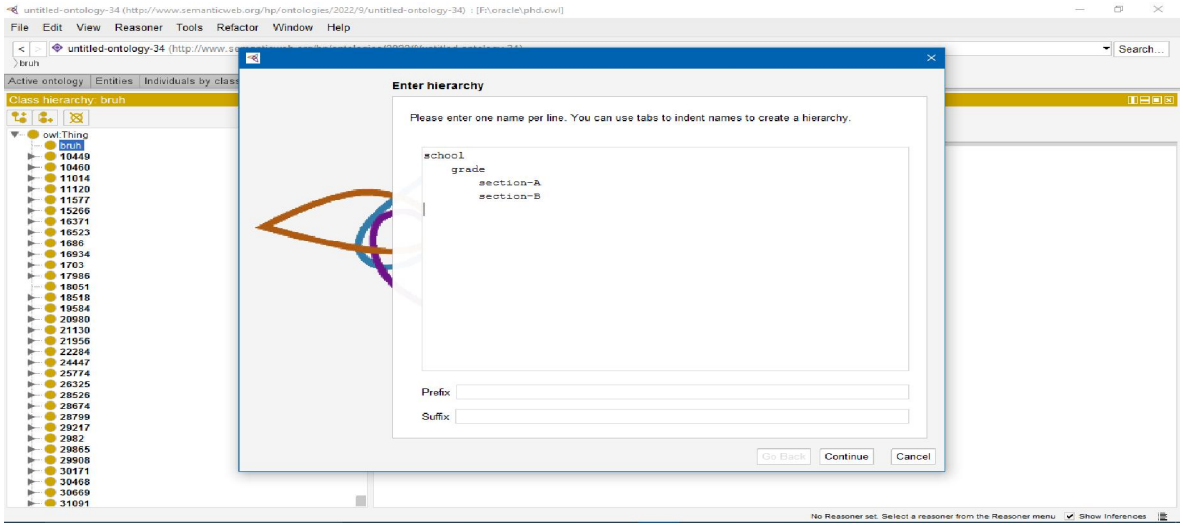

Figure 2: Creation of classes and subclasses using protégé 5.5

In the above figure, school is a class, grade is a sub-class and section A and Section B are instances

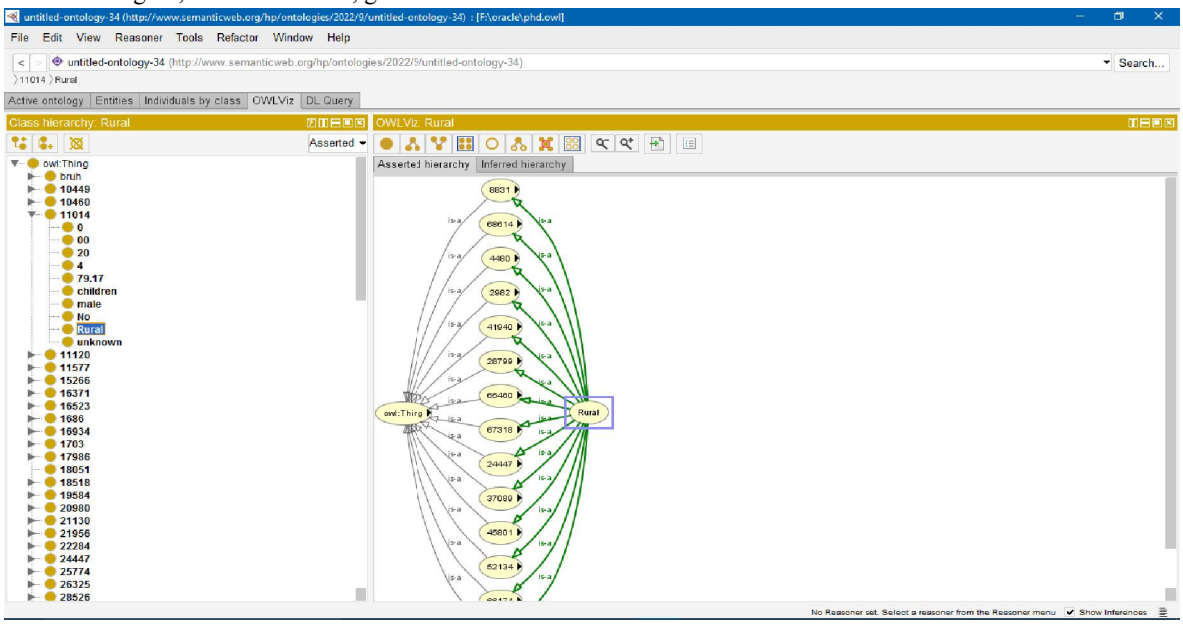

Figure 3: Graph generation for selecting ID's in Rural.

In the above screenshot, the graph is generated for a characteristic rural in particular.

V. RESULTS AND DISCUSSION

The generated ontology for this health bases system is termed as H-Onto and is measured on the following performance metrics**.**

Table 1

S. No	Performance Metrics	High	Medium	Low
1	Adaptability	50	9	1
2	Alignment	51	6	3
3	Clarity	56	3	1

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4	Correctness	48	9	3
5	Deployability	49	10	1
6	Portability	47	11	2
7	Accuracy	49	9	2
8	Scability	47	12	1

The above table gives the performance metrics results as per the voting done by the set of batch 60.

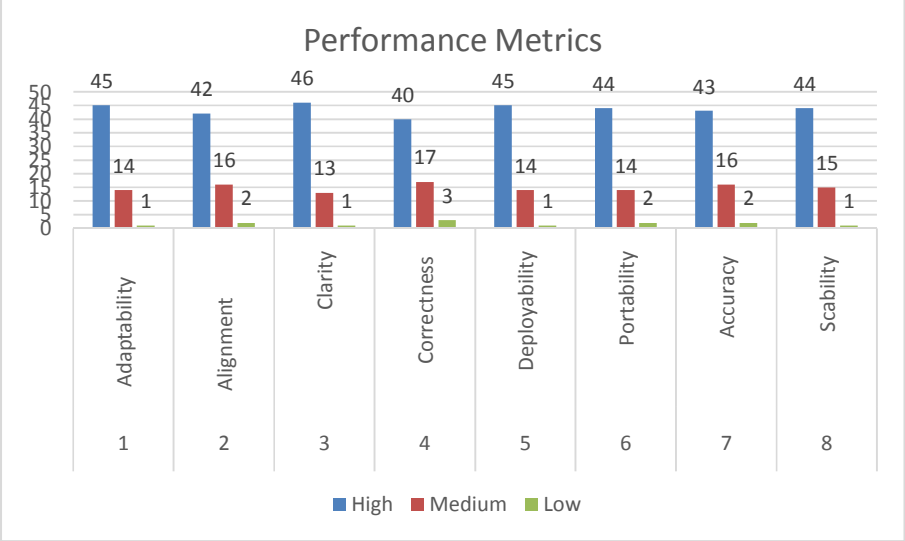

Figure 4: Graph representation of performance metrics of H-Onto.

1. **Performance**: It's the estimation of how quickly the application responds or answers according to the conduct of the doctor/nurse or the patient. In case if it takes too long to respond, then it is considered as a bad application.
2. **Scalability**: It measures performance of any network or system mainly focuses on the performance of websites. If we update any details of the patient or if we add more patients details the size of the system should be scalable. If there is any error in the performance of the system it identifies the reason behind it.
3. **Portability:** The capacity of a system or one of its components to operate in different environments is referred to as portability. Equipment, application, or other application platform specifications are typically included. Simply put, it shows how smoothly activities carried out on one platform are carried out on another.
4. **Reliability:** It describes the likelihood that a system or its component will function well over a predetermined period of time and under specific conditions. Traditionally, a likelihood percentage is used to express it.For now, if a system has a 90% dependability for a week, it means that throughout this week, under typical usage conditions, there is a 90% opportunity that the system won't encounter a catastrophic failure.
5. **Adaptability:** The system developed is adaptable to the required environment is measured by the individual's comments.
6. **Alignment:** The system developed is in line with the requirements of the user
7. **Clarity:** The system developed is clear and satisfies the user requirements.
8. **Correctness:** The system developed is measured for the correctness of the outputs based on the users' inputs.
9. **Deployability:** The system developed can be deployed in an easy manner to the benefit of the users.
10. **Accuracy:** The system developed is measured for its accuracy and whether the system generates relevant values.

VI. CONCLUSION

The ontology generation using the owlviz by protégé 5.5 termed as H-Onto has given a good and fast retrieval of the data, making it very easy for the user. The performance metrics are measured based on the voting done by the

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individuals of batch size 60.We found out practically that the system performance is above 75 percent in all metrics and combination of high and medium cases is above 95 percent which gives an illusion that the system is user acceptable.

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