EVALUATING STUDENTS' DESCRIPTIVE ANSWERS USING NATURAL LANGUAGE PROCESSING AND ARTIFICIAL NEURAL NETWORKS

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ABSTRACT:
Computer based evaluation of students' performance is playing a vital role in world wide for all kinds of examinations. This method is somewhat faster than our manual evaluating process. In this study a new method is proposed to evaluate the students' brief answers such as descriptive answers using Artificial Neural Networks [ANN]algorithm and Natural Language Processing [NLP] algorithms. In this system staff member creates answer sheet and keyword dataset for the examination process. These dataset are stored in data storage and student enters their answers in the examination page. This system automatically calculates result using two algorithms of NLP and ANN. Before this evaluation process the pre-processing technique in applied on the answers entered by the students. In this study, we used an Artificial Neural Networks algorithm for the normal answer comparison and stores marks for this in database and also evaluate the same answer using Natural language processing [NLP] algorithm to check grammar mistakes and stores the marks in database and finally compares both marks and provides final result. By these methods we can get an efficient result. The results given by the system is compared with the evaluation done by the faculty member.

Keywords: *Artificial neural networks [ANN], Clustering, Evaluating, Keywords, Natural language Processing [NLP], Text mining.*

I INTRODUCTION

Computer based evaluation of student answer is the common work which is used in many areas in assessment of students learning process. The great idea on using the computers in learning process has changed the field of learning system widely. The computer assisted assessment system was developed for to evaluate the one word answer such as of multiple choice questions. And can also evaluate the paragraph answer such as descriptive answer based on the keyword matching. The great drawback of this system is the student cannot know their mistakes and they won't try to improve them. Hence to make them to improve their English knowledge and grammar knowledge the proposed new method called evaluating the student descriptive answer using the Natural Language Processing algorithm and Artificial Neural Networks algorithm will be used. Many Researchers at this field only try to provide the marks and by this method the student will not know their mistakes and again at other exams they will make the same mistakes. It cannot able to improve the student knowledge on study. Hence this method of Evaluation of student answer using natural language processing and artificial neural networks is used.

In the text mining for assessment of student answer, the teacher prepares questions and answers. Text mining process is done by natural language processing and word net tools. Artificial Intelligence and computational Linguistics concerned with the interaction between computer and human (natural) languages. It will groups the English words into some of the sets of synonyms

called synsets provides short definitions and usage examples, and records a number of relations among these synonym sets. PoS tagger (Part of Speech tagger) is implemented to extract the important keywords in the answer given by staff before assessment is done. The extracted Keywords are categorized as mandatory keywords, subordinate keywords, and technical keywords. WordNet tool is used to give the related synonyms to literal word in the subordinate terms. Now Teachers can feed the servers with the eligible terms in the categories to be present for student evaluation.

The main objectives of this study is to evaluate the student descriptive type answers using the NLP and ANN algorithm and to design a tool for evaluation of the student descriptive type answer using the NLP algorithm for Grammatical checking and produce marks and ANN algorithm for normal answer comparison and produce marks.

II LITERATURE REVIEW

Yuejin Xu and Noah Reynolds (2012) did a survey to analyze the students' written response to a teacher leadership dilemma. The main objective of this study is to find out the accuracy of the categories which were generated by the IBM SPSS of text analytics survey.

Pooja Kudi and Amitkumar Manekar did a study on online evaluation of the descriptive answers with the short text matching. This method used the machine learning approach to solve the problem using the text mining and focused on short answer matching.

Meena K and Lawrence Raj did a research work on "Evaluation of the Descriptive answers using the Hyperspace Analog to language algorithm and self organizing Map". These works focused on the online evaluation of the descriptive answer which will be eliminate the discrepancy in that manual evaluation. The HAL algorithm is used to separate categories of words.

Shweta M. Patil and Prof. Ms. Sonal Patil did a research work on "Evaluating the student descriptive answer using natural language processing". The method evaluates the paper using the NLP tools.

Chi-Hong LEUNG and Wun-Na YUNG did a study on "Efficient Japanese parsing Algorithm for computer assisted language learning" (2003). In this work they used the algorithm called Computer Assisted Language Learning algorithms(CALL) for the computer language teaching and learning.

III METHODOLOGY

In this study to evaluate the student answer Natural Language Processing (NLP) algorithm and Artificial Neural Networks are used. The process starts by first staff creates answer sheet and keyword dataset for the examination process. These dataset stored in data storage and students enter their answer in the examination page. Once the student has submitted an answer text, the system will automatically calculate result using two algorithms of NLP and ANN. Before this evaluation process the pre-processing technique in undergone for the answer. Here we used Artificial Neural Networks algorithm for the normal answer comparison and stores mark for this in database and also evaluates the same answer using Natural language processing [NLP] algorithm to check grammar mistakes and stores the marks for this in database. Some basic linguistic analysis is performed in a natural language parser is respectively used to perform POS tagging of the student's answer text. After linguistic analysis, the student's answer text is processed by the artificial neural networks algorithm it will compares the student's answer text with the staff answer and with keywords.

The result of each process is calculated used by "marks calculator" to compute the total marks obtained by the student for his/her answer. and finally compares both marks and provides final result. By these methods we can get an efficient result.

Evaluating the students answer using the natural language processing

This is the important part in our work, here we evaluate the student answer by using the Natural Language Algorithm, and this part starts with the process of pre processing of student answer. Then finally moves in to its NLP process which takes

place in text mining process. They are discussed below.

Natural Language Processing (NLP) will be briefly presented together with an overview of some sub-areas especially relevant to evolutionary computation. NLP is a research field concerned with the interaction between computers and natural (human) language, as spoken and written language bodies are being processed for various purposes. The field is situated between Computer Science and Linguistics, and deals with problems ranging from ambiguity resolution both on lexical and syntax level, part-of-speech-tagging (POS), speech and text segmentation, to syntactic and semantic parsing. The problems have traditionally been solved with either rule-based or data-driven approaches, or in later times combinations of the two. The spelling and grammar checking, machine translation, text summarization, question answering systems, and dialogue systems are the some of applications.

The text similarity measures perform poorly on some tasks. The short answer only provides a limited content, because the length of the text is typically short, ranging from a single word to a dozen words by using information Exaction (IE). Information Extraction (IE), which is the technique used in this work, is in the middle of the Statistical and the full NLP approaches. It only requires shallow NLP without doing an in-depth analysis and it is more robust than ordinary Keyword Analysis. IE techniques pertain to acquiring structured information from free text, e.g. identifying Named Entities in the text and filling in a template. 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.

Pre-processing

It is normalization of the text includes throwing unwanted words, stemming etc. All relational operators are separated by white space. The preprocessing is dependent upon the natural language processing algorithm's ability to recognize the sentence tags in desired format. Split compound sentences to simple sentences. The process of

converting data to something a computer can understand is referred to as "preprocessing." One of the major forms of preprocessing is going to be filtering out useless data.

Part-of-Speech Tagging

It assigning a part-of-speech to each word in a sentence, useful in information retrieval, word sense disambiguation and it helps in parsing by assigning unique tags to each word thus reducing number of parses. We use POS tagger

Misspelling words: Number of misspelled words are recorded from the short answers.

Removing Stop Words

The process of converting data to something a computer can understand is referred to as "preprocessing." One of the major forms of preprocessing is going to be filtering out useless data. In natural language processing, useless words (data), are referred to as stop words.
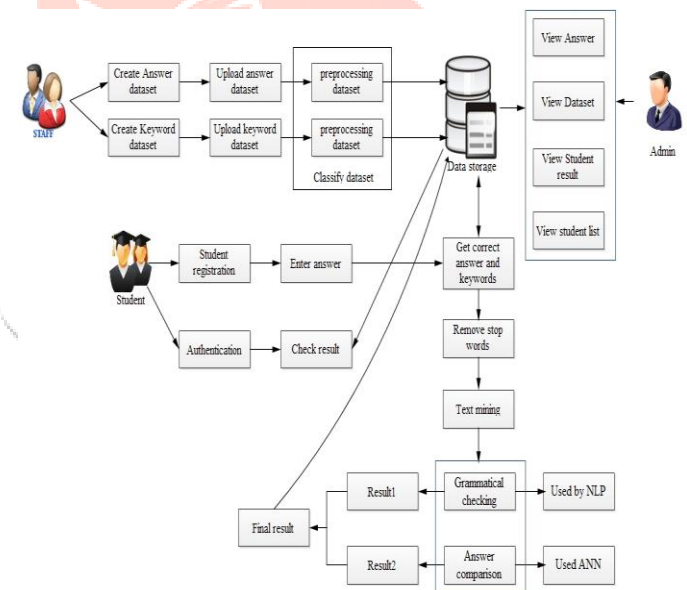
Steps to Evaluate Descriptive Type Answers using NLP and getting result

Step 1: Start.

Step 2: Form the correct answer store all the words present in it in a master table.

Step 3: Collect and insert all the probable synonyms and antonyms of the words of the correct answer to a synonym table and antonym table.

Step 4: If there exists any verb in the master table or synonym table or antonym table then insert their all possible tenses accordingly to the synonym table and antonym table.

Step 5: Assigning a weight to each synonym which is consider as the change of meaning of the sentence.

Step 6: Set student's score for the answer to 0. Input student's answer. Split the input into words and store them in a temporary table.

Step 7: Check if the key words or key terms are present in the temporary table. If key words or key terms found put the weight for that word. score = score + new weight. Go to Step 11.

Step 8: If key word or key verb not found then check if any synonym word of the key terms are found. If synonyms for key terms found put the weight for that word. Score = score+ new weight. Go to Step 11.

Step 9: If synonyms for key terms not found then stop further checking and consider the answer as ERROR.

Step 10: Check if any other antonym found in the temporary table. For each antonym the net weight should be multiplied by -1. If number of antonym is n, score = score * (-1)n

Step 11: Check the position vectors of the nouns and verbs combination in the input answer and compare it to that of the correct answers to verify the dependencies of the nouns and the verbs in the answer.

Step 12: Check if there exists any grammatical error in the sentence. For each grammatical error deduct 2 from the net score.

Step 13: If the net weight is positive and in the range of 20% of original score then the answer is CORRECT.

Step 14: End.

Evaluating the students answer using the artificial neural networks algorithm

The role of Artificial Neural Networks algorithm is normal answer comparison and stores marks for this in database. Here the answer will be evaluated only by normal comparison of text using the keywords. In this module compare student answer with correct answer.

Each and every word of student answer is compared with correct answer. If student answer is match with correct answer increase scores are assigned using Artificial Neural Network (ANN) algorithm. After score assignment Final scores are divided by making summation of assigned scores of all words.

Final result calculation

Here we used two type of dataset for result analyzing process. One is correct answer dataset and another one dataset is keyword dataset for comparison method. These two dataset uploaded by staff. If answer is correct assume value 1 else value 0, Results was calculated based on comparisons in Two parts. First part calculate based on the grammatical mistake checked using NLP algorithm of text mining process and another one part is answer comparison process using ANN algorithm. And this proposed system result at the first part get result 1 and result at the second part is called result 2. Finally calculate the average result of both two parts result automatically calculated. This final result is accurate result of student result based on student answer and it is stored as result3.

IV RESULT AND DISCUSSION

In this module if student enter the correct details in authentication, after authentication we can view final result. Then the Final calculated scores assigned to student response are given in report. The student can view their result by logging in to the result page using their respective register number and their password. There will be a single result which is displayed for the students in the tool, but their would be the three types of results found in our database for the students purpose to make them improve from ther grammatical knowledge and from general exam knowledge.

There would be three types of result called as result 1, result 2 and result 3, these three result are produced and stored in the database. The first result is known as result of grammatical checked result which means the result of NLP. That is calculated on the basis of the grammatical mistakes for each mistakes the two marks will be detected in the net score, this is the result 1

Then we move on to the result two, this is the result of ANN process, here the answer is evaluated on the

basis of the ANN algorithm and the result for this process is stored in the database as result 2, this result is produced by comparing both the result 1 and with the gain result of result 2.

Screen shots for application
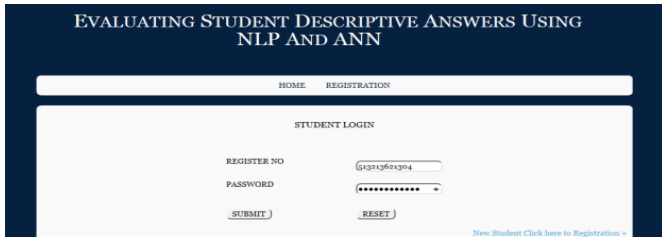## 1. Student login page

Figure: 4. Student login page

This is the student login page, here the student will login to write the examination, the login id and password was created by the student while the registration process, through that password and the user id the student will be authentised to get in to the examination page.
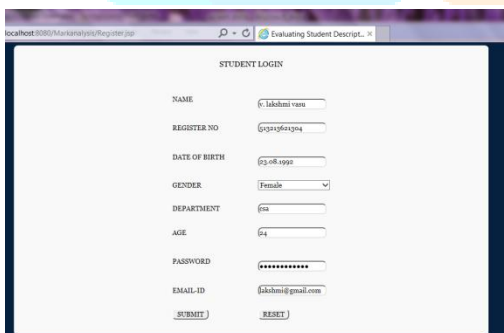
2. Registration page

Figure: 5. Registration page

This is the registration page of the student, here the student will register their details .This page consist of the name, register number, date of birth, email id, password and age. Through these details the student will authentised to write the examination.
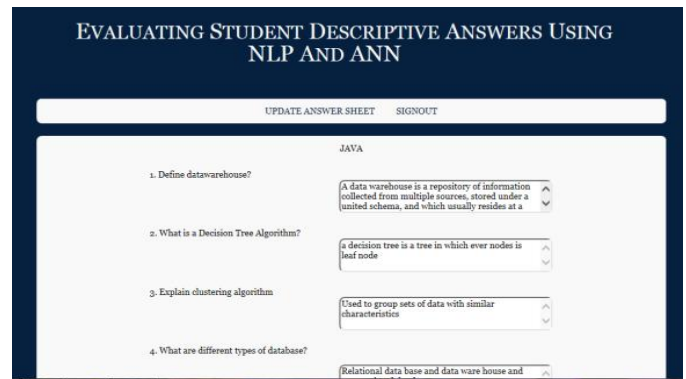
3. Examination page

Figure: 6. Examination Page

This is the examination page, it consist of the some of the questions, which is the question for the examination, the student will answer the questions and finally they complete their exams and view their results.

4. Result page

Figure: 7. Result page

This is the result page of the student, after the student finished his/her examination, the next page appears with the ready to check results, by clicking on that the student results

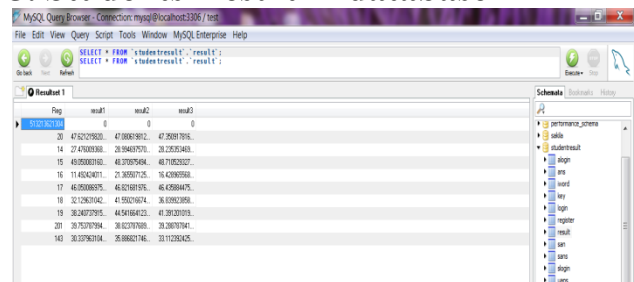## 5. Students' result in database

Figure: 8. Students' result database

This is the result of the students who wrote the examination through the tool, it was stored in the database; it is the database page with the results of the students. It has all the student results. It consists

of the three types of result. The result 1 is the result for evaluating the grammatical mistakes, result 2 is the result for the normal answer comparison, then the result 3 is the average of the both result 1 and result 2

V   CONCLUSION

REGNO.	RESULT 1	RESULT 2	RESULT 3	STAFF'S MANUAL RESULT
304	47.62	47.06	47.35	49
305	27.47	28.99	28.23	31
306	49.05	48.37	48.71	49
307	49.05	48.37	48.71	48
308	11.49	21.36	16.42	18
309	46.05	46.82	46.43	47
310	32.12	41.55	36.83	40

In an existing system to evaluate the students performance NLP process is applied. In study we developed a tool to calculate the results using Natural Language Processing (NLP) and Artificial neural network (ANN) algorithms. The staff will create answer sheet for question sheet and keyword dataset set related to answer for the examination process. These dataset stored in data storage And student answer compare with correct answer using ANN algorithm, and student answer check out spelling mistake and grammatical mistake using NLP algorithm after complete text mining process automatically calculate result using NLP, ANN results. The result 1 is got through the NLP algorithm and the result 2 is got through the ANN algorithm, and finally both results are compared and average result is produced as final result. These algorithms are used successfully and produced efficient result. The system generated results are compared with evaluation done by the faculty members. Comparative marks is listed in the above table. We found that there is no vast difference between the system generated marks and evaluation done by the faculty member. In future work, Deep learning method can be used as the advanced technology in the process of handwriting recognition of the student answer sheet.

REFERENCES

1. Yuejin Xu and noah Reynolds (2012), "Using text mining techniques to analyze students written response to a teacher leadership dilemma" International journal of computer theory and Engineering, Volume 4.

2. Pooja kudi and Amitkumar Manekar (2014), "Online Examination with short text matching", IEEE Global conference on Wireless computing and Networking.

3. Meena k and Lawrence Raj (2014), "Evaluation of the Descriptive answers using the Hyperspace Analog to language and self organizing Map", IEEE International conference on Computational Intelligence and Computing Research.

4. Shweta M. Patil and Prof. Ms. Sonal Patil, "Evaluating the student descriptive answer using natural language processing" International Journal of Engineering research and Technology, Volume 3, Issue 3.

5. Chi-Hong LEUNG and Wun-Na YUNG (2003), "Efficient Japanese parsing Algorithm for computer assisted language learning" Third International Conference on Semantics, Knowledge and Grid.

6. M. Govindarajan, and R. M. Chandrasekaran (2007), "Classifier Based Text Mining for Neural Network". International Journal of Computer, Electrical, Automation, Control and Information Engineering Vol 1, Issue 3.

7. Sathish Kumar S and N Duraipandian (2012), "Artificial Neural Network based String Matching Algorithms for Species Classification – A Preliminary Study and Experimental Results". International Journal of Computer Applications, Volume 52 Issue no 14.