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AI-BASED EXAM PAPER EVALUATION SYSTEM

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ABSTRACT
The increasing number of students and examinations in educational institutions has made manual evaluation of answer scripts a time-consuming and error-prone process. Traditional evaluation methods are often inconsistent and require significant human effort, leading to delays in result processing. This paper presents an AI-based exam paper evaluation system that automates the assessment process using Optical Character Recognition (OCR) and Natural Language Processing (NLP) techniques.
The proposed system extracts textual content from scanned answer sheets using OCR and processes the extracted text through NLP techniques such as tokenization, stopword removal, and text normalization. The processed student answers are then compared with predefined model answers using Term Frequency-Inverse Document Frequency (TF-IDF) and cosine similarity. Based on the similarity score, marks are automatically generated.
The system ensures faster evaluation, improved accuracy, and reduced human intervention. Experimental results demonstrate that the proposed method achieves high accuracy in evaluating descriptive answers and can be effectively used in modern educational systems.

1. INTRODUCTION

The rapid growth of educational institutions has led to an increase in the number of examinations conducted regularly. Evaluating answer sheets manually is a labour-intensive and time-consuming task. It also introduces issues such as human bias, inconsistency, and delayed results.
With advancements in Artificial Intelligence (AI), automated systems can now assist in solving these challenges. Technologies such as OCR and NLP enable machines to understand and process textual data effectively. These technologies can be leveraged to develop an automated evaluation system that reduces human effort and improves accuracy.
This paper proposes an AI-based system that evaluates answer sheets by extracting text using OCR and analyzing it using NLP techniques. The system compares student responses with model answers and assigns marks based on similarity, ensuring a fair and efficient evaluation process.

2. LITERATURE SURVEY

Several research works have explored automated evaluation systems using machine learning and NLP techniques. Early systems focused on objective-type questions, which are easier to evaluate using predefined answers. However, descriptive answer evaluation remains a challenging task due to variations in language and expression. Some approaches use keyword matching, which lacks semantic understanding and leads to inaccurate results. Advanced methods incorporate NLP techniques such as TF-IDF, semantic similarity, and machine learning models to improve evaluation accuracy.
Recent studies have also explored deep learning models for text analysis, but they require large datasets and high computational resources. OCR-based systems have been used to digitize handwritten and printed text, enabling further analysis using NLP.
Despite these advancements, there is still a need for an integrated system that combines OCR and NLP for efficient answer evaluation. The proposed system addresses this gap by providing a complete pipeline from text extraction to automated grading.

3. SYSTEM ARCHITECTURE

A. Architecture Overview

The proposed system follows a layered architecture that processes answer sheets through multiple stages, including image processing, text extraction, text analysis, and evaluation.

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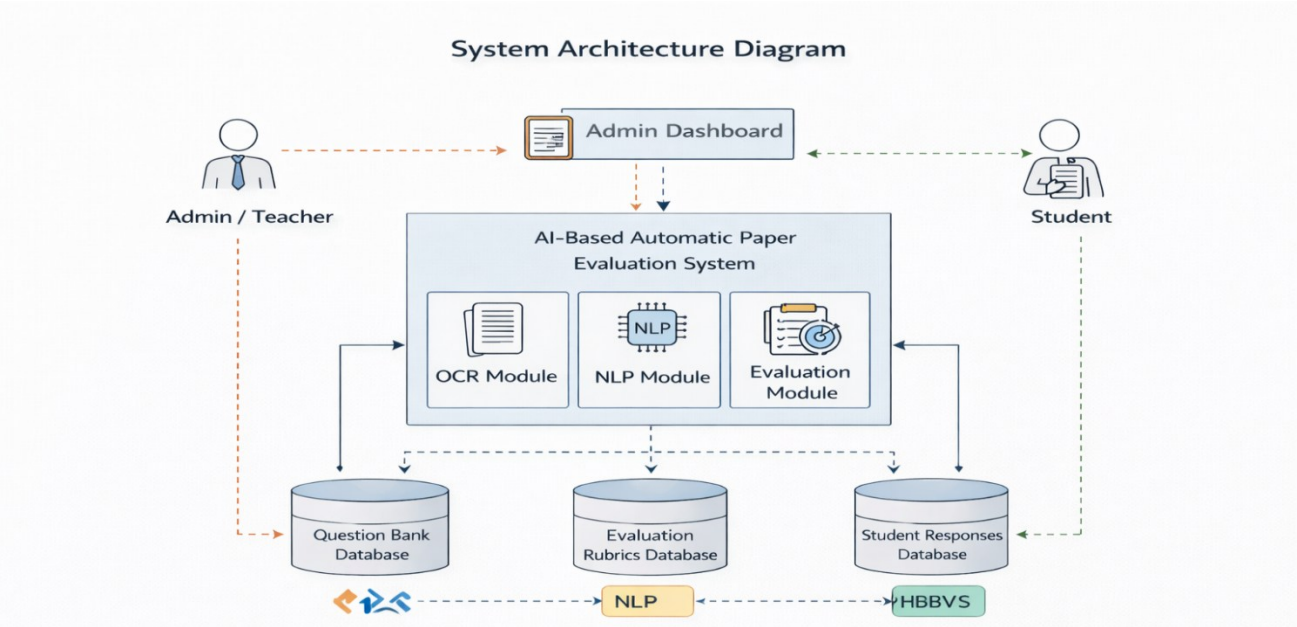
The system begins with the input of scanned answer sheets, which are processed using OCR to extract text. The extracted text is then pre-processed using NLP techniques. Feature extraction is performed using TF-IDF, and similarity is calculated using cosine similarity. Finally, marks are generated based on similarity scores.



B. System Components

The system consists of the following components:

- **Input Module:** Accepts scanned answer sheets
- **OCR Module:** Extracts text from images
- **Preprocessing Module:** Cleans and normalizes text
- **NLP Module:** Performs tokenization and stopword removal
- **Feature Extraction Module:** Applies TF-IDF
- **Similarity Engine:** Calculates cosine similarity
- **Result Module:** Generates marks

C. System Workflow

The system follows the steps below:

1. Upload answer sheet
2. Apply OCR for text extraction
3. Perform text preprocessing
4. Tokenize text
5. Remove stop words
6. Generate TF-IDF vectors
7. Compute cosine similarity
8. Compare with model answer
9. Generate marks
10. Display result

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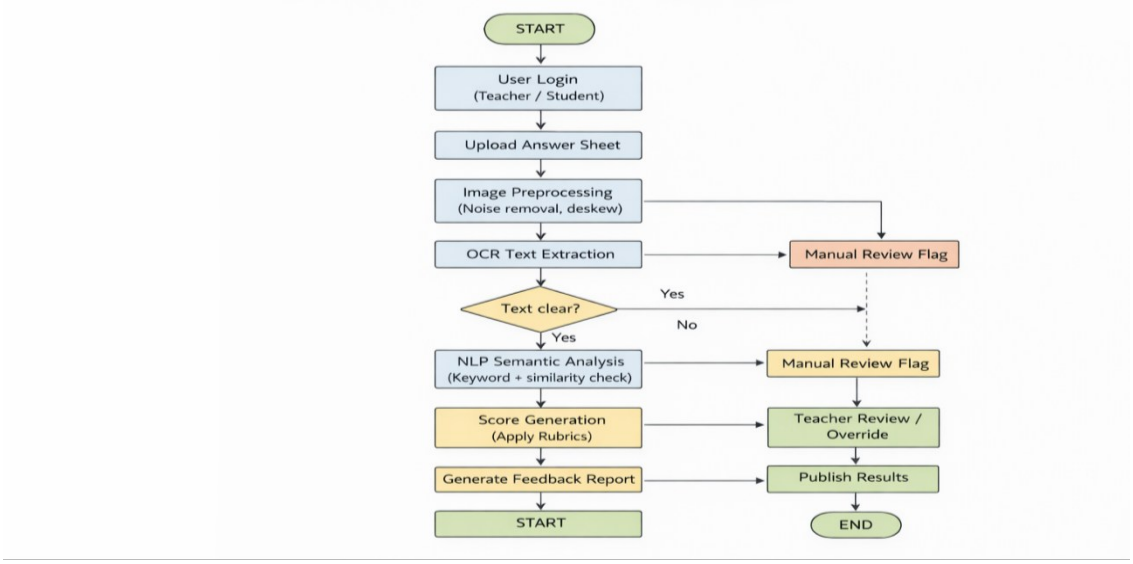
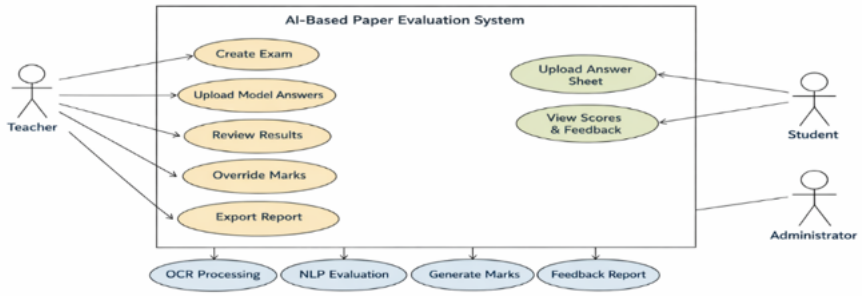


D. Use Case

The use case diagram illustrates the interactions between the primary actors (Teacher, Student, Administrator) and the system's functional capabilities. Key use cases include:



- Teacher: Login, Create Exam, Upload Model Answers, Review Evaluated Results, Override Scores, Export Reports.
- Student/Administrator: Login, Upload Answer Sheet, View Scores and Feedback.
- System: Perform OCR, Execute NLP Analysis, Generate Scores, Generate Feedback Report

4. IMPLEMENTATION

A. Data Collection and Preprocessing

The system uses model answers and student answer sheets as input data. OCR is applied to convert images into text. Preprocessing techniques such as removing special characters, lowercasing, and stop word removal are applied.

B. Feature Extraction (TF-IDF)

TF-IDF is used to convert textual data into numerical vectors. It highlights important words while reducing the importance of common words.

C. Similarity Calculation

Cosine similarity is used to measure similarity between student answers and model answers. The similarity score ranges from 0 to 1.

D. Result Generation

Marks are generated based on the similarity score. Higher similarity results in higher marks.

5. TESTING AND VALIDATION

The system is tested using multiple answer sheets to evaluate performance.

- **Accuracy:** High accuracy in text matching

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- **Efficiency:** Faster than manual evaluation
- **Consistency:** Uniform marking system

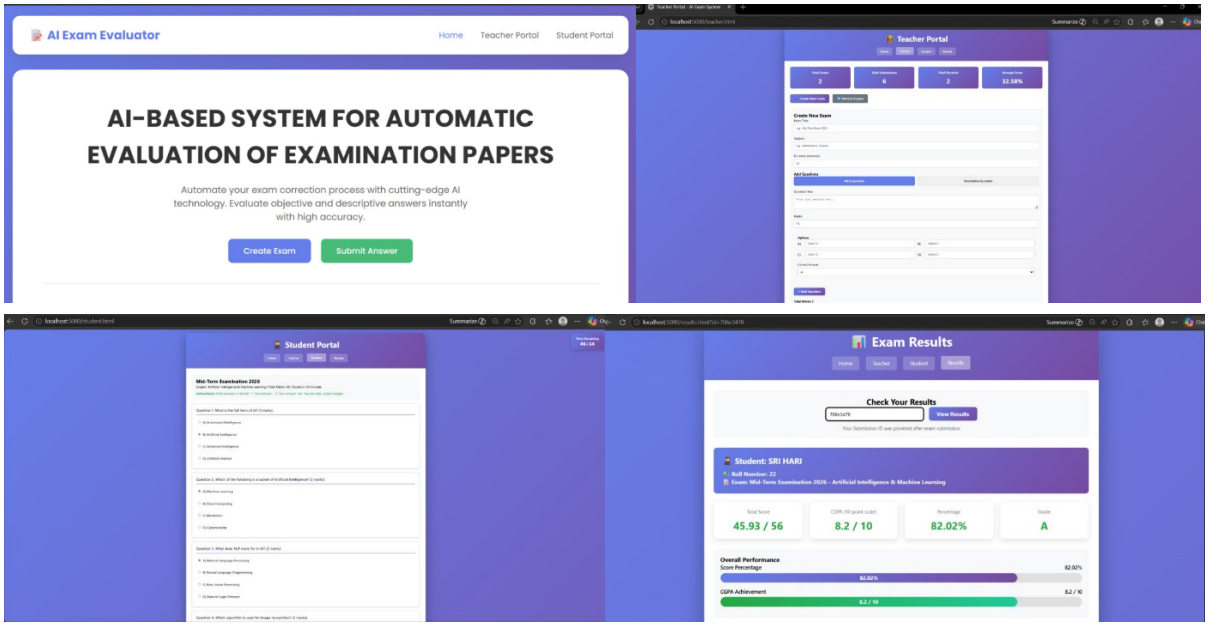
The system also handles different input formats and ensures reliable performance.

6. EXPERIMENTAL RESULTS

The system demonstrates:

- High evaluation accuracy
- Reduced evaluation time
- Improved consistency

Graphs and results show that the system performs efficiently for descriptive answers.



7. CONCLUSION

The proposed AI-based exam paper evaluation system provides an efficient solution for automated answer evaluation. By integrating OCR and NLP techniques, the system reduces manual effort and improves accuracy. The use of TF-IDF and cosine similarity ensures reliable evaluation of descriptive answers.

The system can be further enhanced by incorporating deep learning models and improving OCR accuracy for handwritten text. This approach can be widely adopted in educational institutions for faster and fair evaluation

FUTURE ENHANCEMENTS

* Handwritten text recognition improvement
* Deep learning-based semantic analysis
* Cloud-based deployment
* Integration with online exam systems

REFERENCES

[1] Jurafsky, D., & Martin, J. H., Speech and Language Processing
[2] Manning, C. D., et al., Introduction to Information Retrieval
[3] Tesseract OCR Documentation
[4] Scikit-learn Documentation (TF-IDF & Cosine Similarity)
[5] Research papers on NLP-based evaluation systems