

# Novel Scoring System for Identify Accurate Answers for Factoid Questions

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**Abstract:** *Question and Answer System (QAS) are some of the many challenges for natural language understanding and interfaces. In this paper we have develop a new scoring mathematical model that works on the five types of questions. The question text failures are first extracted and a score is found based on its structure with respect to its template structure and then answer score is calculated again the question as well as paragraph. A name entity recognizer and a Part of Speech tagger are applied on each of these words to encode necessary of information. After that the text to finally reach at the index of the most probable answer with respect to question. In this the entropy algorithm is used to find the exact answer.*

**Keywords:** Natural language processing, Question answering System, Information retrieval.

## 1. Introduction

Questions answering (QA) systems look for the answer of a question in a large collection of documents. The question is in natural language. QA systems select text passages. Then, after that the answer is extracted from these passages, according to criteria issued from the question analysis. NLP focuses on communications between computers and natural languages in terms of theoretical results and practical applications, and on information sharing now that information is exchange as it never has been before and sharing information becoming the leading theme in the domain of NLP systems[2][3]. Automatic question answering system will help for the above technology. In this Question Answering System consists of three distinct phases: Question classification, information retrieval or document processing and answer extraction.

The design of a standard QA system assumes that the language in which the question is asked and the text collection available to be processed are all in the same language. English QA system research attempts to deal with a wide range of question types like WHEN, WHERE, WHAT, HOW, WHOM, WHY & WHOSE. Thus the aim of a QA system is to localize the exact answer to a question from a structured or a non-structured collection of texts. Question Answering (QA) Systems allow the user to ask questions in a natural language and obtain an exact answer. In this, we tried to learn the important issues in the field of Question Answering (QA) systems. We peeked into the internals of many established QA systems. we do not only consider simple questions but text problems consisting of several sentences. Our approach to translating the natural language question uses an underlying corpus and the knowledge base to derive meaningful and relevant patterns which can then be used to process the questions and capture their meaning with respect to the underlying knowledge base. We classify the text based on their subject, verb, object and preposition for determining the possible type of questions to be generated. The ability of QA systems to recognize a great amount of answer types is related to their powerfulness for extracting right answers [5] [6] [8].

## 2. Previous Work

A survey of different QA techniques has been elaborated. Question answering system for Indian languages like Hindi, Telugu, Bengali and Punjabi is discussed. In Hindi language the Hindi QA system research attempts to deal with a wide range of question types like when, where, what time, how many[1][3]. The developed Question-Answering system in Hindi is using Hindi Shallow Parser. The shallow parser gives the analysis of the sentence in terms of the morphological analysis, POS tagging, Chunking etc. In Bengali language question and answering system is one of the Indo-Aryan languages of South Asia with over 200 million native speakers. A translation based on transliteration and a table look-up method is proposed as an interface to the actual QA task. The implementation part thus involves transliterating a Bangla question as an equivalent Latin alphabet (English) version that could be used in an actual QA task [2]. The Bangla lexicon consists of a good number of "loan-words" from Arabic, Persian, English and other languages. An approach to transform the Bangla question could be;

- Tokenizing the transliterate version of the Bangla question,
- Translating the remaining question by a simple table look-up method.

## 3. Methodology

In this first we collect the corpus of data or paragraph from encyclopaedia to make the questions and find the exact answer show n fig1. Corpus is of two types: Questions and Paragraph. These questions have many types and these types are what when, where/which, who/whose/whom. After this with the help of these questions we make the question from paragraph then next step is the paragraph chunk and question score, the chunk paragraph is a format of writing, which forces you to expand on your ideas and explain your arguments.

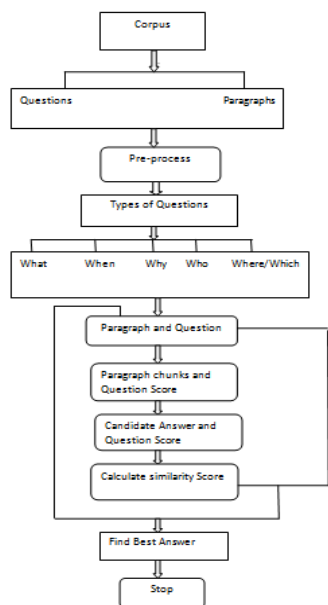


Figure 1: Flow of Question Answer

It helps in skills writing development and the scores are calculated on the basis of the accuracy of the answers. After that the candidate put query or question and answer then the similarity score will be calculated this loop will continue for process till the best answer will be find.

#### 4. Results

##### 4.1 Mean Precision Percentage Values

It is the fraction of relevant retrieved answers given by the question and answer system to the total number of retrieved answers given by the question and answer system. Mathematically, it is represented as:

$$\text{Precision} = \frac{\text{No. of relevant retrieved answers given by the system}}{\text{Total no. of relevant retrieved answers given by the system}}$$

The average Precision, Recall and F-Score is shown in table:

Table 1: Average Precision, Recall and F-Score of each question type (in Percentage)

S. No	Question Type	Worst Case	Average Precision Case	Best Case	Worst Case	Average Recall	Best Case	Worst Case	Average F- Score	Best Case
1	What	70.6 65116	82.604651	85.604 65116	47.88 372	59.88372	62.88 372	29.27 57	32.2757	35.27 57
2	When	70.57 42857	82.571429	85.571 42857	51.57 143	63.57143	66.57 143	30.45 77	33.4577	36.45 77
3	Why	68.11	80.11	83.11	46.2	58.2	61.2	28.26 83	31.2683	34.26 83
4	Who	67.86 14286	79.857143	82.857 14286	42.3	54.3	57.3	26.9 65	29.9065	32.9 65
5	Where	63.7	75.7	78.7	49.2	61.2	64.2	28.36 71	31.3671	34.36 71

We have also considered the worst case scenario for analysis the working of the system for each factoid questions, in this we have found that in worst case the system typically find 7 questions corrects and 9 questions correctly in best possible case ‘when ‘what’ type of questions are explored and search

on the input paragraph and similar is the case of other factoid types [4] [7].

The graph given below in fig.2 shows the values of mean precision for each type of factoid questions types which shows how the system search for the information which is relevant to the question to process the best answer from possible dataset of answer predicted by the system. Scores are calculated on the basis of the accuracy of the answer that add another level of precision which can be made by finding more common artifacts between the question token and the answer token. The results would be more precise with the use of more common verbs, nouns, adjectives, adverbs, pronouns in both token sets and matching pattern with the usage of regular expressions.

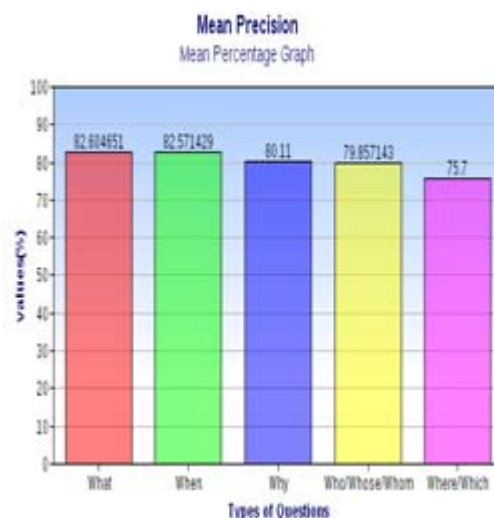


Figure 2: Average Mean Precision of each question type(in Percentage)

##### 4.2 Mean Recall Percentage Values

It is the fraction of the number of relevant retrieved answers given by the question and answer system to the total number of relevant answers that should have been retrieved. Mathematically, it is represented as:

$$\text{Recall} = \frac{\text{No. of relevant retrieved answers given by the system}}{\text{Total no. of relevant retrieved answers that should have been retrieved}}$$

The percentage of recall for each question type can be seen by the graph given below in fig. 3. The answer found by the question answering system can be more or less thorough than the actual answer based on the dataset provided. The number of answers possible for a query depends on the evaluator and the ground truth. The answer expected by the evaluator may differ from depending on the depth of search. As a result of which there is a good amount of recall percentage due to obvious reason of the high value of precision. The number and the type of answers found from the paragraphs quite similar in nature can be seen because of this high value of recall mentioned above, creating difficulty in discriminating one set of answer token from another possible similar set of answer token.

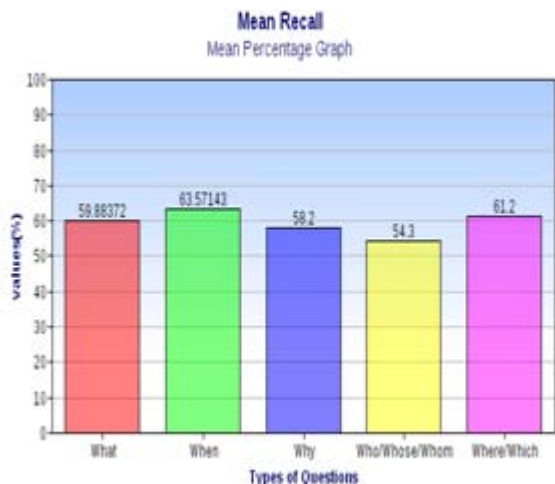


Figure 3: Average Mean Recall of each question type (in %)

### 4.3 F-measure Percentage Values

It can be calculated only if precision and recall are known for system. It calculates a harmonic mean between precision and recall. Mathematically, it is represented as:

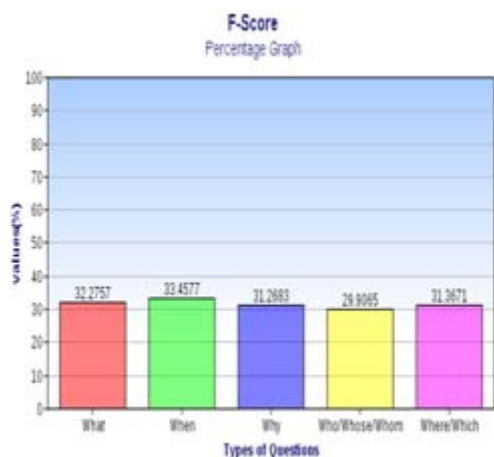


Figure 4: Average F-Score of each question types (in Percentage)

$$F\text{-measure} = \frac{(Precision * Recall)}{(Precision + Recall)}$$

### 5. Conclusion

Through this thesis work, we tried to learn the important issues in the field of Question Answering (QA) systems. We have added all types of questions.. It can be used to improve question answering system by checking all returned answers. However, it cannot be used alone to select the good answer. Answering system has become an important component of the online education platform. From our research findings we took the initiative of proposing a basic framework for a QA task for the language English [9]. The goal of a question answering system is to retrieving answers to questions rather than full documents or best matching passages, as most information retrieval systems.

### 6. Future Score

In this research paper, we have added all types of questions. These questions are when, why, who/whom, when, where.

We used the dataset and evaluated the performance of our system using Recall and Precision. The future work include that also the more questions can be added and the coding system could be better [10] [11]. We hope to carry on these ideas and develop additional mechanisms to question generation based on the dependency features of the answers and answer finding.

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