International Journal of Technology Research and Management
ISSN (Online): 2348-9006
Vol 1 Issue 6 December 2014

Proposed Architecture for Efficient and Intelligent Question Answering System that Uses Semantic Web and Ontology

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Abstract: Popularity of internet, attract the user to search data from the web, instead from the book or any other documents. The reason behind this popularity is, everything related to any filed is available on the internet very easily; user does not need to work hard to for searching any data from the web. Persons need to just type the query on the search engine to get result. Sometimes, during search, user does not get proper result after searching, and the huge links open in front of user to select his/her require answer. So by this search, user gets confused and impatient. This has become a big problem of searching on web. In this paper we will be going to show a proposed architecture for semantic question answering system, which will show the significant result in place of unmatched and ambiguous data.
Keywords: Ontology, Question Answering (QA), Semantic Web, Web data, Web Scrapping.

1. INTRODUCTION

As we know that, now a days, Internet is using by every person. Everybody prefers to use Internet instead of using books, because the Internet reduces the work load of human. The meaning of above line is that, if user will search answer from books, he needs to search from different books and work load of human gets high, so the user get irritate in searching from books and other related documents. And if user search data on the web using search engines or question answering systems, so that he only needs to type his/her question or query on the search box and he get the answer. There are so many search engines are available on Internet, by which the user can search their data very easily. Some of the search engines are Google, Swoogle, Bing, SenseBot, START, Yahoo. These are very popular and useful search engines and question answering systems.

Our system is basically a question answering system, which is based on Semantic Web and Ontologies. Semantic web means, meaningful search on the web. With the help of semantic web we can protect from senseless data on the "Web of Data". The user get only useful data on the place of un useful or irrelevant data.

The question answering system is the system, which provide the answer to the user according to their need. There are too many types of question answering systems available on the web and provided answers to the users, but they do not provide accurate and relevant answer to the user. By the irrelevant answers user get bored and hopeless.

Many professors and and students are doing research on Question answering systems that Semantic web to retrieve useful data from the web-data instead of meaningless data. They are trying to make a system which will give the accurate answer to user according to his/her requirement. The main aim of researchers is to provide accurate and exact matched result to the user, by which user get happy and believe on the result.

Ontology is also a very important to be used in question answering system. Ontology refers to communicate with the database and make the result more appropriate. Ontology classify the data of database and than search the data from the database which provide a easy and valuable search of the data.

There are too many problems occur, while finding the answer of a particular question or query.

1. Less availability of data: Sometimes data is not available on the database, which causes less availability of

data. By using web database we can resolve the problem of data availability.

2. Keyword based search: Keyword based search is also a problem of irrelevant data searching. Sometimes keyword are not found and user get un useful answer. If we will use use content based search we can provide better result than a keyword based search system.

3. No Suggestions available: If user search the answer of any question, he should get some of the suggestions, so that he/she can select require question or answer. This problem can be solved by using AJAX.

4. Synonyms Search: If we are not able to search the particular question, we should search for their synonyms, by which user will be able to get write answer instead of wrong and ambiguous data.

By solving above four problems we can make a very good question answering system. Our aim is to make a system which will be able to give exact result to the user instead of using un useful and meaningless data.

There are so many systems, which worked on the question answering systems that uses semantic web and ontology. Querix was a system, which was created by Esther Kaufmann, Abraham Bernstein, and Renato Zumstein in 2006. This system uses high English grammar and matches the query by using matching center. It gives the 78.6% exact match. The problem with this system was its complexity. This system was too complex so that it becomes a tough task to understand its architecture and procedure. After having a tough architecture, this system was still not able to give correct and accurate answer to the user.

Another system was SMART, which was developed by Battista, A.D.L., N. Villanueva-Rosales, M. Palenychka and M. Dumontier in 2007. This was an Ontology based semantic query answering system and used OWL, SPARQL, RDF and Java programming to implement system. Query interface of this system was not so good; this system shows the less knowledge base. The system should be based on intelligence, which is not used in this system.

QASYO was a question answering system for YAGO ontology developed by Abdullah M. Moussa and Rehab F. Abdel-Kader in 2011. This system uses natural language query on the place of keyword, means this simplifies natural language query into simple query. Converting a natural language query into simple query and then providing the answer becomes time consuming. The answer should be generated as fast as possible. This process takes too much time to generate query result. But still this system provide relevant result to the user, If the system not able to answer of the query, than simply reply 'sorry, don't know the answer'.

Another system QAAL (Question Answering for Automatic Learning) was developed to reduce the steps, which are used to convert the natural language query into keywords or simple query. This system was developed in 2012 by Kalaivani and K. Duraiswamy, This system basically uses Graph Matching Algorithm (RDF Graphs) for providing accurate answer to the user. This system classify the questions according to the question words like (What, Where, Whom, When, How, Who etc.). These question words shows, which type of result require by the user, for example; who, whom related to any person, When related to time. Where related to place etc. For implementing this concept they used ontology.

Sometimes un useful and huge amount of data is provided to any person during his/her searching process. V. S. Babanne, Dr. S. T. Patil, D. J. Joshi thought to make a system which will able to solve the the problem of ambiguous and unrelated data. They finally resolve this problem in 2013 by developing Intelligent Question Answering System.Tthey make this system as rule-based system which follow the If-Then rule. This system selects a domain which was Java. Means this system was able to answer any question which will be related to Java. By using knowledge base this system is able to give exact answer to the user.

Erfan Najmi, Khayyam Hashmi, Fayez Khazalah and Zaki Malik in 2013 make an Intelligent Semantic Question Answering System. Most of the Question Answering system uses search engine approach, which provides a list of result and user need to select his require answer from the searched results. To resolve this problem they make a system which gives only one word answer to the user, but they provide accurate and exact result. So that, user can get appropriate and useful data means they resolve the problem of unnecessary results which was provided to the user while he/she is searching anything.

Above described Question Answering Systems based on Semantic Web and Ontology. But still those systems had some problems. We are trying to resolve those problems. Like Intelligent Semantic Question Answering System was able to provide only one word answer. It could be a better system, if it can give the descriptive answer also. Knowledge Base should be very important part of the

question answering system, which was not used by every system. Some system uses RDF (Resource Description Framework), which matches the result using graph. This technique is called graph matching.

In this paper, we will be going to suppose a architecture for Intelligent Question Answering System, that will use Semantic Web and Ontology. We have discussed about the old systems. In the next section of this paper, we will describe the proposed architecture for the require system. After the description of architecture, in section III we will describe proposed results of our system, which will shows the proposed result accuracy and proposed performance of the system. Section IV will be Conclusion. Than we end with References.

2. PROPOSED ARCHITECTURE

Proposed architecture for semantic web and ontology based question answering system is shown in Fig. 1. Which is consists of different steps and parts. The main steps of our proposed system are: 1. User Query Box, 2. Answer Type Selection, 3. Intelligent Query Analyzer, 4. Database, 5. Onto- logy, 6. Answer Generator.

Now we will describe every step of our system. Every part of the system performs some particular task to generate the exact and accurate result according to the user's requirement. We will hope that the system we are proposing, we will implement it the way we think.

User Query Box: In this block of system, the user will insert the question for getting the exact answer. The user should be used only English to insert the question and the question will be end with the question mark (?).

Answer Type Selection: In this procedure, the user will select the type of answer he requires. There will be 2 links will be available for the user with the help of these he will select one of the link to get the answer. These two links will be "One word answer" and "Descriptive Answer". If the user selects one word answer than he get the answer in one word according to his question. If user will select descriptive answer than he will get the description of answer for his/her question.

Intelligent Query Analyzer: Intelligent Query analyzer will analyze the question to generate the answer. In our system 2 Intelligent Query Analyzer are used, which uses the same steps and perform the same task. Only difference is that one query analyzer will work to search one word answer and another query analyzer will work to find the descriptive answer. These analyzers use 4 steps to analyze and divide the query. 1. Tokens. 2. By finding Adjectives, Verb, Object and Question Word. 3. Search for Synonyms. 4. Search for query in Database.

1. Tokens: In this first step the query will divide in tokens by the space separators and the token will end when the token generator is find the question mark in the end.

2. By Finding Adjective, Verb, Object and Question Word: After dividing the whole question in tokens, this will find the adjectives, verb, object and question word in the question. Firstly it will concentrate on question word, which type of question it is. There may be different question words like, What, Where, When, Why, How, Who, Whom, which, How long, How old, How many. After analyzing the question word, this will find the subject, object and verb from the tokens, and transfer all these division to the next step of query analyzer.

3. Search for synonyms: Now the system will search for synonyms. It may be possible that the any word of divided question not available in the system, so that this will search for synonym for the word in the database. For example, if someone uses "Home" instead of "House". This step will add synonyms with that word and forward the query to next step.

4. Search Question in Database: The divided and forwarded query now comes to the search portion. In this portion the data is finally searched from the database. This step retrieves data from the database and forwards the searched data to the user. This step works as interface between the system and database. In both query analyzer, this step is performs similarly. It connected with 2 different ontologies, which search for one word answer and descriptive answer.

5. Ontology: The divided question from the intelligent query analyzer comes to the ontology. Here the ontology searches the query type. The Whole data of the database is classified with the help of ontology. So, here the type of

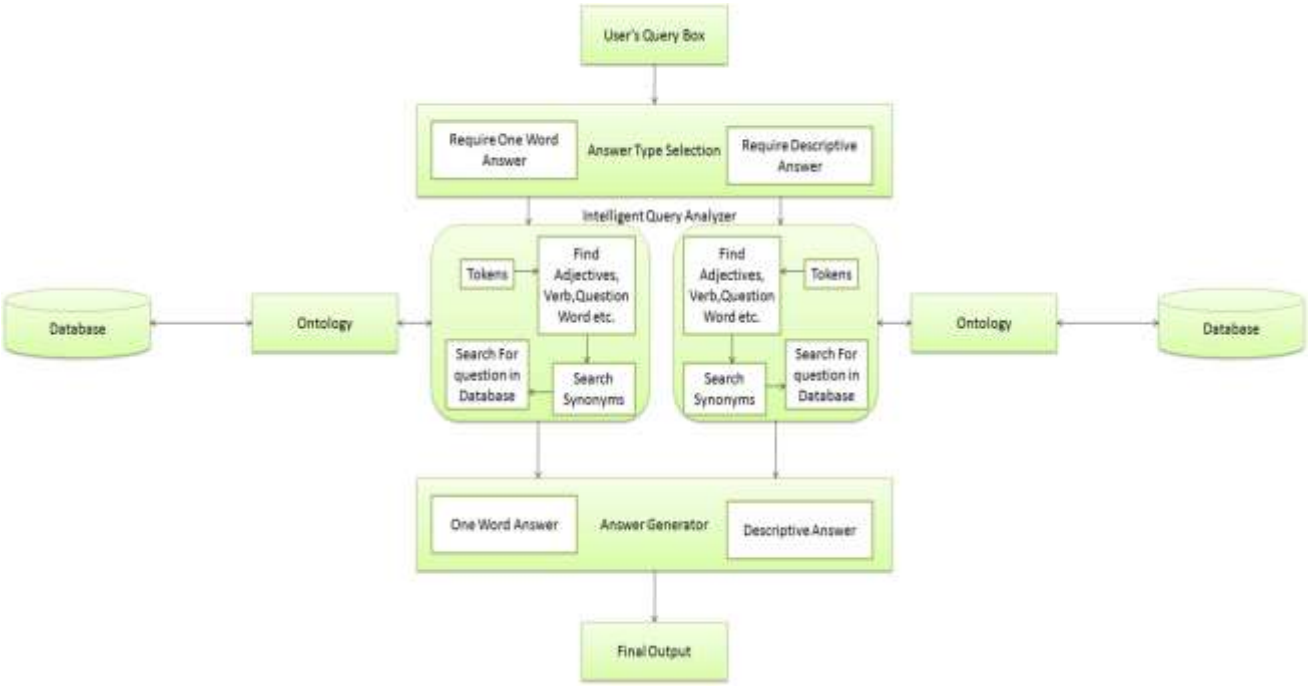

Fig. 1 Architecture for Intelligent and Semantic Question Answering System uses Semantic Web and Ontology

query is selected, and decided where to send the query. When the query, matches with the particular classification than it will send to that classified portion of the database where the data is searched. In the system, ontology works for 2 types of data one for descriptive and one for one word answer.

Database: After all the classifications and divisions the data finally send to the database to search. In a database, where according to ontology multiple tables are made. From, that tables the data is searched and retrieved and again transfer to the intelligent query analyzer for the further processing. When, the answer for the question is found than that answer is transfer to the system. In the system there are 2 databases are used, one database consists of one word answers and another database is consists of descriptive answer. According to user's selection databases will be selected to retrieve the answer.

Answer Generator: After all the searching procedure, the answer and question comes to the Answer generator. Answer generator study the question and answer, and generate the result require by the user by its intelligence. If the answer type selected by the user is "One Word Answer", than this will check for the one word answer, and if the answer type is selected by the user is "Descriptive", than this will check for the descriptive answer. After this checking procedure, the result will show to the user.

Final Output: Now, the retrieved result from the database will show to user as the answer for the user's question. The user will get exact answer of his question. There will not be any major amount of data shown to the user. Only single answer according to his/her requirement will be show to the user.

We are assuming that, if we will implement this system, according to our thinking, than that system will be able to answer every type of answer and correct answer to the user. And user will like this so much. We want to create an intelligent system, which will provide accurate and relevant result to the user according to their requirement.

We will use Php Framework, HTML, Java Script, CSS, MySQL, Ajax and Web Scrapping to implement our system. Web Scraping will be very important part of our system. We will use web database to access result for the user.

3. PROPOSED RESULT

We are proposing a system, which will provide exact matched result to the user. For example:

Ques.: Who is current Prime Minister of India?

Ans.: Mr. Narendra Modi is Prime Minister of India.

Ques.: Who is Lord Ram?

Ans.: Lord Ram was 17th Avtar of Lord Vishnu. He was son of king Dashrath. His birth place was Ayodhya. Janak Nandani Sita was his wife. He killed Ravan and save Sita from him.

Ques.: Where does a lion live?

Ans.: Lion lives in Forest and called as "King of Jungle".

Similarly, many questions can be asked by the user. And we will want to give exact or related answer to the user. Like examples, we want to provide answer to the users. We are thinking that we can make that system, which will give exact result to the user.

4. CONCLUSION

Semantic Web and Ontology based search plays a very important role in searching on web. Our paper described about proposed architecture of a system, that will search the user's query in a easy ,manner and provide accurate answer to the user as they require. In this paper, We have given details about the concept, which we will be going to implement by using different techniques. We have discussed a brief details aboutresearch have been done in making question answeringsystems.

The objective of semantic web and ontology is to providemeaningful and relevant information to the user. So, we cansay that this is very useful concept for the developer ansresearchers to work on this, because every user want usefulinformation.

Acknowledgement

I would like to thank Miss. Swati Sing Lodhi, to guide me for creating this paper and for her suggestions she gives me for making my system better than any other system..

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