

# Implementation of Smart Question Answering System using IoT and Cognitive Computing

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## **Abstract:**

Nowadays people use internet search engines as medium of reference to understand any concept and get knowledge about queries due to the advancement in technology. In this paper our aim is to present a system which is the new way of searching for the information present on the internet and it is based on the new era of computing that is Cognitive computing. To resolves the situation where ambiguity and uncertainty is present Cognitive computing is used and attempts to simulate the mechanism of human brain. Recent information requirements need an efficient mechanism which should be capable of interacting with users in a more natural way. Our system is intended to manage large amount of textual data and mining suitable knowledge. Resulting in a new level of clarification to search results for the user by providing exact answer to the natural language query that are specified by users. Our system will be helpful to the users because system is able to provide relevant answers which do not require end users to wade through a huge amount of data present on the internet. This paper briefly summarizes implementation, characteristics and designing of question answering system with the help cognitive computing.

## **Keywords:**

*Question answering systems, Questions, Answers, Natural language processing, Cognitive Computing, Cognitive learning, IoT.*

## **I. INTRODUCTION**

Internet is a sea of information and for that reason it is palace where the user may get answer for his Variety of Question. With the help of keyword, search engines like Yahoo! and Google has become a core part of internet, helping user to get information needed from the internet. Nowadays a user goes to Google for getting the answer to his solution but the keywords are extracted from the search box results are displayed in the form of external links to solution.

Several of the search engines like Google and Yahoo! only provides the links to the query asked in the search box, a user has to click every link to check whether it is relevant answer or not. To reduce the work of searching and preprocessing the perfect answer to the question by user has been provided by Question Answering system with relevant refined information. This type of refinement in the system will provide a satisfaction to user for getting relevant

answer to question with the help of Cognitive Computing and IoT [1].

A question answering system will be providing refined and relevant answer for the user question if also then the user is unsatisfied his question will be raised in discussion box where the experts, researchers may answer to query. Providing refined extra information to the user for question will increase the refinement in question answering system by most relevant data. By providing such refined data to user will reduce the work for user to find answer he is looking for.

## **II. SYSTEM ARCHITECTURE**

Nowadays as there is vast amount of data available on internet which is easily obtainable and relevant for

user. Modern search results are in the form documents or links provided by the search engine through which user has to find the useful information from that links and documents. However, this can be inadequate if the user wants a specific answer to a question in mind. The basic objective of our system is to retrieve the correct answers to the queries posed by the user in search engines. The extracted answer could be from a collection of documents such as the World Wide Web or any local database Collection. Our proposed system will extract Answers from local database.

### **Flow of Question Answering System:**

- Question Interpretation,
- Identification of Question category,
- Applying question answering procedure to relevant knowledge structures,
- Retrieval of answers

In our proposed architecture each step has been implemented which narrates system overview. The basic concept of Proposed Architecture is inspired by the method of human Question answering and then it has been implemented in computerized model [1].

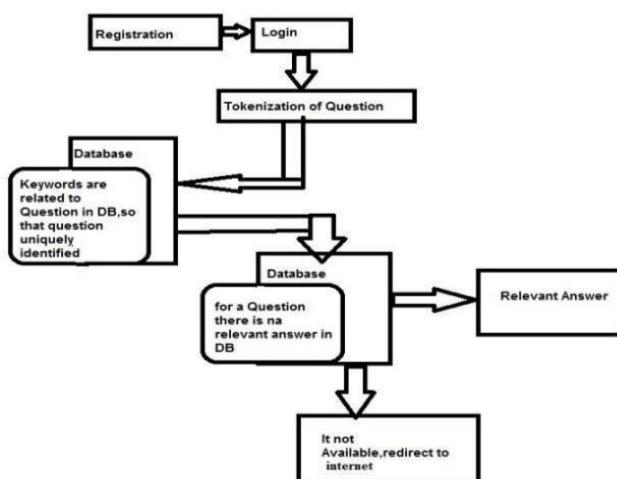


Figure 1: System Architecture

## **III. IMPLEMENTATION OF SYSTEM**

Our System consist five modules and their roles as follows:-

### **1. Indexing:**

This is the initial phases of the system where the question are tokenized and indexed by the keyword and tagging is performed on the database [6].

### **2. Question Processing:**

This is the important phase of the answer extraction.

Divided into phase:

#### **A. Parsing the query:**

We need to perform light weight form of parsing because we require only the key parts of the query and it is also useful in saving CPU cycles [2].

#### **B. Computing answer type:**

Parsing the Query will help in identifying the answer type of the question; once the answer type is found the query generation is perform [3].

#### **3. Query generation:**

Once the Answer type is known then query generation is needed that will retrieve candidate passages with the searching. Queries are then raised according to the keywords, phrases, and token in the passages.

#### **4. Indexed Term Dictionary:**

The processing of text involves two main problems, first problem is the extraction of feature terms that become effective keywords in the training phase and then the second is actual classification of the document using these feature terms in the test phase. The TF-IDF is stored as a table as the Term (keyword), count & document id. It represents that the term is appeared in the number of files & the count of the term in each file.

The screenshot shows a MySQL Query Browser window with the following details:

- Query: `SELECT * FROM qa q;`
- Resultset 1:

id	que	ans
1	what.java	Java is a Complete Platform for Object Oriented Software D...
2	what.jvm	JVM is an acronym for Java Virtual Machine, it is an abstra...
3	what.jre	JRE stands for Java Runtime Environment, It is the implem...
4	what.jdk	JDK is an acronym for Java Development Kit, It physically ...
5	what.jitcompiler.jt.compiler	JIT compiles parts of the byte code that have similar funct...
6	what.platform	A platform is basically the hardware or software environmen...
7	what.classloader	The classloader is a subsystem of JVM that is used to load ...
8	what.constructor	Constructor is just like a method that is used to initialize the ...
9	what.static.variable	static variable is used to refer the common property of all o...
10	what.static.block	Is used to initialize the static data member,It is executed bef...
11	what.this.keyword	It is a keyword that refers to the current object.
12	what.inheritance	Inheritance is a mechanism in which one object acquires al...
13	what.composition	Holding the reference of the other class within some other ...
14	what.super.keyword	It is a keyword that refers to the immediate parent class obj...
15	what.method.overloading	If a class have multiple methods by same name but differen...
16	what.method.overriding	If a subclass provides a specific implementation of a metho...

Figure 2: Indexed Term Dictionary (Terms, Doc\_id, freq)

## 5. Answer extraction:

Answer is extracted from data base on the query asked by the user and the relevant answer is provided to the query with detailed information with it for user satisfaction. Then the ranking and scoring system is invoked for user feedback and system improvement.[4][5]

## IV. ALGORITHM USED

### Naive Bayes Algorithm:

$$p(c/x) = \frac{p(x/c) * p(c)}{p(x)}$$

Where,  $p(x)$  is the **Total Dataset**,

Let **Q** be the **input Query** for a particular **answer A**

**Q-->A**

Therefore,

$$p(Q/A) = \frac{p(A/Q) * p(Q)}{p(A)}$$

Where **p(A/Q) = likelihood of Specific Answer**,

**p(Q) = count of nearest specific query**  
**, p(A) = Prior Total Dataset**

$$p(A) \Rightarrow p(Q)$$

## V. TYPES OF QUESTION ANSWERING SYSTEM

### A. Closed-domain question answering:

Closed domain question answering deals with questions under a specific domain (Technology, Science, Tourism, Medical etc.) The domain specific QA system involves heavy use of natural language processing systems formalized by building a domain specific ontology. This is predominantly used for online learning purposes.[6]

### B. Open-domain question answering:

Open-domain question answering deals with questions about nearly everything and can only rely on universal ontology and information such as the World Wide Web.(2).The domain specific Question Answering System gives more specific and correct answers than web based QA system as it is restricted for only one domain resource to Answer.[6]

## VI. RESULTS ACHIEVED

The system provides relevant answer to the user query with detailed information with it. This may help in Online learning Process also will help user to gain more and adequate knowledge about the related query. The objective of our proposed system to enhance the quality and correctness of answers and provide it to end users quickly and correctly is achieved[1].

## VII. FUTURE SCOPE

In Future System can be used as both **Open Domain** as well as **Closed Domain Question Answering System**. Features like **Voice Recognition** for Query Asking and **Text to Speech** for Answering Module can be added to make it more interactive and user friendly. **Media requests** like **Audio-Video files request** can be addressed in addition to Q/A..

## VIII. CONCLUSION

This paper describes development of question answering system with the help of cognitive computing. Cognitive computing is an emerging form of intelligent computing system by the mechanism of the brain. Aim of our system is to generate the query questions automatically with relevant answer to it with detail information required. In any intelligent system keywords and relevancy algorithms are the main parts.

Colloquially, This system can be called a 'Search Engine++' System since it works like a search engine using all the features of an online learning or a question answering system.

## IX. COMPARISON WITH EXISTING SYSTEM (In terms of performance parameters)

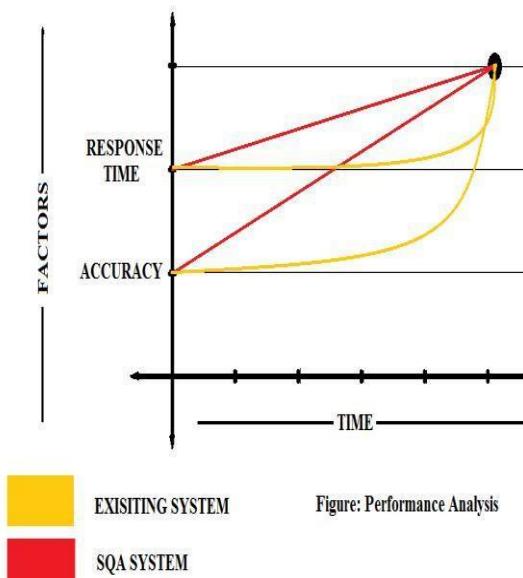


Fig 3: Performance Analysis Graph

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