Machine Learning Based On An Adaptive Approach For Subjective Answer Evaluation.

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Abstract- In the present circumstances, examinations can be classified into two distinct categories: objective and subjective. Competitive exams typically fall into the format of multiple choice questions, which require them to be administered and evaluated on computer screens. At present, most competitive examinations are being held online because of the high volume of students taking part in them. Nevertheless, subjective assessments like board exams are not suitable for computer-based administration. It is essential to incorporate Artificial Intelligence (AI) into our online examination systems. The integration of AI in the management of online exams would significantly streamline the assessment of subjective responses. Moreover, this approach would result in faster and more accurate results. Our proposed system would be carefully designed to replicate the marking process carried out by human evaluators. As a result, this system would be extremely valuable to educational institutions.

Keywords - Automated answer verifier, answer verifier, theory answer checker, matching answers.

1. INTRODUCTION

In the modern era, there are various methods used to conduct examinations, including online exams, multiple-choice question (MCQ) exams, and exams using Optical Mark Recognition (OMR) sheets. These different formats of assessment are administered on a daily basis worldwide. The evaluation of students' response papers is the key element in any examination. Traditionally, this task is done manually by teachers, which can be challenging when dealing with a large number of students. Therefore, automating the process of checking answers would undoubtedly bring significant benefits [2].

By automating the evaluation process, not only would it reduce the burden on the examiner, but it would also enhance the transparency and fairness of the evaluation by eliminating any potential biases from the teacher's perspective. In today's world, there are numerous virtual tools available for evaluating multiple-choice questions; however, there is a lack of tools specifically designed for evaluating subjective answer-based examinations.

This project aims to utilize machine learning to facilitate an adaptive approach for evaluating subjective answers. The resulting product can be implemented in various educational institutions to streamline the grading process. With further improvements, the product can even be used for conducting online theory examinations. Upon launching the product, the user will be presented with two options: to log in as an admin/college faculty member or as a student. After selecting their preferred option, the application user will be prompted to enter their correct login credentials. The college faculty member will have access to features such as uploading question papers and reviewing student answer sheets, while the student will be able to upload their answer sheets and view their allotted marks in real-time.

2. LITERATURE SURVEY

Measurement of text similarity: Text similarity measurement underpins various natural language processing tasks like information retrieval, question answering, and machine translation. This study systematically surveys the current state of similarity

measurement methods, evaluating their pros and cons. It proposes a refined classification system for text similarity algorithms, focusing on text distance (length, distribution, semantic) and representation (string-based, corpus-based, single-semantic, multi-semantic, graph-structure-based) [1]. The aim is to offer a comprehensive framework for researchers and practitioners, guiding future research and applications in the fields.

Evaluating student descriptive answers using natural language processing: The necessity of evaluating deep understanding in lessons has spurred advancements in Computer Assisted Assessment (CAA) for free-text answers. Recognizing the limitations of multiple-choice questions (MCQs), educators and researchers have sought more robust evaluation methods [3]. This paper reviews techniques supporting CAA, examines existing systems for marking short free-text responses, and proposes leveraging Natural Language Processing (NLP) to enhance evaluation of descriptive answers.

Factors affecting sentence similarity and paraphrasing identification: Sentence similarity assessment involves determining how closely two sentences resemble each other in structure and meaning, a process influenced by factors such as sentence representation, similarity measurement, and word weighting [9]. This study examines how these factors affect similarity detection and paraphrase identification using clustering algorithms.

3. METHODOLOGY

A. SYSTEM ARCHITECTURE

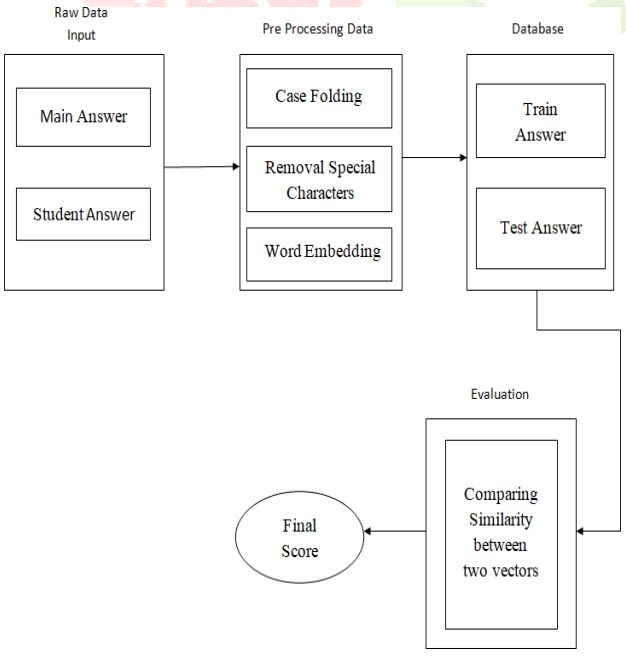

Fig 1. System Architecture

B. DEVELOPMENT ENVIRONMENT

The application's utilization of Machine Learning for analyzing the student's answer sheet has been executed in Anaconda Navigator Environment, a widely employed platform for conducting data science projects and experiments. This open- source web-based tool is extensively utilized in numerous machine learning applications. The creation of the Graphical User interface (GUI) has been achieved through the utilization of Visual Studio Code, an Integrated Development Environment (IDE) developed by Microsoft [4]. Visual Studio Code offers a comprehensive range of features, making it a preferred choice for developing applications in frameworks such as Django and Flask, which are predominantly based on Python. Additionally, it supports various other frameworks and is commonly favored by code designers for efficient code editing.

C. ANALYSIS OF DATA

- In the answer checking process, the training input for machine learning algorithms undergoes several modifications to improve accuracy. Initially, the input is tokenized to break it down into individual words, facilitating further analysis. Stop words and punctuation are then removed to refine the set of words, focusing on meaningful content.

- Stemming is applied to normalize words, ensuring consistency and enhancing accuracy in word matching. This process results in a distinct set of words that form the basis for evaluation.

- Furthermore, the system identifies a specific set of keywords essential for a correct answer. The presence of these keywords in the student's answer determines the allocation of marks, reflecting the relevance and completeness of the response. This approach streamlines the assessment process and ensures fair evaluation based on key content criteria.

D. FORMATION OF WEBSITE

- The website has been developed utilizing Flask, a Python-based framework, as one of the underlying technologies employed in its design.

- The main page of the website offers users the option to log in either as an administrator or as a student[5].

- The option to upload the question paper is made available through the administrative window.

- The student window is equipped with the necessary features to enable the submission of the student's answer sheet.

E. WORKING

An application known as an automatic answer checker assists in the evaluation of student answer sheets, mimicking the assessment process performed by a human being. The objective of this software is to evaluate open-ended and subjective queries, and subsequently assign scores to pupils based on the validation of their responses.

In order to execute the entire procedure, the user must store the responses to the questions, enabling the application to validate the answers against the answer sheet[6]. Within this system, the administrator is granted the capability to create the question paper and track the students who have submitted their answer sheets.

After logging in to the system successfully, the student will be able to access and review the question paper. Subsequently, the student will virtually write down the answers to the corresponding questions.

It is important to note that the responses to the questions may not precisely match those provided by the administrator [12]. However, any discrepancies in the answer will be promptly addressed by the system, thereby alleviating any concerns the student may haveregarding the accuracy of their answer sheet evaluation. The system has been constructed utilizing diverse machine learning algorithms, which ultimately compute the students' grades and deliver them back to the students. The application would be consisting of the followingcomponents:

Logging Facility:
When the application is opened, the user will encounter a main window displaying two separate choices: Admin and Student. The user can choose one of the options to continue with their intended task.

Student log-in:
The student log-in process necessitates the utilization of the student's mail ID as the identification (ID) and password in order to achieve a successful log- in. In the event of a failed log-in attempt, the student will be prompted to re-enter both the ID and password [7]. Upon successful log-in, the student will gain access to the uploaded question paper by the examiner, enabling them to attend the Exam.
Upon completing the responses to all inquiries, the student must click the "see marks" button to view the displayed marksand corresponding grade.

Admin log-in:
The log-in configuration of this system is designed specifically for the admin, who is a teacher[11]. To access the system, the admin must enter their mail ID as the identification and a designated password as the password. Once logged in, the admin will have the ability to create the classroom which will help to generate the question paper and track the submission status of each student's answer sheet. This feature allows the admin to easily identify which students have submitted their answer sheets and which students have not.

Answer Checking Process:
In the answer checking process, the input undergoes tokenization to break it into words and removes stopwords and punctuation. Stemming is then applied for word normalization [8]. The system identifies key keywords necessary for a correct answer, and the presence of these keywords determines the marks allocated to the student. This streamlined approach ensures fair evaluation based on essential content criteria.

4. EVALUATION

The evaluation of the proposed project was multi-faceted, aiming for a thorough understanding of its efficacy. It began with assessing the quality aspect, focusing on the precision of the Automatic Answer Checker system[10]. This likely involved scrutinizing factors such as accuracy and reliability to ensure the system's ability to provide correct answers consistently.

Following the quality assessment, the evaluation delved into analyzing performance. This phase aimed to comprehend the differences between the automated answer checking method and traditional approaches. Factors such as speed, efficiency, and effectiveness in identifying correct answers or errors were likely compared.

By examining both quality and performance, the evaluation sought to provide a comprehensive picture of the proposed approach's effectiveness. This systematic assessment likely enabled the project team to identify strengths, weaknesses, and areas for improvement in their system, facilitating further refinement and optimization.

5. FLOW CHART

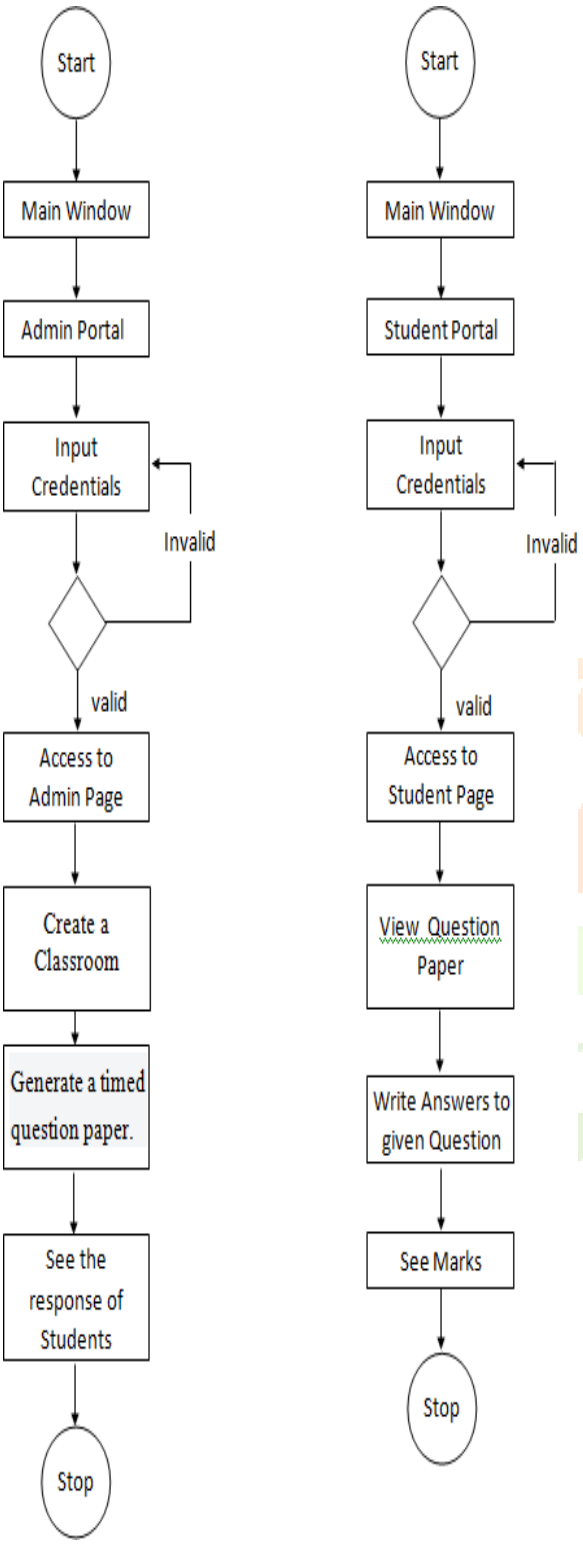

Fig 2. Flowchart

6. RESULT

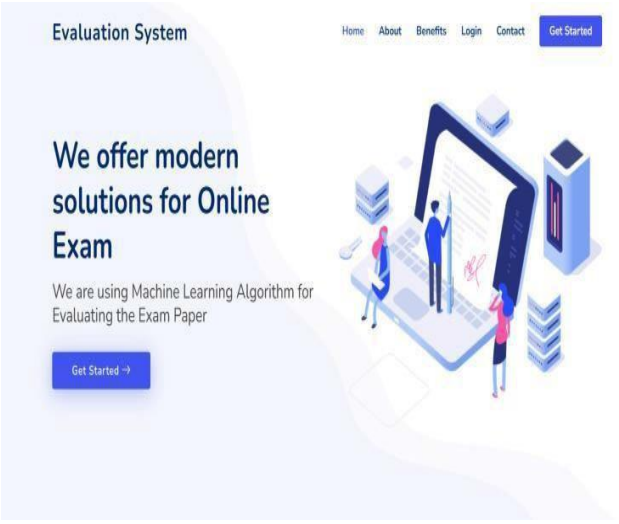

Fig 3. Home Page

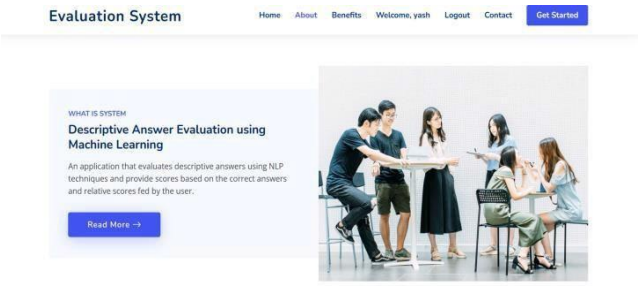

Fig 4. Website Snapshot

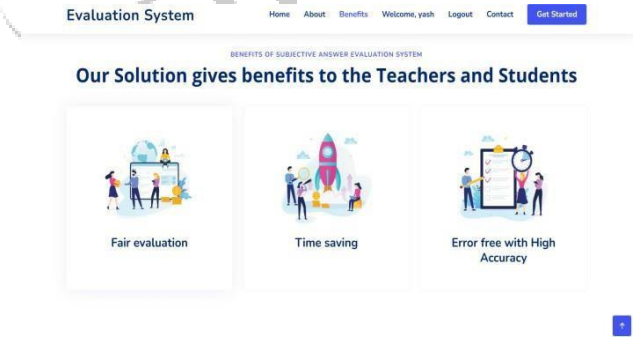

Fig 5. Info Page

Fig 6. Classroom

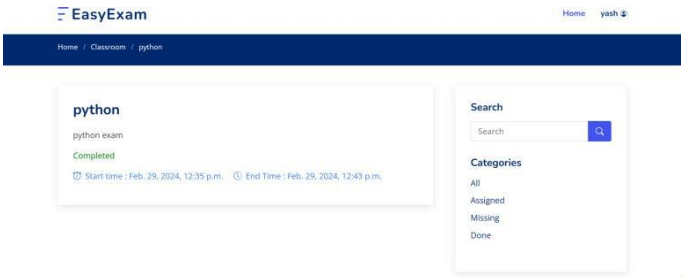

Fig 7. Exam Section

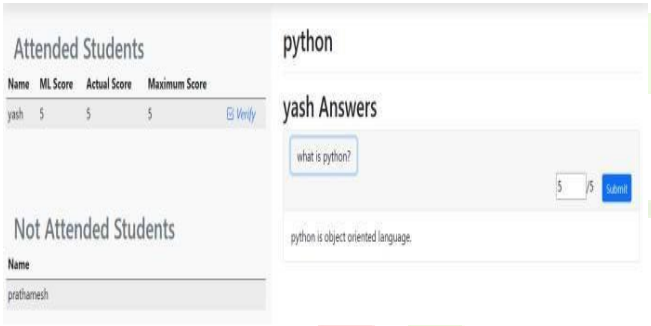

Fig 8. Test Result

7. CONCLUSION & FUTURE SCOPE

The final stage of the project report titled "Machine learning Based on an adaptive approach for subjective answer evaluation." has been successfully achieved. Throughout its development, great attention has been paid to anticipate and resolve any potential errors, resulting in a system that is highly efficient and dependable. One notable feature of the application is its robustness, which opens up numerous possibilities for enhancing its functionality in the future. Before implementation, the application is expected to go through approval and authentication processes. Subsequent efforts will focus on developing an algorithm to assess and identify syntax errors in our keywords. Additional analysis will be conducted to guarantee maximum efficiency and fairness in rectifying these mistakes.

In this system, the removal of notations and symbols during pre-processing facilitates the overlapping of text. However, this pre-processing also eliminates crucial symbols and features in the context of mathematical problems. This system can be effectively employed by educational institutions to evaluate students' term work, alleviating the arduous task of manually checking each student's work for teachers.

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