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# Automatic Answer Script Evaluation System

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**ABSTRACT:** The manual evaluation of answer scripts is a time-consuming and intensive process that has been the norm in the education system for many years. The automatic answer script evaluation system is an automated system designed to assess and grade answers provided by students to various exam questions. The system employs a set of pre-defined rules, and algorithms and utilizes technologies such as NLP, ML, and AI to evaluate the answer scripts to analyze the students' answers and provide accurate and consistent grading, based on the specific requirements of the exam along with brief feedback. The evaluation system consists of several key components such as keywords, synonyms, semantics, grammar, and a set of grading rules, algorithms, and user interfaces for inputting and displaying results. The system can be programmed to handle various types of questions, such as multiple-choice, short-answer, and essay questions. The advantages of using an answer script evaluation system are numerous. Firstly, it saves time and reduces human error, as the system can assess answers much faster and more accurately than human graders. Additionally, it provides consistent and objective grading, as the system uses the same set of rules and algorithms for all students. Finally, it allows for quick and easy feedback to students, enabling them to identify areas for improvement and work on them accordingly. In conclusion, an answer script evaluation system is a highly effective tool for grading students' answers in exams. It offers numerous benefits, including speed, accuracy, consistency, and objective grading, which can lead to improved learning outcomes for students.

**KEYWORDS:** NLP, evaluation, Objective Grading, Text conversion, Automated evaluation, Keyword similarity, LSTM.

## I.INTRODUCTION

Answer script evaluation is a crucial aspect of examination and challenging task because handwriting differs from person to person due to style, font, size, orientation, and other factors like extremely time-consuming and arduous process and can be biased or influenced by the perception/mood of the evaluator in a traditional evaluation system. An examination system's integrity is ensured by a fair, consistent, unbiased, and exact valuation, which is crucial for all educational institutions. The evaluation of answer scripts has undergone substantial modifications as a result of the introduction of technology into the evaluation system. At this point, the introduction of technology to the evaluation system has digitalized the process but has not automated it yet. many different assessment procedures are employed. A descriptive question-answering strategy is the one that is most frequently utilized. There are other sites that involve a lot of manual processes that may slow down the evaluation process. Hence we design and develop an automatic answer script evaluation system along with automated grading systems that reward grades and feedback more efficiently and accurately than humans by using a machine learning approach to aid the manual system of evaluation. An Automatic Answer Script Evaluation System is an innovative solution designed to automate and streamline the process of grading and evaluating answers. This system has transformed the traditional paper-based evaluation process into a more efficient, reliable, and effective one, making it an essential tool for educational institutions. The system leverages modern-day technologies such as artificial intelligence and machine learning algorithms to grade, evaluate, and provide real-time feedback on a large volume of student responses in just a matter of seconds. By automating the grading process, the system reduces the workload of teachers, significantly minimizes human errors, and provides students with prompt and accurate feedback on their academic performance. With this system in place, the evaluation process is no longer a tedious and time-consuming task that requires manual and repetitive labor. Instead, it becomes a fast and reliable process that frees up instructors' time and allows them to focus on more important aspects of their work. An automatic answer script evaluation system can provide meaningful insights into student performance which can help teachers to identify areas where students are struggling, and determine the effectiveness of their teaching methods. These insights can then be used to develop tailored teaching techniques, which allow students to improve their academic performance. The system can be used to provide students with a more engaging and interactive learning experience, incorporating elements of gamification and social learning.



## II.LITERATURE SURVEY

### **1. Automatic question generation and answer assessment for subjective examination by Bidyut Das, Mukta Majumder, Arif Ahmed Sekh, and Santanu Phadikar**

This study focuses on generating subjective questions and also an evaluation system is suggested for assessing the answers. For generating the questionnaires, key phrases are extracted from the course curriculum (syllabus). Next, based on the key phrases, different types of subjective questions are generated

### **2. An intelligent system for Evaluation of descriptive answers by Vinal Bagaria, Manasi Beldar, Mohit Badve, and Sunil Ghane**

This research work proposed an intelligent assessment platform that considers the question type, necessary keywords, structural, conceptual, and language aspects to evaluate an answer and generates personalized feedback and analysis reports for students and teachers to promote focused learning.

### **3. Automated Grading of Programming Assignments Using Machine Learning Techniques" by Saira Saeed and Sameena Shah**

This paper discusses the development of a machine learning-based system for the automated grading of programming assignments. The system uses a combination of natural language processing and program analysis techniques to evaluate the correctness and quality of student code submissions.

### **4. Fast and easy short answer grading with high accuracy by Md Arafat Sultan, Cristobal Salazar, T. Sumner**

This research is a fast, simple, and high-accuracy short answer grading system that utilizes recent advances in the identification of short-text similarity, and augments text similarity features with key grading-specific constructs to produce top results on multiple benchmarks. However, there was immense scope for improvement in this work.

### **5. Use of syntactic similarity-based similarity matrix for evaluating descriptive answer by D. V. Paul, J. Pawa**

This research is an attempt that has been made to address the problem of automatic evaluation of descriptive answers using a vector-based similarity matrix with order-based word-to-word syntactic similarity measure to find the similarity between sequential words in sentences

## III.NEED OF STUDY

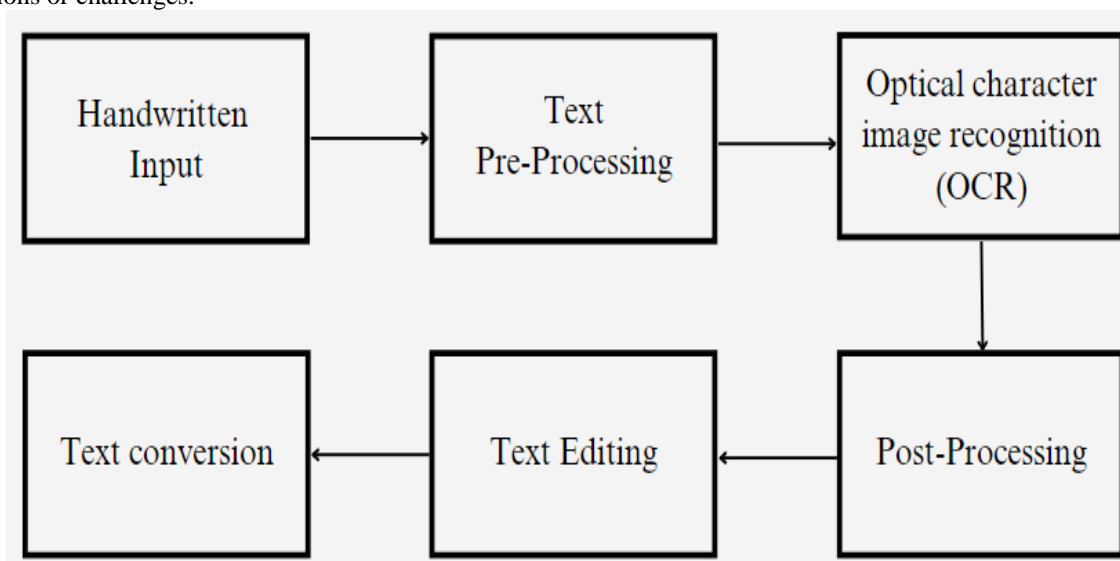
Automatic answer script evaluation systems are increasingly important in education and assessment settings. They offer several benefits that help to improve the efficiency, consistency, and effectiveness of the assessment process. One of the primary benefits of an automatic evaluation system is its time efficiency. Manual evaluation of answer scripts is a time-consuming and tedious process, especially for large-scale assessments hence there is a need to automate the evaluation process. An automatic evaluation system can process large volumes of responses quickly, reducing the time and effort required by human evaluators. This can lead to faster turnaround times for grading, reducing delays in the assessment process and workloads on evaluators and human error. Automatic answer script evaluation systems eliminate alphabetizing each line and grade answers automatically along with feedback for students through which students can improve their studies. Manual grading can introduce biases and inconsistencies in the grading process, as human evaluators may interpret and score responses differently. However, automatic evaluation systems can ensure consistency and objectivity by applying standardized criteria to evaluate all responses. This can reduce the chances of human error and ensure a fair assessment process for all students. In addition, automatic evaluation systems improve the scalability of the assessment process. They can handle a large number of responses simultaneously, making them well-suited for large-scale assessments, such as standardized tests or entrance exams. This can reduce costs and provide cost savings over time.

## IV.METHODOLOGY AND IMPLEMENTATION

As mentioned earlier automatic answer script evaluation system is a software system that assesses the correctness and quality of answers provided by students or other users in response to questions or prompts and grades according to accuracy, relevance, correctness, keywords, etc, and add on to this system also provides feedbacks to students. We can employ various techniques and methodologies to effectively evaluate student answers, including text extraction and measuring similarities between extracted text and correct answers.

The system initially needs to necessitate text conversion of the student's handwritten script. The process of converting the handwritten script into text in an automatic answer script evaluation system involves several steps. The first step is to capture an image of the handwritten response. This can be done using a scanner or a digital camera, the captured image needs to be pre-processed to remove any noise or artifacts that may interfere with the handwriting recognition process. This step involves tasks such as noise reduction, image binarization, and image segmentation. Next is

Handwriting recognition: The pre-processed image is then passed through an optical character recognition (OCR) engine or a machine learning model trained to recognize handwriting. The output of this step is a digital representation of the handwritten text. later Post-processing: The output of the handwriting recognition step may contain errors or inaccuracies, particularly in the case of messy or illegible handwriting. Post-processing techniques such as spell-checking, grammar correction, and contextual analysis can be applied to improve the accuracy of the text. Finally Integration: The final step is to integrate the converted text into the automatic answer script evaluation system, where it can be processed and analyzed using natural language processing techniques to evaluate the quality of the response. Overall, the accuracy of the handwriting recognition process depends on several factors, including the quality of the image, the complexity of the handwriting, and the sophistication of the recognition algorithms used. It is important to carefully evaluate the performance of the handwriting recognition system and implement strategies to address any limitations or challenges.



**Fig 1- Handwritten script to text conversion Workflow**

The automatic answer script evaluation system is mainly based on Natural language processing(NLP).NLP is a digital method used to understand, interpret and generate human language. It has been proposed as a valuable tool for educators in grading student work. NLP-based systems have shown great potential in accurately evaluating student answers by analyzing the language used in their responses. The use of NLP in automatic answer script evaluation involves a complex process. First, the system must extract the text from the student's response script, which can be done through image recognition or other means. Once the text is extractedit undergoes data Pre-processing: The first step in any NLP task is to pre-process the raw data. This includes tasks such as tokenization, stemming, lemmatization, and stop-word removal. Tokenization is the process of splitting the text into individual words or tokens. Stemming and lemmatization are techniques used to reduce words to their base form, and stop-word removal involves removing commonly used words such as "the," "and," and "is" that do not carry significant meaning.Once the data is pre-processed, the next step is to extract relevant features from the text. This involves techniques such as bag-of-words and TF-IDF (Term Frequency-Inverse Document Frequency) that represent the text as a set of numerical features, After extracting relevant features, the next step is to develop a model that can learn from the features and predict the quality of the answer. The model can be developed using techniques such as machine learning, deep learning, or rule-based approaches. The model is trained on a set of labeled data that consists of both good and bad answers. The model learns from the labeled data and tries to predict the quality of the answers based on the extracted features.Once the model is trained, it is evaluated on a set of test data that the model has not seen before. The evaluation metrics can be accuracy, precision, recall, F1-score, or any other metric that suits the problem.Finally, the model is deployed in the production environment, where it can automatically evaluate the quality of the answers provided by the students.

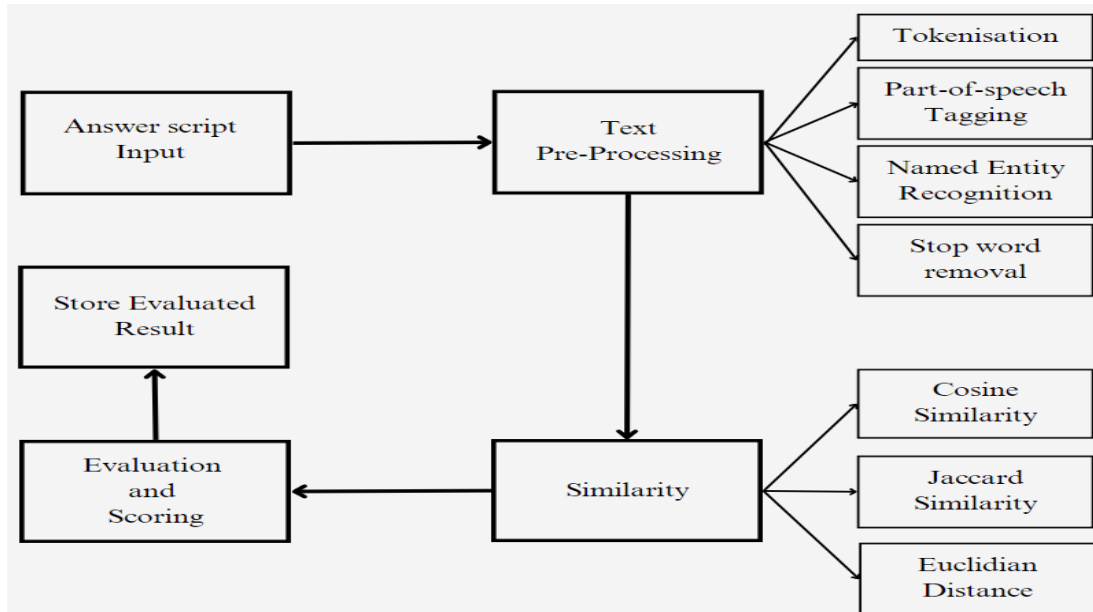


Fig 2- Natural Language Processing(NLP) Methodology Workflow.

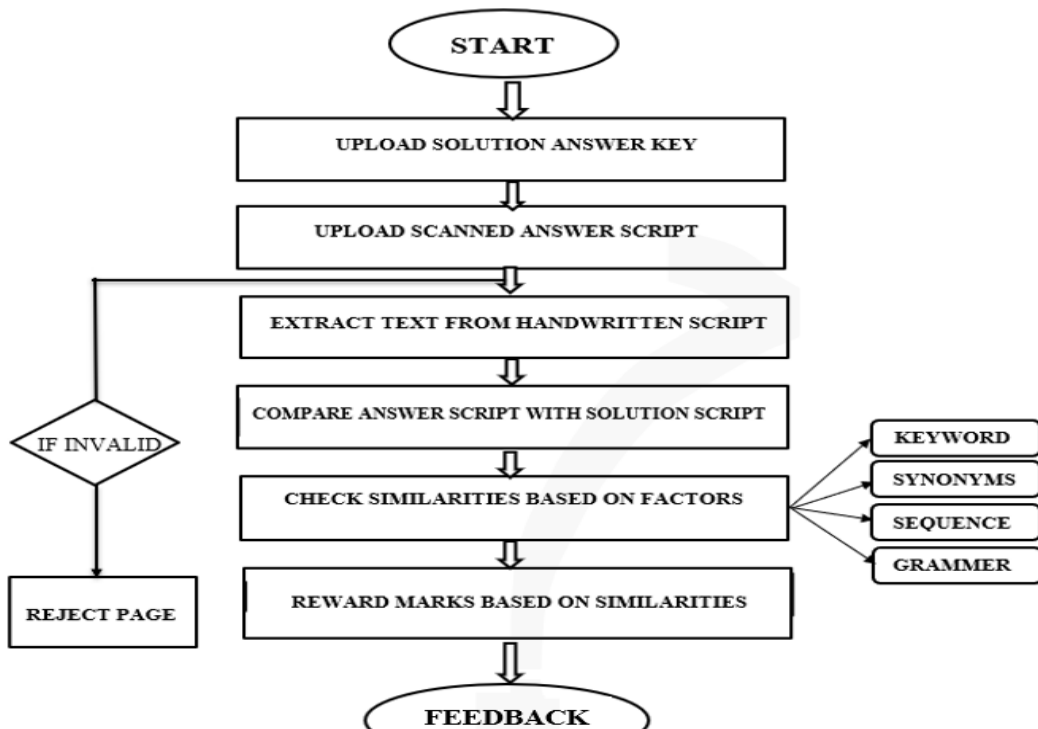


Fig 3- Automatic Answer Script Evaluation System Workflow

In our implementation, the system uses a question and a scanned Answer key to identify the correct answer for each question and then compares the student's answer with the correct answer to allocate marks. The first step of our system is to specify the question with its weightage and upload the scanned Answer key that contains the correct answers to each question and then use this information to evaluate the student's response. The question specified and scanned answer key can be created manually or extracted from an existing database or spreadsheet. Next, the system parses the specified question and the answers to extract the relevant information and validation of correct answers corresponding to each question. The system can use various techniques to parse these files, such as regular expressions or natural language processing. Once the question and the answer key have been parsed and validated with each other the system is ready to evaluate the student's answer. The student's handwritten answer is submitted to the system as a scanned image which is an input for evaluation. Since the answer is in the form of a scanned image and is handwritten the system uses optical character recognition (OCR) technology to convert the image into digital text. This step is



challenging, as OCR technology struggles with messy or illegible handwriting. Once the student's answer has been converted into digital text, the system compares it with the correct answer for the corresponding question. The system uses the lstm model with similarity detection algorithms such as cosine similarity, Jaccard similarity, or Levenshtein distance with parameters like keywords, synonyms checking, sequence also grammar to calculate the similarity between the two answers. The system then assigns a grade based on the percentage of similarity between the student's answers and the correct answers The system then assigns a grade based on the percentage of similarity between the student's answers and the correct answers The system also displays a score based on the validation of the answer, which corresponds to the question, and eventually averages these two grades and total marks for the specific answer is rewarded. These algorithms measure the degree of overlap or difference between the two texts and produce a similarity score under the specified weightage. For example, if the similarity score is 70%, the system could allocate 7 out of 10 marks for that question. However, the allocation of marks is not always straightforward, as some questions may have multiple correct answers or require a certain degree of creativity or subjective interpretation. In these cases, the system can use more sophisticated evaluation techniques, such as natural language processing or machine learning, to assess the quality of the answer and allocate marks accordingly. The report shows the student's overall score, and marks allocated for the question, Finally, feedback for a student is given in terms of bad, average, good, and excellent based on grades obtained for improvement of students.

### V.RESULT AND DISCUSSION

The automated answer script evaluation system works by first specifying the questions with their weightage and uploading their corresponding scanned answer key, and then uploading a scanned image containing the student's answers to the same questions. The system then compares the two sets of answers and assigns a grade based on the percentage of similarity between the student's answers and the correct answers. The system also displays a score based on the validation of the answer that corresponds to the question and eventually averages these two and awards total marks for the specific answer along with the brief feedback.

The screenshot shows a web application interface titled "Auto Answer Evaluation". It contains the following elements:

- Enter Question:** A text input field containing "what is machine learning?".
- Enter Marks Weightage:** A text input field containing "10".
- Upload Correct Answer Image:** A file upload field with a "Choose File" button and the filename "Answer key.png".
- Upload Student Answer Image:** A file upload field with a "Choose File" button and the filename "student ans.png".
- Submit:** A green button at the bottom center.

Fig 4 - web application page to specify questions and upload answer key

**Correct Answer**  
Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.

**Student Answer**  
Machine learning is a branch of artificial intelligence (AI) and electronics which focuses on the use of hardware data and algorithms to imitate the way that animals learn, gradually improving its accuracy and hardwork |

**Marks Weightage**  
10

**Similarity Marks : 10**

**Question Answer Similarity Marks : 3.75**

**Other Marks : 1.0**

**Total Score : 7.88**

**Feedback : GOOD**

**Fig 5 - Web application page to upload student answers and get scores with feedback.**

## VI.CONCLUSIONS

An automatic answer script evaluation system is a useful tool for educational institutions and online platforms to assess the performance of students and learners. System use algorithms and machine learning to evaluate written responses to questions and provide instant feedback to users. The benefits of an automatic answer script evaluation system include faster grading, objective and consistent evaluation, and the ability to provide brief feedback to students. However, the accuracy and reliability of the system depend on the quality of the algorithms and the training data used to develop them. While our automatic answer script evaluation system can save time and effort for teachers and instructors, it should not be seen as a replacement for human evaluation and feedback. Instead, it should be used as a complementary tool to help teachers and instructors focus on providing more personalized and engaging learning experiences for their students. Overall, automatic answer script evaluation system have the potential to enhance the efficiency and effectiveness of the learning and assessment process, also need to be developed and implemented with careful consideration and monitoring to ensure their accuracy and fairness.

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