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# Subjective Answer Evaluation System

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***Abstract*— In recent years we have seen that a large number of examinations have gone online. However we have observed that these examinations cater only objective or multiple choice questions and provision to subjective answer and its evaluation is still an open problem. Automation of descriptive answer evaluation process will be helpful for various universities and academic institutions to efficiently handle the assessment of exam answer sheets of students. Aim of our system is to check the degree of conceptual knowledge of the student by evaluating the subjective answers submitted by the student written online. The key step in our approach is keyword extraction which is used to evaluate subjective answers. Keywords are the important words present in a document. Along with the keywords, marks will be allotted based on the grammar, length and the synonyms of the keywords written by the student in the answer.**

***Keywords:*-computer, assessment, descriptive, processing, evaluating, grammar, database, extraction.**

## I. INTRODUCTION

In recent years we have seen that a number of governments, semi government examinations have gone online, for example [IBPS Common Written Examination (CWE)]. This system or any other such systems are advantageous in terms of saving resources and time. However we have observed that these systems cater only multiple choice questions and there is no provision to extend these systems to subjective questions. [2]. We have studied a number of problems for which these systems cannot be used in board examination, university examination where student writes subjective answers so we have proposed this software to reduce the usage of resources. The major issues with online objective answers are students coming from various educational backgrounds have difficulties with grammar, formation of correct and complete sentences. Natural language is very rich in expressing the sentences; therefore the same meaning can be conveyed in different forms using different set of words. Similarly for evaluating answers for the same question, different teachers may have different views. So to avoid such problems we have proposed this system which can be adopted easily and will also reduce the evaluation time.[1,2]

The techniques for automatic marking of free-text responses are basically categorized into three main kinds, Statistical, Information Extraction and Full Natural Language Processing.

### *A. Statistical Technique:*

It is only based on keyword matching, hence considered as poor method. It cannot tackle the problems such as synonyms in student answers, nor does it takes into account the order of words, nor can it deal with lexical variability. [3,6]

### *B. Information Extraction (IE) Technique:*

Information Extraction consists of getting structured information from free text. IE may be used to extract dependencies between concepts. Firstly, the text is broken into concepts and their relationships. Then, the dependencies found are compared against the human experts to give the student's score.[4,6]

### *C. Full Natural language processing (NLP):*

It involves parsing of text and finding the semantic meaning of student's answer and finally comparing it with standard answer and assigning the final scores.

NLP is the application of computational methods to analyze natural language. NLP uses tools such as syntactic parsers to find the linguistics structure of a text and rhetorical parsers to find the discourse structure of a text. The combination of these techniques improve the use of statistics by involving a deep text parsing and a semantic analysis in order to gather more information to effectively assess the student's answer. Most NLP applications such as information extraction, machine translation, sentiment analysis and question answering, require both syntactic and

semantic analysis at various levels. [4,5,8]

## II. THE PROPOSED SYSTEM

Many architectures and features have been proposed for descriptive answer evaluation. There is no standardized software to award marks/grades for the answer given. The approaches are mainly based on keyword matching, sequence matching and quantitative analysis, but semantic analysis of descriptive answer is still an open problem. Considering the general structure of text analysis in natural language processing, most of the work has been done for syntactic analysis but semantic, pragmatic are still not being explored.

### *Scope of System*

Subjective Answer Evaluation System is a system that is developed with an intention to evaluate subjective answers written online. This system would reduce the manual efforts required for correcting answers. The following steps explain the working of the system:-

- The user has to login with the essential details and the system will authenticate the same-The login module authenticates both the user and the admin. Once the authentication is done, the user and admin can perform their individual activities.
- After authentication, questions will be displayed to the user
- After answering the question it will be submitted to the system
- The submitted answer will then be evaluated by the system and marks will be allotted- The evaluation of the answer is done by comparing the student's answer with the standard answer stored in the database.

The system will not be able to evaluate mathematical equations as well as answers with diagrams. The system can check only five different answers of the students.

## III. ARCHITECTURE DIAGRAM

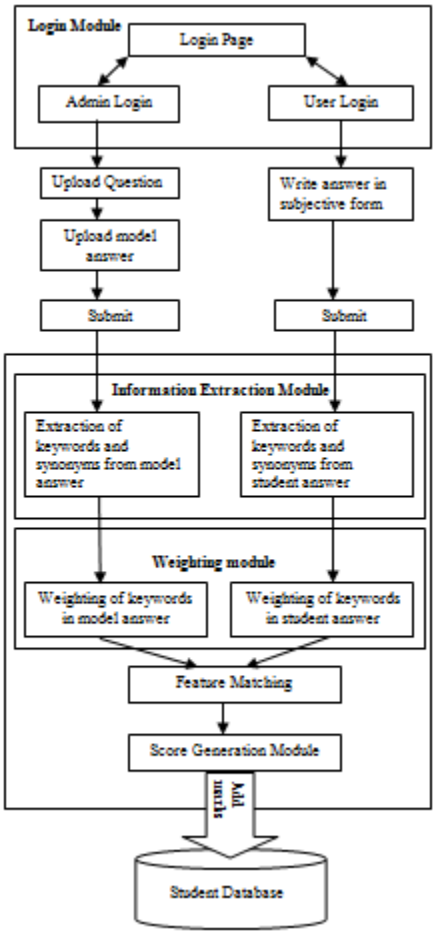


***Fig 3.1: Architecture of the proposed system***

## IV. METHODOLOGY

The system comprises of four modules and they are Login module, Information extraction module, Weighting module and Score Generation module.

### *A. Login Module:*

The login module authenticates both the user and the admin. Once the authentication is done, the user and admin can perform their individual activities.

### *1. Admin Login:*

The admin needs to enter the username and the password for authentication. Once authenticated, the

admin can now create the question and store the answer for the same in the database. The admin can also add students, subjects and tests for those subjects. The admin should keep all the keywords present in the answer in capital letters. Thus admin should store the answer with a subject expert helping him to identify the keywords present in the answer. The question will be displayed to the user and the answer stored will be used as the standard answer for comparing with the user's answer.

***2. User Login:***

The user login enables the user to write the answer for the question displayed. The user is asked to enter his login id and test id. If all the credentials are satisfied then the student is redirected to the page where the question and a text box for the answer is displayed. Once the user has completed writing the answer, he/she can submit the answer for evaluation.

***B. Information Extraction Module:***

Information extraction module is a module where the process of extracting the keywords from the standard answer and the user submitted answer will take place. Along with the keywords, the synonyms of the keywords submitted by the user will also be extracted. The keywords are the words that provide the key concept or are of great significance in a document. The keywords that get repeated very often in a document are given less importance. But the keywords which occur rarely in a document will have great importance. The synonyms of the keywords will be extracted from the dictionary stored in the database. [6].

***C. Weighting Module:***

***1. Keywords***

The keywords of the model answer must be written in capital letters while storing the database. These keywords are extracted by our system and stored in a multidimensional array. Now these words are checked in the student's answer and depending on the percentage of keywords present in the student's answer, marks will be given. First of all, the student's answer is broken down into strings and is stored in a multidimensional array. Now the keywords extracted by the system from the admin's answer are checked with the array of the student's answer one by one.

***2. Synonyms***

Synonyms are required in-order to analyze the similar sentences written by the user instead of the sentences mentioned in the standard answer. Using Wordnet, the similarity of the sentences can be mapped between the user's answer and the standard answer. Thus, even though the student's answer does not contain the exact keywords or sentences, sentences having similar meaning will also get marks.

***3. Grammar***

Grammar is used to form the structure of a sentence. There is a possibility that the user may only write the keywords without the sentences. Thus checking grammar plays an important role in subjective answer evaluation. In order to secure maximum marks the user must specify the keywords along with the proper sentence formation. Grammatically incorrect sentences in the student's answer will be given less marks even if there are a lot of keywords.

***4. Length***

Length of the answer is also important as the student may write the answer very shortly with all keywords and grammatically correct sentences. Such an answer would get all the marks for grammar and keywords but it will get less marks for the length.

Following table explains the marking scheme based on keywords and length of the answer:-

**Table I**

**Marking Scheme Table**

| **Keywords matched in Percentage** | **Marks obtained out of Max marks for Length** |
|---|---|
| 80-100 | 100% of Max marks |
| 60-80 | 90% of Max marks |
| 40-60 | 80% of Max marks |
| 20-40 | 50% of Max marks |
| 5-20 | 30% of Max marks |
| 1-5 | 10% of Max marks |
| 0 | 0% of Max marks |

***D. Score Generation Module:***

The score or mark is generated depending on the above factors and the total marks will be sum of all the marks obtained from individual sections. Depending upon the priority, keywords are given 40% priority followed by grammar 30% and then synonyms 20% and finally the length of the answer 10%. The marks for length are dependent on the percentage of keywords matching and a

marking scheme is tabulated for giving marks to the length. Thus if the student writes a completely different answer with no keywords matching, then marks for length won't be allotted.

## V. CONCLUSION AND FUTURE SCOPE

Examinations play a very important role in colleges, universities and various other educational institutes. Many educational institutes have their examinations conducted online. But these exams only contain multiple choice questions which are proving to be very efficient in testing the student's aptitude, on the other hand fail to measure the conceptual knowledge a student or learner must possess. Therefore subjective answers must be included in online examinations. The proposed system attempts to evaluate the subjective answers. The proposed system evaluates the answer based on the keywords. By comparing the standard answer and the student's answer marks are awarded to the student. Maximum marks are awarded if the student utilizes all the keywords mentioned in the standard answer. Hence the said system could be of great utility to the educators whenever they need to take a quick test for revision purpose, as it saves them the trouble of evaluating the a bundle of papers. Also this system totally evacuates any circumstance of biasness.

In future we are planning to evaluate subjective answers with diagram and mathematical expressions.

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