



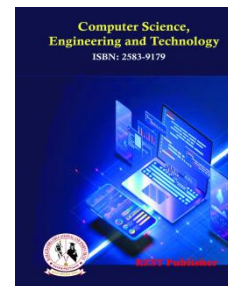
Computer Science, Engineering and Technology

Vol: 1(3), September 2023

REST Publisher; ISSN: 2583-9179 (Online)

Website: <https://restpublisher.com/journals/cset/>

DOI: <https://doi.org/10.46632/cset/1/3/3>



Intelligent Descriptive Answer Evaluation System

* Deepthi Rani S S, Bismija Badusha S

Christ Nagar College, Maranalloor, Thiruvananthapuram, Kerala India

*Corresponding Author Email: deepthisiva.ss@gmail.com

Abstract. Assessing the quality of responses in educational and professional assessments is a critical task, especially when dealing with subjective questions that demand descriptive answers. Traditional multiple-choice assessments fall short in evaluating a student's ability to express complex ideas and critical thinking skills. In this paper, we highlight the growing need for a Descriptive Answer Evaluation System (DAES) that can address the shortcomings of current evaluation methods. The primary goal of DAES is to provide a comprehensive and automated approach to assess descriptive answers, focusing on both content and expression. We explore the limitations of existing evaluation techniques, such as manual grading, and discuss how technology can revolutionize the assessment process by leveraging natural language processing and machine learning algorithms. Furthermore, we delve into the advantages of implementing a DAES, including scalability, consistency, and the potential for timely feedback. We also address the ethical considerations and potential biases that may arise in automated evaluation systems and propose strategies to mitigate these concerns. Through this paper, we aim to shed light on the importance of transitioning to a Descriptive Answer Evaluation System in educational institutions, standardized testing, and professional certification assessments. By embracing this technology, we can enhance the objectivity, efficiency, and effectiveness of evaluating descriptive responses, ultimately promoting a more equitable and robust evaluation process in various domains.

Keywords: Machine learning, natural language processing, Data preprocessing Levenshtein, Distance algorithm

1. INTRODUCTION

The Education is acquiring its importance in day by day. A student is evaluated by his/her scores. The evaluation of student's work is a central aspect of the teaching profession that can affect students in significant ways. At present the students evaluation is done either by manual work by collecting the students answer paper and evaluating it and publishing the results or through multiple choice questions through online. The students get different courses now days, by online and offline systems. So the evaluation of students answers only by multiple choice questions are not enough. The descriptive answers of the students must also be evaluated. So, we are developing software to automate the evaluation of answers using Natural Language Processing and Machine Learning. For every answer being entered, evaluation is done based on the usage of word, their importance and grammatical meaning of the sentence. With this approach we can save the cost of checking the answers manually and reduce the workload of the teachers by automating the manual checking process. The evaluation time is also reduced by using this software.

Objectives:

- An artificial intelligence- based agent can evaluate the subjective type answers not only efficiently, but also fairly with considerably good accuracy.
- To develop an online exam system for descriptive type questions.
- To implement techniques and algorithms that use semantic similarity for evaluation of detailed type answers.
- To reduce the time consumption in results generation for exams.
- Provide an efficient and fast way for descriptive types of examination.
- The cost of paper, copying, and distribution expenses are all reduced or eliminated.

- Even the cost of scanning the papers and then distributing them among the staff for evaluation is eliminated as the students will directly give online tests and they will be checked automatically by the machine.

2. PROPOSED SYSTEM

To avoid all the cons of the existing system the proposed system will evaluate the descriptive answers by taking the word order as well as the sentence sequence into consideration. The spell errors will also be checked through this system. In the proposed system the teacher can login to their page and can add question their corresponding answers and their maximum marks. The student can login to their page and can respond to the various questions provided, by selecting the subjects. The proposed solution will use Computer Assisted Assessment for the evaluation of descriptive type answers. This system will also consider word order while checking along with the sequence of sentences. The answer to a particular question is answered differently by different students. So, this proposed system will have the primary task of finding out the semantic meaning of the answer. In semantic analysis the meaning and interpretation of words, signs, and sentence structure. Semantics largely determine our reading comprehension, how we understand others, and even what decisions we make as a result of our interpretations.

3. METHODOLOGY

In this system we use supervised machine learning and natural language processing to evaluate the answers provided by the students. Various data preprocessing methods are implemented to evaluate the answers.

Supervised machine learning: Supervised machine learning can play a significant role in the development of a descriptive answer evaluation system. Such a system is designed to automatically assess and grade descriptive answers provided by students or individuals in various educational or assessment contexts. Supervised machine learning allows the system to automatically grade and evaluate a large number of descriptive answers, saving time and effort for educators and examiners. This is particularly useful in scenarios where manual grading is time-consuming and subject to human bias. Machine learning models can provide consistent grading standards, ensuring that all answers are evaluated according to the same criteria. This consistency helps in maintaining fairness and objectivity in assessment. It often involves grading a large number of responses, especially in online courses or standardized testing. Machine learning models can easily scale to handle a high volume of answers without a significant increase in resources. Supervised machine learning models can be trained to adapt to different domains or subject areas. They can learn from a diverse set of annotated answers and adjust their evaluation criteria accordingly, making them versatile for various educational contexts. In standardized testing scenarios, such as SAT or GRE, where a large number of answers need to be evaluated consistently, supervised machine learning can ensure uniform grading standards across all test-takers. Once a machine learning model is trained, it can significantly reduce the cost associated with human graders, making educational assessment more cost-effective, especially in large-scale applications.

Natural Language Processing: Natural Language Processing (NLP) plays a crucial role in evaluating descriptive answer evaluation systems in various educational, assessment, and natural language understanding contexts. Descriptive answer evaluation systems often deal with a large number of responses from students or users. NLP can automate the process of analyzing and evaluating these responses at scale, saving time and resources. NLP algorithms can provide consistent evaluations by applying predefined criteria consistently to all responses. This reduces human bias and ensures fairness in the evaluation process. Automating the evaluation process with NLP can significantly speed up the grading or assessment process, allowing educators and institutions to provide quicker feedback to students. NLP systems can be designed to evaluate answers based on objective criteria, such as correctness, relevance, and coherence, which are predefined by educators or experts. This minimizes subjectivity in grading. NLP can analyze the strengths and weaknesses of individual students and provide personalized recommendations for further learning based on their responses. Descriptive answers may vary in terms of language, style, and expression. NLP can handle these variations and still provide accurate evaluations by understanding the context and semantics of the responses. NLP can extract valuable insights from large datasets of descriptive answers, helping educators and institutions make data-driven decisions to improve teaching and assessment methods. NLP systems can be continually refined and improved using machine learning techniques, adapting to changes in educational materials and user responses.

Data preprocessing techniques:

Text Cleaning: Text cleaning here refers to the process of removing or transforming certain parts of the text so that the text becomes more easily understandable for NLP models that are learning the text.

Tokenization: Tokenization is the process of dividing text into a set of meaningful pieces. These pieces are called tokens we can divide a chunk of text into words, or we can divide it into sentences. Depending on the task at hand, we can define our own conditions to divide the input text into meaningful tokens.

Lowercasing: Lowercasing is a common data preprocessing step in natural language processing (NLP) and text analysis. It involves converting all the characters in a text to lowercase. The main purpose of lowercasing is to ensure that the text is treated consistently, regardless of the original letter casing.

Lemmatization: Lemmatization is a linguistic process that involves reducing words to their base or dictionary form, known as the lemma. The goal is to normalize words to their common root form, which helps in reducing the dimensionality of text data and improving text analysis.

Stemming: Stemming is a text normalization technique used in natural language processing and data preprocessing to reduce words to their base or root form. The goal of stemming is to remove suffixes or prefixes from words so that similar words with the same root are treated as the same word, regardless of their inflections.

Removing Noise: Removing noise in data preprocessing refers to the process of identifying and eliminating irrelevant, incorrect, or inconsistent information from a dataset to improve its quality and reliability for analysis or machine learning tasks. Noise in data can arise from various sources, including errors in data collection, measurement inaccuracies, outliers, and random variations. Removing noise is crucial because it can lead to more accurate and meaningful insights and models.

Stop Word Removal: Stop word removal is a common technique in natural language processing (NLP) and text analysis used during the data preprocessing phase. Stop words are words that are commonly used in a language but are generally considered to be of little value in text analysis because they do not carry significant meaning on their own.

Parts of Speech Tagging: Part-of-speech tagging (POS tagging) is a fundamental step in natural language processing (NLP) and data preprocessing. It involves the process of assigning each word in a text or a sentence with a specific part-of-speech category or label, such as noun, verb, adjective, adverb, pronoun, preposition, conjunction, interjection, etc. This helps in understanding the grammatical structure and meaning of a sentence.

Levenshtein Distance algorithm: It is the measure of the similarity between strings, which takes into account the number of insertion, deletion, substitution, and transposition operations needed to transform one string into the other. The distance between two strings a and b can be defined by using a function $f_a, b(i, j)$ where i and j represent the prefix length of string a and b respectively

4. RESULT & DISCUSSION

- Descriptive answer evaluation field focuses on assessing short natural language responses to questions in an automatic way.
- Online acknowledgment can radically cut miserable the period essential to correct huge amounts of data.
- Using descriptive questions helps in better evaluation and serves the most useful purpose.
- An artificial intelligence-based agent can evaluate the subjective type answers not only efficiently, but also fairly with considerably good accuracy.
- To develop an online exam system for descriptive-type questions.
- To implement techniques and algorithms that use semantic similarity for evaluation of detailed type answers.
- To reduce the time consumption in results generation for exams.
- Provide an efficient and fast way for descriptive types of examination.

The cost of paper, copying, and distribution expenses are all reduced or eliminated. Even the cost of scanning the papers and then distributing them among the staff for evaluation is eliminated as the students will directly give online tests and they will be checked automatically by the machine.

Future Scope: In future, we can extract handwritten text from the image instead of the descriptive answers provided through online mode. This will be more realistic and more useful. We can use recursive neural network (RNN) to train our model with different handwriting. This will make our model more accurate. The model can be trained for different languages across India. In this, we can collect dataset of different handwritten languages. Hence an answer with language other than English can be evaluated. System will also evaluate the overwritten alphabets and other words with absolute accuracy. The system can be trained in such a way so that, it can check the complete paper instead of a single answer.

5. CONCLUSION

Descriptive answers have various parameters upon which they can be evaluated such as the question specific content and writing style. Evaluating subjective answers is a critical task to Perform. When human

being evaluates anything, the quality of evaluation may vary along with the emotions of the person. Performing evaluation through computers using intelligent techniques ensures uniformity in marking as the same inference mechanism is used for all the students. In Machine Learning, all result is only based on the input data provided by the user. Our Proposed System uses machine learning and NLP to solve this problem. The need for online examination aroused mainly to overcome the drawbacks of the existing system. The main aim of the project is to ensure user-friendly and more interactive software to the user. The online evaluation is a much faster and clear method to define all the relevant marking schemes. It brings much transparency to the present method of answer checking The answers to all the questions after the extraction would be stored in a database. The database is designed as such that it is very easily accessible. The work of checking hundreds of answer sheets which more or less contains the same answer can be quite a boring task for the teachers. This system can be used instead in order to reduce their burden. It will save a lot of effort and time on teacher's part. The human efforts applied in this repetitive task can be saved and spent more in other academic endeavors. The obvious human mistakes can be reduced to obtain an unbiased result. The system calculates the score and provides results fairly quickly. This system can be widely used in academic institutions such as schools, colleges, coaching and institutes for checking answer sheets. It can also be implemented in different organizations which conduct competitive examinations.

REFERENCES

- [1]. Intelligent Short Answer Assessment using Machine Learning Rosy Salomi Victoria D, Viola Grace Vinita P, Sathya R International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958 (Online), Volume-9 Issue-4, April 2020
- [2]. SubhadipBasu, Nibaran Das, Ram Sarkar, MitaNasipuri, “An MLP based Approach for Recognition of Handwritten ‘Bangla’ Numerals”, in Proc. Indian International Conference on Artificial Intelligence, 2005., Pp. 407-417.
- [3]. Prajna Nayak and Sanjay Chandwani, “Improved Offline Optical Handwritten Character Recognition: A Comprehensive Review using Tensorflow”, International Journal of Engineering Research & Technology (IJERT) Published by: www.ijert.org Vol. 10 Issue 11, November-2021
- [4]. Chhanda Roy, Chitrita Chaudhuri, “Case Based Modeling of Answer Points to Expedite Semi-Automated Evaluation of Subjective Papers”, in Proc. Int. Conf. IEEE 8th International Advance Computing Conference (IACC), 2018, pp. 85-90.
- [5]. Handwritten numeric recognition using support vector machine technique in machine learning k.v.k. Sasikanth, y.vineetha, p.supraja, k.v.mohankrishna, sagarmandal, 2019 jetirapril 2019, volume 6, issue 4.
- [6]. Automatic Evaluation of Descriptive Answers Using NLP and Machine Learning. Prof. Sumedha P Raut ,Siddhesh D Chaudhari, Varun B Waghole , Pruthviraj U Jadhav, Abhishek B Saste, International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) Volume 2, Issue 1, March 2022
- [7]. An NLP Based Algorithm for Subjective Answer Checking, Pratik Manoj Desai, RhugavedRajendraNarmade, International Journal of Advanced Research, Ideas and Innovations in Technology, (Volume 7, Issue 6 - V7I6-1213).
- [8]. Subjective Answers Evaluation Using Machine Learning and Natural Language Processing Muhammad FarrukhBashir , Hamza Arshad, Abdul RehmanJaved , Natalia Kryvinska , And Shahab S. Band, Digital Object Identifier 10.1109/Access.2021.3130902.
- [9]. An Intelligent System for Evaluation of Descriptive Answers, VinalBagaria, MohitBadve, ManasiBeldar, Sunil Ghane, Computer Science, Education, 2020 3rd International Conference on Intelligent Sustainable Systems (ICISS).
- [10]. Pawade, Dipti, AvaniSakhapara, IshaJoglekar, and DeepanshuVangani. "Implementation of Open Domain Question Answering System." In International Conference on Data Management, Analytics Innovation, pp. 499-507. Springer, Singapore, 2023.
- [11]. <https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-ml/>