An Interactive Model for Georesource Solution Seeking Using Ontology

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***Abstract*— A Geospatial notion ranges from the objects, relations and the features corresponding to them which fall under the domain of Geospatial ontologies. The vocabularies needed to the search process can be expressed through the ontologies. A heuristic system is designed with the help of the Resource Description Framework combining the knowledge gained from the domain expert, authentication for the solution seeker and the prediction of the ontology to offer the solution. The information retrieval in the spatial data ontology is complex. So a mechanism is projected for the Resource Description Framework (RDF) ontology for accessing the geospatial data. As the RDF data accessing turns complicated, the algorithm application of the N-Triple for producing the Subject, Object, and Predicates from RDF's data conversion is applied. The implementation of the cache table is added to enhance the speed. Demand replacement is used in the cache to add the queries when the limit goes beyond the value indicated by the cache. The query with the least demand value is replaced by the new query. It makes the workflow to be redirected to the already predicted solution. The retrieval of the information is more accurate and the flexible query and submission.**

***Index Terms*— Resource Description Framework (RDF), Ontology, Ontology Web Language (OWL), Geographic Information Services (GIS).**

I. Introduction

The history of artificial intelligence shows that knowledge is critical for intelligent systems. In many cases, better knowledge can be more important for solving a task than better algorithms. To have truly intelligent systems, knowledge needs to be captured, processed, reused, and communicated. Ontologies support all these tasks. The Data model of the RDF is analogous to the archetypal approaches of conceptual modelling like the entity–relationship or class diagrams. These models rely on the resources that take the form of these triples like the subject, predicate and object. The subject connotes the source needed to perform the relations and the connection linking the subject and object is stated by the predicate. The

OWL is a standard ontology language that is recommended by the W3C. The individuals, classes, and properties form the essentials of that language. The true cases in a particular area or domain are symbolized by individuals, while the classes are represented as pools of individuals of the same category. The Properties contain the binary nature. It has the directional links that bonds individuals from property domain to another in the property range. Classification on the property into the object and the data type is based on this range and the links with individuals and the XML schema. OWL Description Logics is a OWL specification sublanguage. All constructors present in that language are included although with the help of the description logic, it logically expresses cons and pros in the constructor practices for descriptions in knowledge and interferences. Property restrictions including the has value and the quantifier expresses the geospatial classes and its characteristics by limiting the individual's values. The has Value restriction limits the individuals of a class to specific values.

II. RELATED WORKS

In [1], the system architecture of the SDSS mainly merges with, to give two main categories which are the loose coupling and the tight coupling. There are the elements that contribute to the form this structure. They are spatial databases, GIS models, domain knowledge bases, map display capabilities, report capabilities, and user interfaces. The collective handling of the ontologies and workflows exists in the skeleton of the GIS for providing the possession of data relevance to the user specified downside statement apart from the standard GIS. The intended structure guides the user to formulate a retardant statement associate degreed automatism data explore and investigation.

The Workflow and task based method is alike in the solution briefing. While there is a submission of the query to the web portal relating to the geospatial domain, the result is directed from the task ontology. The machines will conclude GIS information and functions that is derived from the keywords in the input. The outcome from the search in SDCI[1] is huge and accompanied with the increased recall and decreased precision. Service discovery is made automatic to produce the foremost outcome for the decision makers. The framework is split up into four sections. An adaptable and extending structure is the main benefit to the system.

In [2], the Geographical problem solving are the methods that process the related information to achieve the goal using the GI expertise. The link between the GI technologies, GIS and the GISci explains the challenges overcome by the above method. The primary step is the elimination of the details that hold back the study of the information. An integration of different structures [2] helps in the semantic investigation within the context of this problem solving environment. The roles of the semantics in the appliance purposes are examined along with the definition of the framework to a

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model and the scope extension to a level of services. But it completely suits the environment of the heterogeneous type only.

In [3], Conceptual Level Programming Environment supplies human-friendly methods in terms of problem solving process description. The task ontology systems may provide process imitation at the abstract level. A surrounding for the author is given to form a proper and productive ontology. There is also a need in making the problem solving process firm enough to state the computational semantics. This CLEPE receives several GPNs and discloses the links among them by recreating the object flow model with the help of the task ontology. Axioms [3] are used to determine better solution for that environment. The presentation of the process changing to the domain object is done unambiguously with the help of the axioms. The implementation of the conceptual level makes it easy for comprehending the behaviour of the GPN.

In [4], heuristic categorizations are used to establish the recurring patterns which reveals the performance of generic tasks of extreme level universally like the judgement of hypothesis and abstraction of data. Role-limiting methods like propose-and-revise and cover-and-differentiate are evaluated to distinguish the classification of methods and steer the system modelling. Problem solving methods allows the extraction of the routine dispensation of information from execution particulars. When associated with a piece of program code that implements it, a PSM further becomes an operational building block that a programmer can incorporate readily in a working system , much like an element of a mathematical subroutine library. There is less adaptability to upcoming technologies no renewal of potential impact to the centred approach for building of the applications.

III. PROPOSED SYSTEM

Ontologies provide a structured framework for modeling the concepts and relationships of some domain of expertise. Ontologies support the creation of repositories of domain-specific reference knowledge—domain knowledge bases—for communication and sharing of this knowledge among people and computer applications. In particular, ontologies provide the structural and se- mantic ground for computer-based processing of domain knowledge to perform reasoning tasks. In other words, ontologies enable the actual use of domain knowledge in computer applications. It provides an overview of different means to specify and perform reasoning on a knowledge base. It retains one of these means, Problem-Solving Methods, because they provide reusable reasoning components that participate in the principled construction of knowledge-based applications.

An ontology enabled framework for a geospatial problem-solving environment that allows collaboration among Web-service providers, domain experts, and solution seekers to semantically discover and use geographic information services to solve a target class of geospatial problems. The framework contains Ontologies that provide knowledge bases for domain experts to formalize geospatial semantics and conceptually model workflow of geospatial problems for semantic references and inferences, an ontology-enabled catalog (ONTOCAT) that provides an inter- face for Web-service providers to annotate GI services using formal semantics for semantic discoveries, Web portal that supplies an interface for solution seekers to submit geospatial problems and evaluate the discovered GI services, and an ontology engine that parses the problems and performs semantic inferences to discover the required GI services based on annotated semantics and conceptualized processes.

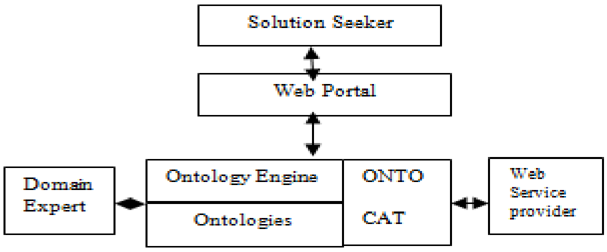

Fig.1. Architecture

Using the proposed framework, solution seekers can only submit geospatial problems by selecting values from the four drop-down lists: question type, spatial subject, spatial relations, and spatial referenced object. However, the flexibility to submit various geospatial problems is limited. The proposed system is the Resource Description framework uses the Ontology engine, ontology, ontocat and the Web portal for the formulation of the solution. Using the N-Triple Conversion, it predict the data in the RDF file. The N-triples are used to classify the RDF field to the Subject, Object, Predicate Classification. The Modules processing the system are spit up based on their usage. Unlike the existing system, there is a usage of adding the information to the directly to the rdf file. This can be done only in the presence of security in the system. A password protected login is designed to restrict the people who can access the data. The Query Parser is used to parse the query that is submitted by the user. This query parser helps removing the unwanted words. In the given result from the query parser, the web portal helps them to identify the spatial items that could be passed on to the matching process. The result is given to the user. The Architecture of the system to process the query and perform the entire operations in the system is represented in this diagram, rated for the received question tags.

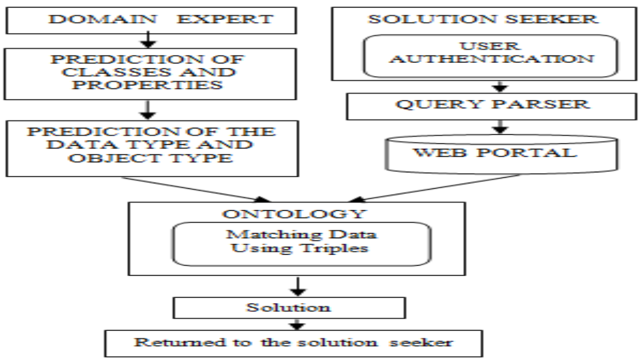

Fig.2. Interrogation system architecture

These rules contain the topic, domain, properties and class connections. Based on the rules that are specified. The resulting solution is filtered with each of the RDF property. Finally after the steps that are involved in filtering process. The Resulting solution is passed to the module of the user. The GIS function is analyzed for the given question type. The GIS data is got from the RDF ontology. The Features are analyzed for the Spatial Ontology Item. The Web service access is based on the domain, topic and ontology connections. Questions are in a much more flexible format. It analyzes the question type.

The Questions are parsed and split the query into ontology part, question part, reference part. The request is redirected to the ontology search engine. A OWL file is downloaded from the internet and that file contains data of various properties. If the data needs to be updated then the recent year's data can be downloaded. The data contains various geographical features. That data is uploaded to search engine from the given dataset.

The use of the RDF dataset is made for the ontology process. According to the figure 3 and figure 4, now predicting the classes in the RDF file for identifying the properties. Next the prediction of the properties using the classes. The Properties are categorized into two groups are Data Type Properties and Ontology properties.

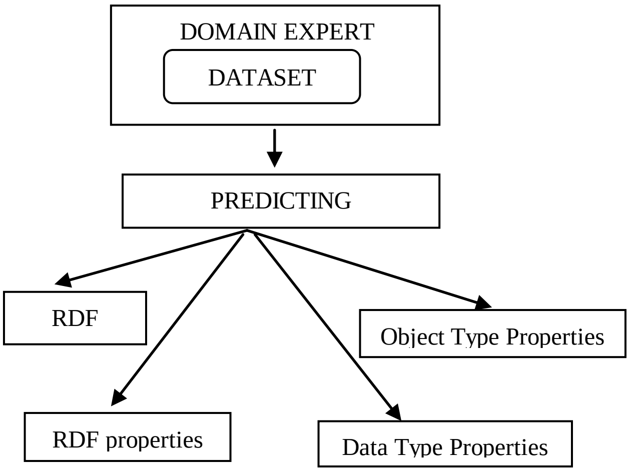

Fig.3. Prediction process

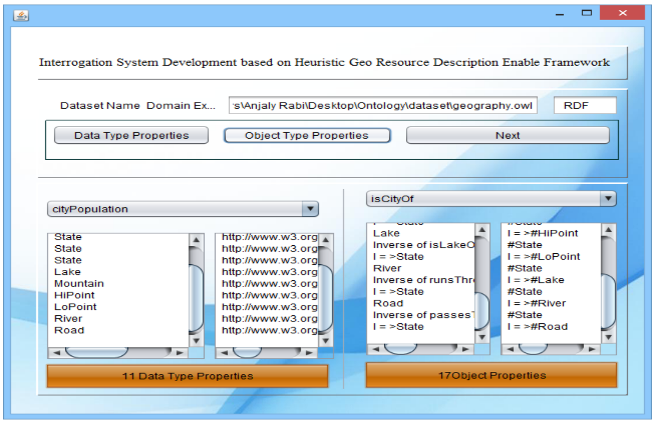

Fig.4.Screnshot for the prediction process

The content is extracted from domain expert dataset. The main application of the N-Triples Algorithm splits the content into subject, object and predicate. It stores the elements of the file into the Server. Finally find the relationship between the classes and their properties. The Subject consists of the main part of the query that can be used for the query search primarily. The next keyword for the search would be the object. The Predicate defines the property of the data that relates the subject and object. For example, if the query input is "River length of Ganga", then the length would be the property. This is the pictorial representation of the process that happens between the Domain Expert and the Triple Conversion for the ontology prediction.

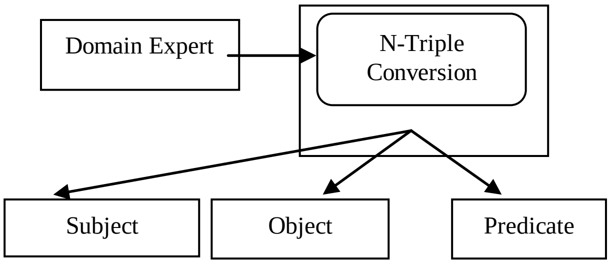

Fig.5. Triple Conversion

The solution seeker is allowed to submit the query. Questions are in a much more flexible format. It analyzes the Question type. The Questions are parsed and split the query into ontology part, question part, reference part. The request is redirected to the Ontology Search Engine. Authentication is used to control the access to the system. It uses capche generation for the key generation. It uses the key length to try the combinations from the set of values. These values can be a set of numbers or alphabets. So in this process, it uses the alphabets. The key length is specified as six. Then it selects a value in the set using the random method from java utility. That value is appended each time and stopped at the length specified. The condition is checked using a count variable in the loop. This security facility can help the system to protect the data. This represents the Capche generation.

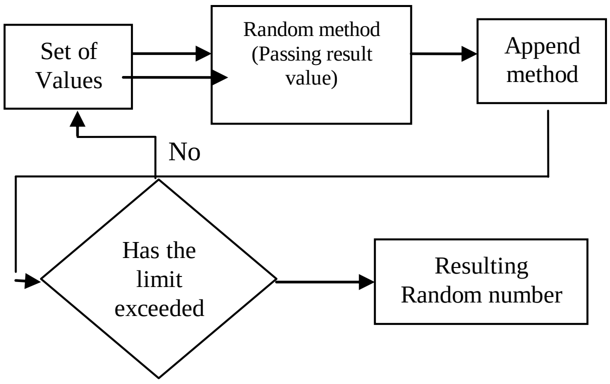

Fig.6.Capche generation

A snippet for the capche generation is given below,

```
StringBuffer sb1 = new StringBuffer();
java.util.Random r = new java.util.Random();
for (int x = 0; x < PASSWORD_LENGTH; x++) {
sb1.append(values[r.nextInt(values.length)]);}
```

the capche. The password length is set by the user and the value is appended accordingly.

Generally paging happens when a page fault occurs and a free page cannot be used to satisfy the allocation. The value is determined by the less time waiting for page-ins. A page replacement algorithm looks at the limited information about accesses to the pages provided by hardware, and tries to guess which pages should be replaced to minimize the total number of page misses, while balancing this with the costs of the algorithm itself. Likewise a cache replacement algorithm is used to help the cache to overcome the management of cache size. A replacement algorithm is used for the reduction of memory in the cache that is used. Cache contains the recently obtained solution. This solution is piled up in the list. So this list must contain a particular limit to help in the memory management o fthe system. The Demand replacement is the replacement algorithm that is used for the memory managment inside the cache list.

The conceptual work flows are identified for the web services. Its respective GI services and conceptual work flows are analyzed. It retrieves the current Conceptual workflow from the web portal. The solutions are formulated for the Solution seeker queries. And it evaluates the Query Results. The precision is calculated according to the existing data. It helps in the evaluation of the efficiency in the system. In pattern recognition and information retrieval with Binary classification, precision is the fraction of retrieved instances that are relevant, while recall is the fraction of relevant instances that are retrieved. Both precision and recall are therefore based on an understanding and measure of relevance.

The precision is the fraction of retrieved instances that are relevant and is calculated to determine the better relevance. The selection of the data from the domain expert is done.

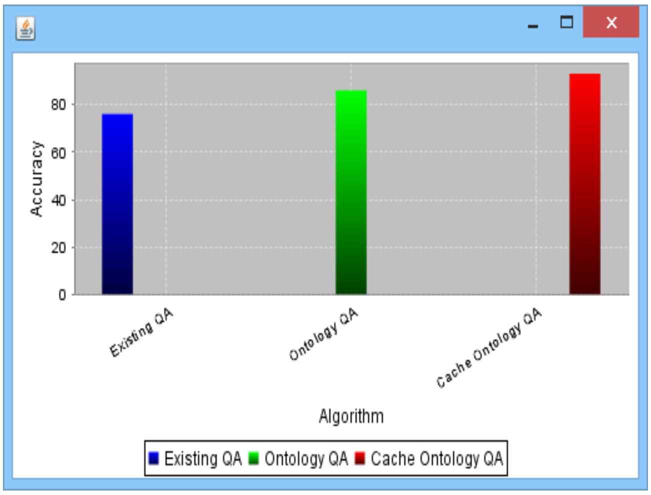

Fig.7.Graph Comparison

The Graph is calculated with the accuracy and time reduction in the produced three systems. The time is taken using the execution time for the whole process with respect to each algorithm used. The usage of this framework helps the user to seek the required solution. The flexibility of the query search for the solution seekers is increased. Time is reduced to retrieve solution for questions.There is a reduction in the complexity of data done by the N-triples. The Domain expert can add the data to the data set for the changing nature of the dataset that this system has chosen. It provides the security through password protection. There is memory management provided for the cache through the demand replacement method. The Cache implementation decreases the time taken for formulating the solution.

IV. CONCLUSION

The usage of this framework helps the user to seek the required solution. The flexibility of the query search for the solution seekers is increased. Time is reduced to retrieve solution for questions.There is a reduction in the complexity of data done by the N-triples. The Domain expert can add the data to the data set for the changing nature of the dataset that this system has chosen. It provides the security through password protection. There is memory management provided for the cache through the demand replacement method. The Cache implementation decreases the time taken for formulating the solution.

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