

# Course: CS69099- Capstone Project

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## Product Name: AutoCorrect+ (AI-Enhanced Descriptive Answer Evaluation)

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### Proposal Prepared By:

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### Product Description

Evaluating descriptive answers takes a long time and requires a lot of physical effort. It is prone to grader fatigue, partiality, and inconsistency caused by differing standards. We have developed a solution to address the above mentioned concerns. Our automated grading system uses strong NLP and machine learning algorithms to deliver consistent grades for descriptive responses.

AutoCorrect+ uses a few natural language processing (NLP) packages and techniques to accurately assess descriptive answers. It employs NLTK for breaking text into smaller units (tokenization) and removing commonly used words (stop word removal). In addition to that, it also uses the scikit-learn (sklearn) package to calculate text similarity using methods like cosine similarity and Jaccard distance. By combining these NLP approaches, AutoCorrect+ establishes a solid foundation for evaluating descriptive answers effectively.

Moreover, AutoCorrect+ is integrated with the Django framework, which provides a user-friendly interfaces for both administrators and students. Administrators can login and manage user registrations, analyze exam results, and add or modify courses and questions through the interface. Similarly, students can easily register, log in, attempt exams, view their results, and update their profiles using the provided interface.

The aim of AutoCorrect+ is to enhance traditional manual grading methods by introducing efficiency, accuracy, and scalability to educational assessment systems using NLP techniques and user-friendly interfaces.

### Product Value

AutoCorrect+ is valuable for the following reasons:

**Time-Saving:** Grading descriptive answers manually is a time-consuming process, especially in large classroom settings or online courses with numerous students. AutoCorrect+ automates this work, which reduces the

workload on evaluators.

**Consistency and Fairness:** It addresses the issue of inconsistency and bias in grading. Manual grading sometimes leads to discrepancies and unfairness. However, AutoCorrect+ ensures a level playing field by evaluating answers in a fair and consistent manner, irrespective of who is grading.

**Scalability:** As class sizes increase and the frequency of assessments increases, AutoCorrect+ can scale effortlessly to meet the demand without compromising on quality.

**Resource Optimization:** By reducing the need for additional grading materials, AutoCorrect+ helps educational institutions save money and be more environmentally sustainable.

## Building the Product

AutoCorrect+ was developed by utilizing natural language processing and machine learning libraries and frameworks. The system begins by measuring the semantic similarity between a student's answer and a predetermined model answer. This process involves integrating various NLP techniques with ML algorithms. The following are the key steps undertaken:

**Text Preprocessing:** We begin by preparing the textual data, tokenizing answers, removing stop words, and optionally doing stemming or lemmatization.

**Text Vectorization:** Next, textual data is turned into numerical vector representations using scikit-learn's CountVectorizer, which captures word importance via frequencies.

**Similarity Scoring:** a. Cosine Similarity: Measures the angle between answer vectors to determine text similarity. b. Jaccard Distance: Calculates the distance between unique word sets and converts it to a similarity score.

**Answer Scoring:** Similarity measure scores are mapped to grading ranges and aggregated to calculate the answer script's overall score.

**User Interface Development:** We created a user-friendly interface with the Django framework, allowing administrators to handle registrations, exams, and subjects. Students may easily register, take examinations, and view results using the interface.

This process assures efficient and accurate grading, making AutoCorrect+ a reliable alternative for automatic evaluation.

## Determining Success

To assess the effectiveness of AutoCorrect+, we can use the following methods:

**Benchmark Testing:** We can conduct a study on a sample of student responses and compare human-graded scores with autocorrect+ grades.

**User Feedback:** We can collect feedback from instructors, students, and other stakeholders who use AutoCorrect+ in real-world scenarios. Their input can provide critical insights into the system's usability, effectiveness, and potential areas for improvement.

## Deployment and Value Creation

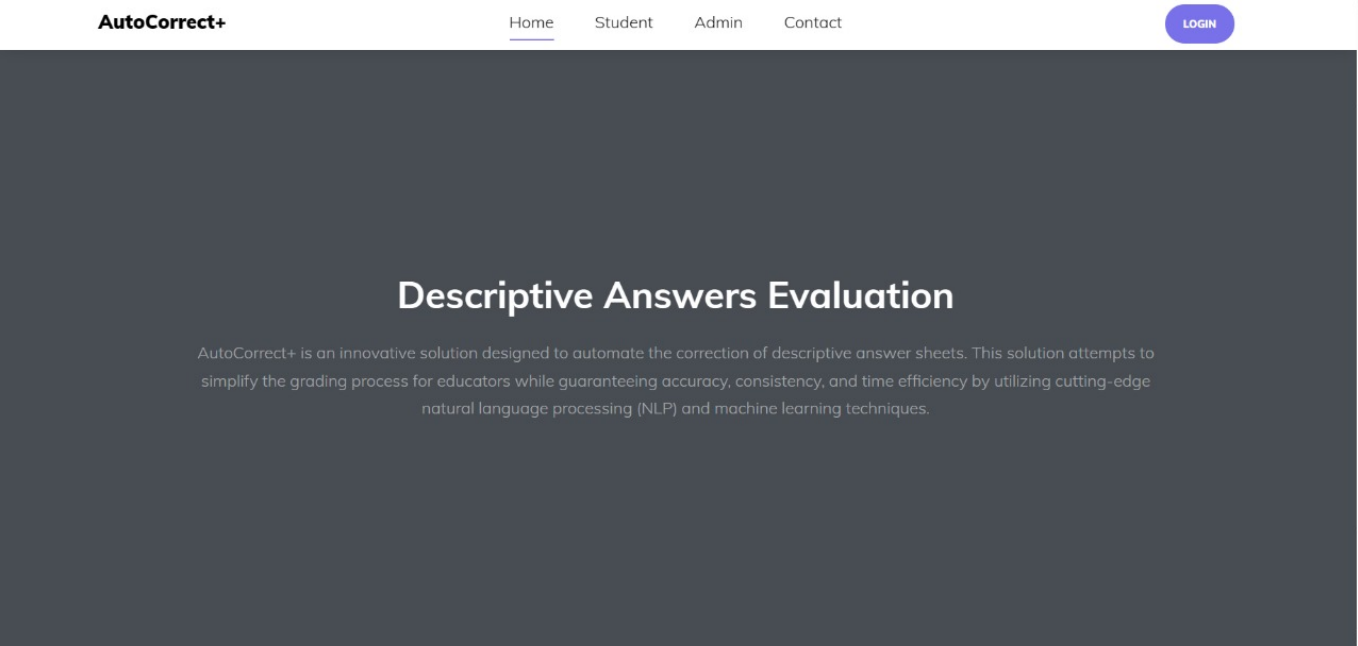
AutoCorrect+ can be utilized in a variety of educational situations to generate value for various stakeholders:

**Educational Institutions:** AutoCorrect+ works with learning management systems and evaluation platforms used in schools, colleges, and institutions. This can help to simplify the grading process, reduce instructor responsibilities, and provide students with timely feedback.

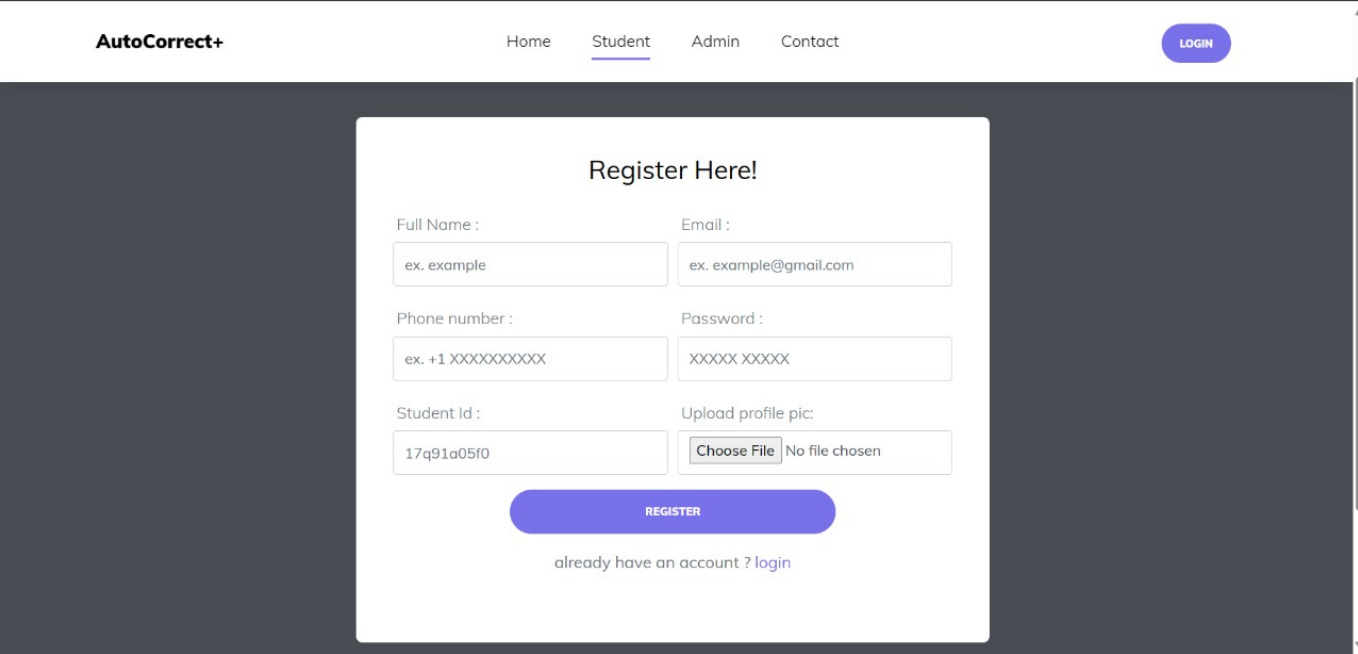
**Online Learning Platforms:** As online education gains popularity, AutoCorrect+ can be immensely beneficial for Online Courses and other e-learning platforms that require large-scale descriptive assignment grading.

Results

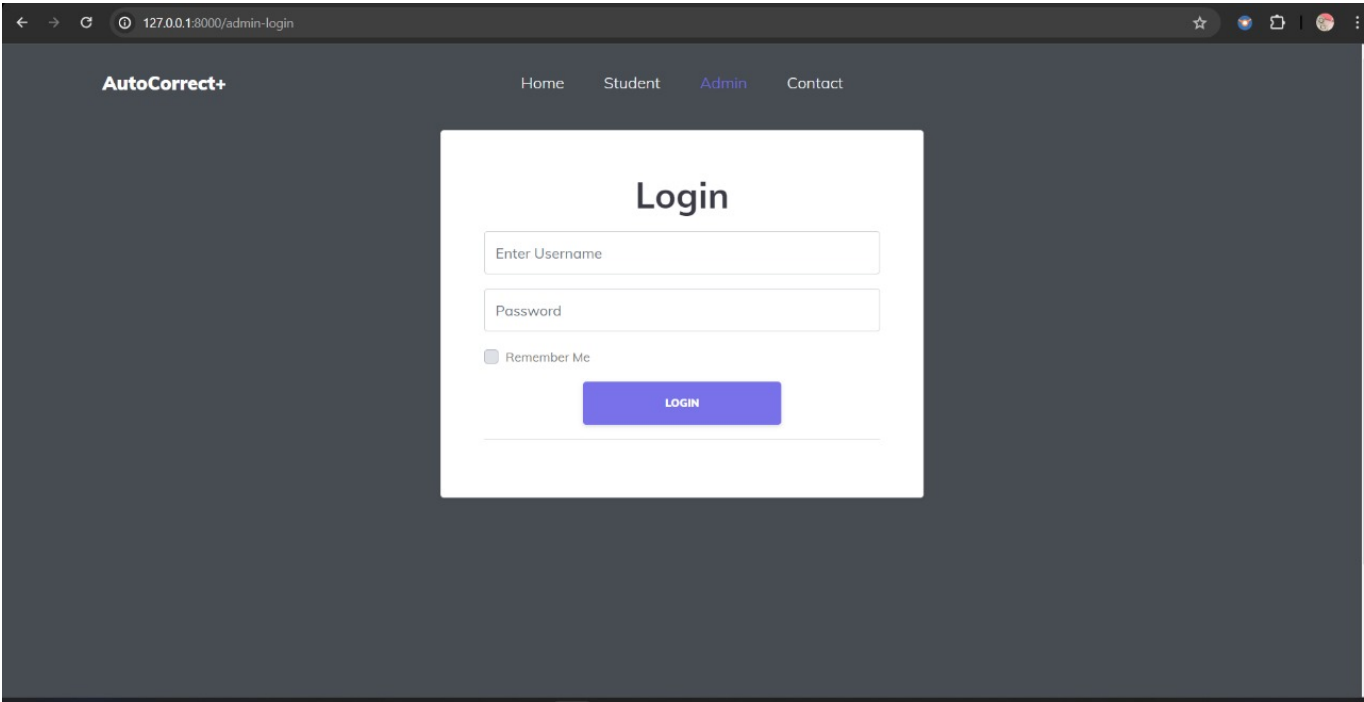
Login Page:



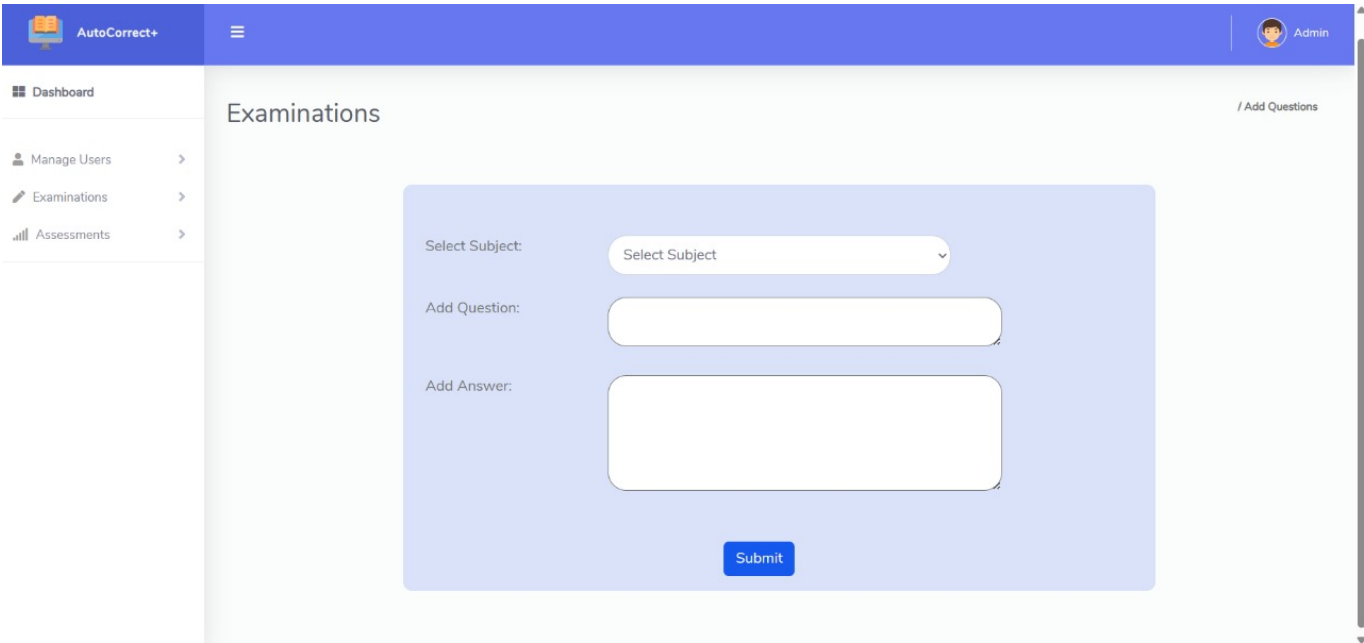
User Registration:



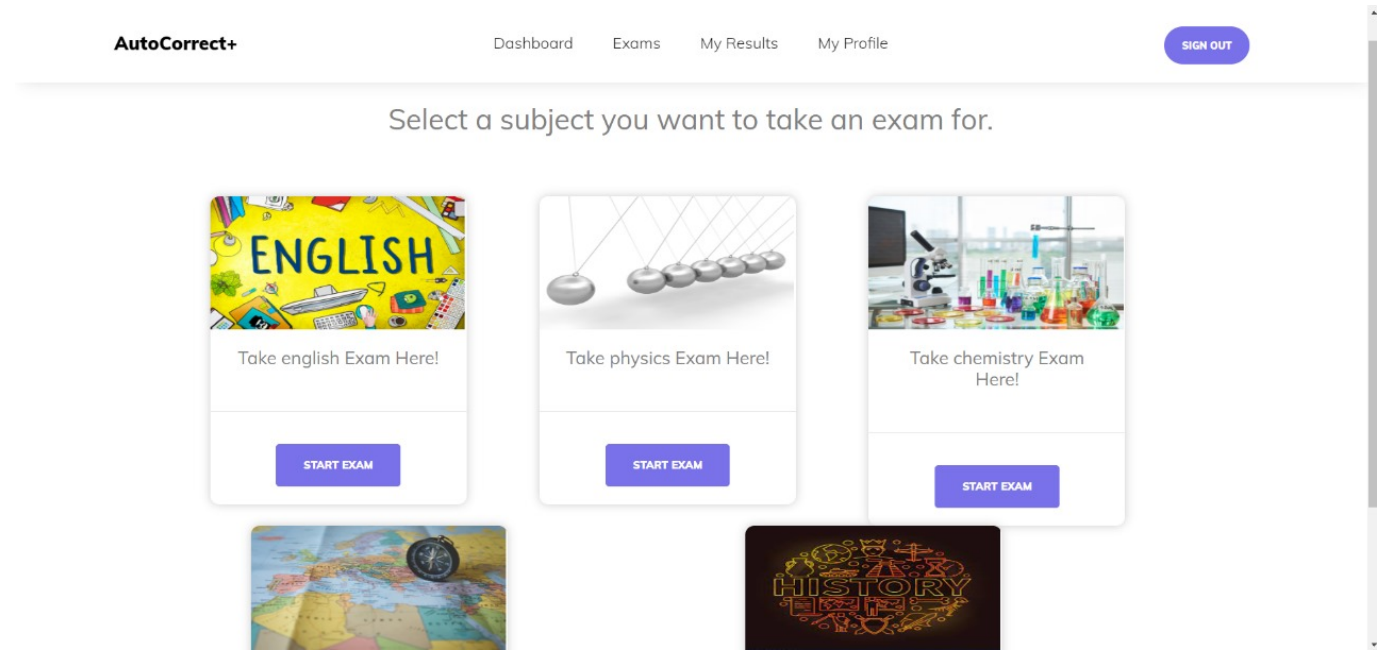
Admin Login:



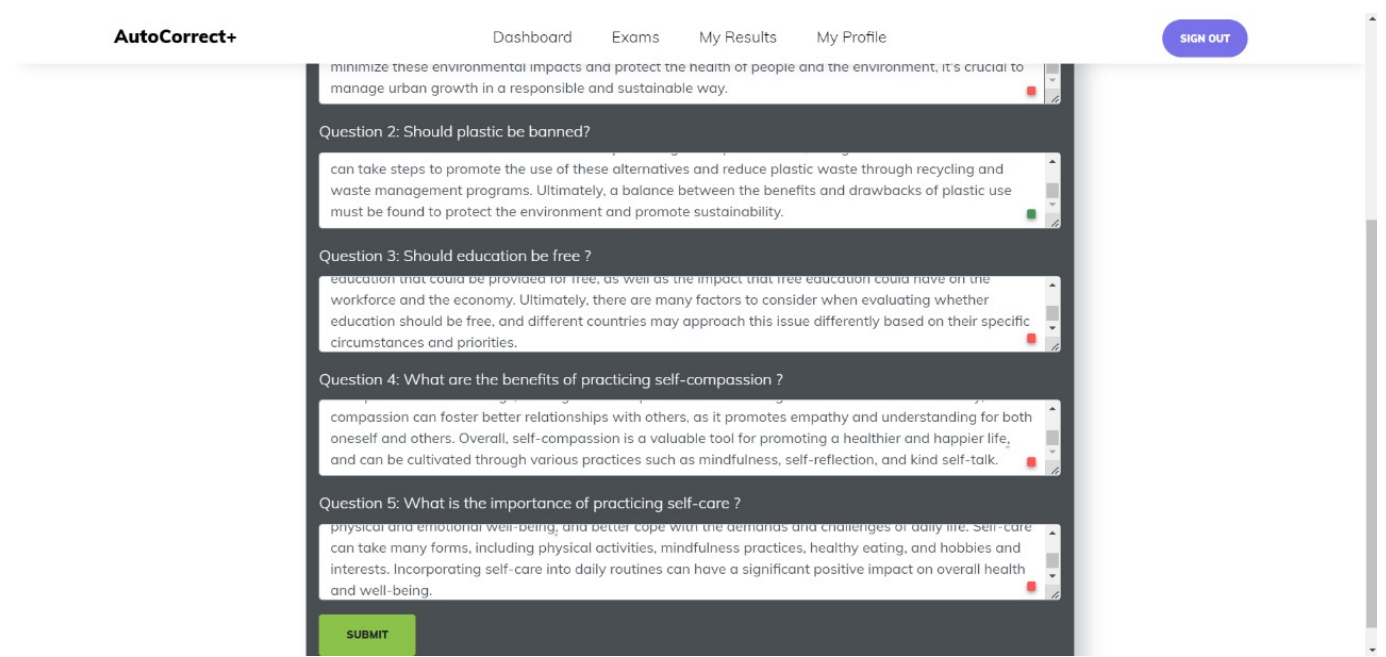
Admin can manage subjects, questions and answers



User Dashboard:



User answering questions:

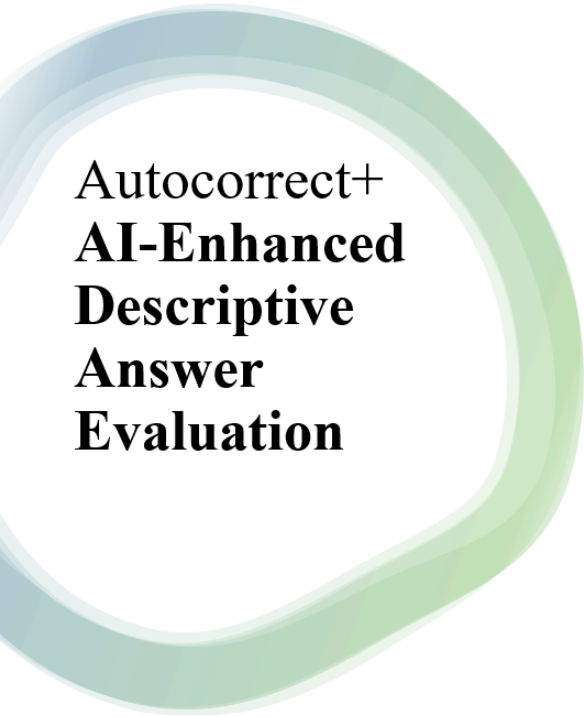


User Results:

Your Results:

| Sno. | Subject   | Toltal Questions | Score   | Grade | Results | Date                       | Action |
|------|-----------|------------------|---------|-------|---------|----------------------------|--------|
| 96   | english   | 4                | 100/100 | A     | Passed  | April 22, 2024, 10:19 p.m. | VIEW   |
| 97   | chemistry | 4                | 78/100  | A     | Passed  | April 22, 2024, 11:22 p.m. | VIEW   |

Presentation



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# Abstract

AutoCorrect+ is an automated grading system that aims to accurately evaluate descriptive answers using natural language processing (NLP) and machine learning techniques. Traditional manual grading of subjective answers is time-consuming, prone to inconsistencies, and requires significant human effort. This project addresses those challenges by developing an AI-powered solution to automatically score descriptive answers.

## Introduction

### Problem Statement:

- Manual grading of descriptive answers is a laborious process
- Grader fatigue, bias, and varying standards lead to inconsistencies

### Solution:

- An innovative solution to automate the grading of descriptive answers
- Utilizes advanced natural language processing (NLP) and machine learning (ML) techniques
- Enables accurate and consistent evaluation at scale

### Core Technology:

- Measures semantic similarity between student's answer and model answer
- Text preprocessing, vectorization, and similarity scoring algorithms
- Techniques like cosine similarity, Jaccard distance, stop word removal

# Literature Review

Paper 1: QuestionCentric Evaluation of Descriptive Answers using AttentionBased Architecture (Oasis et al., 2022)

Paper 2: NLPbased Automatic Answer Script Evaluation (Rahman & Siddiqui, 2018)

Key Takeaways:

- Summarization techniques play a vital role in processing answer scripts
- Availability of training data and exploration of advanced summarization methods are areas for improvement

## History of the Problem



### Manual Grading

Labor-intensive process of reading and assessing each answer  
Time-consuming and prone to human biases and inconsistencies



### Emergence of Automated Grading Systems

Basic rule-based algorithms for keyword matching  
Lacked sophistication and had trouble with complexities in language



### Introduction of Natural Language Processing (NLP) Techniques

NLP techniques have significantly improved the understanding and processing of textual data.



# Product Value



Time Efficiency



Consistency and  
Fairness



Scalability



Resource  
optimization

# Methodology

Text Preprocessing

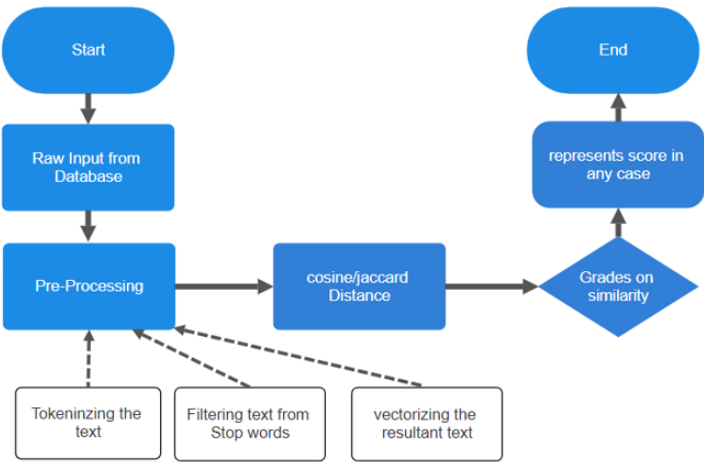
Text Vectorization

Text Similarity calculation

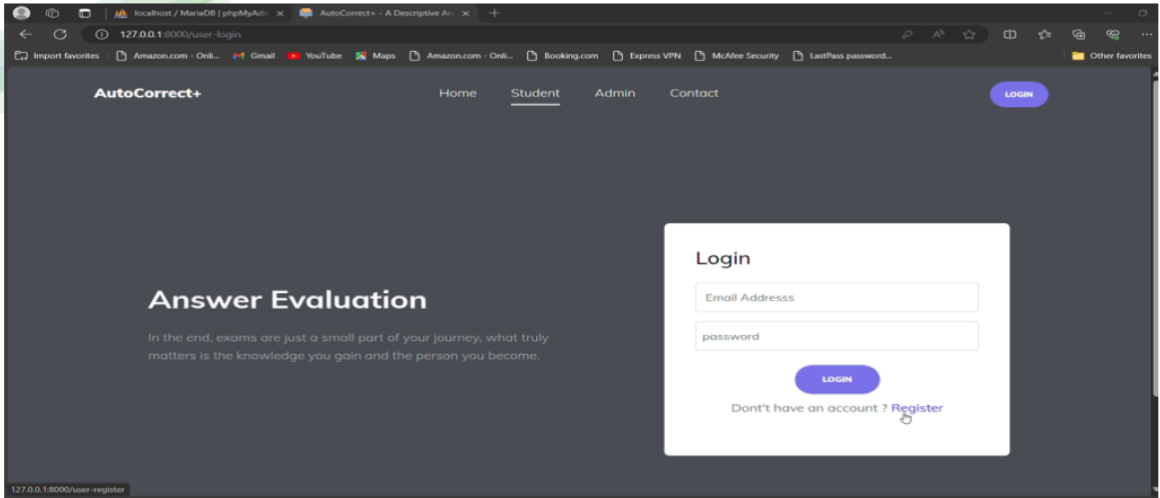
Grading answers

User interface development

# How the evaluation happens??



## Results



## Conclusion

- AutoCorrect+ offers an innovative solution for automated grading of descriptive answers.
- Leverages NLP and machine learning techniques for accurate semantic similarity measurement.
- Addresses challenges of manual grading: time-consuming, inconsistent, and prone to biases.
- Provides a scalable and cost-effective solution for educational institutions.
- User-friendly interface via Django for seamless administration and student experience.

Code: [https://github.com/gayathrideviatluri/Capstone-Team1/tree/main/answer\\_evaluation](https://github.com/gayathrideviatluri/Capstone-Team1/tree/main/answer_evaluation)

## Project Code

[https://github.com/gayathrideviatluri/Capstone-Team1/tree/main/answer\\_evaluation](https://github.com/gayathrideviatluri/Capstone-Team1/tree/main/answer_evaluation)

## References

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- [2] Mohammad Shaharyar Shaukat, Mohammed Tanzeem, Tameem Ahmad, Nesar Ahmad, Chapter 16 - Semantic similarity-based descriptive answer evaluation, Editor(s): Sarika Jain, Vishal Jain, Valentina Emilia Balas, Web Semantics, Academic Press, 2021, Pages 221-231, ISBN 9780128224687, <https://doi.org/10.1016/B978-0-12-822468-7.00014-6>.
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