

# **Automated Grading System for the HumanAlze Hackathon**

## **Revolutionizing Education with AI: Automated Grading System**

### **Overview**

Our project for the HumanAlze Hackathon aims to develop an AI-powered grading system for short answer questions, leveraging advanced Natural Language Processing (NLP) techniques. The system provides precise and efficient assessments and personalized feedback, significantly reducing grading time and enhancing learning outcomes. By integrating seamlessly with Learning Management Systems (LMS) such as Canvas, Moodle, and Blackboard, it streamlines the workflow for educators. Our solution emphasizes reliability, fairness, and continuous improvement, making it a groundbreaking tool for modern education.

### **Uniqueness**

What sets our solution apart is its ability to provide detailed, context-specific feedback to students using cutting-edge NLP. Unlike traditional grading systems, our AI ensures consistency and objectivity, mitigating the biases and variability inherent in human grading. The system's advanced plagiarism detection capabilities promote academic honesty, further distinguishing it from existing solutions. Additionally, our approach incorporates a continuous feedback loop, allowing the system to evolve and improve based on real-world usage and user feedback.

### **Potential Impact**

The impact of our AI-driven grading system is multifaceted:

**For Students =>** Timely, personalized feedback helps students understand their mistakes and improve their knowledge and skills, fostering a more effective learning experience.

**For Educators =>** By automating the grading process, educators save significant time and effort, allowing them to focus more on teaching and student engagement.

**For Educational Institutions =>** The system's scalability and integration with LMS platforms make it a valuable asset for institutions aiming to enhance their educational offerings and maintain high academic standards.

## Process Flow Diagram:

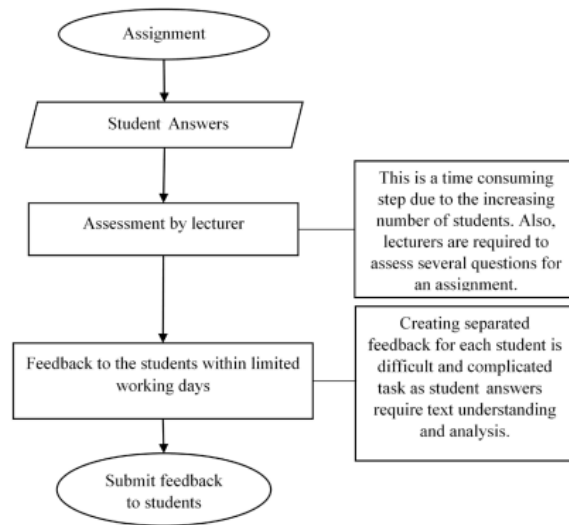
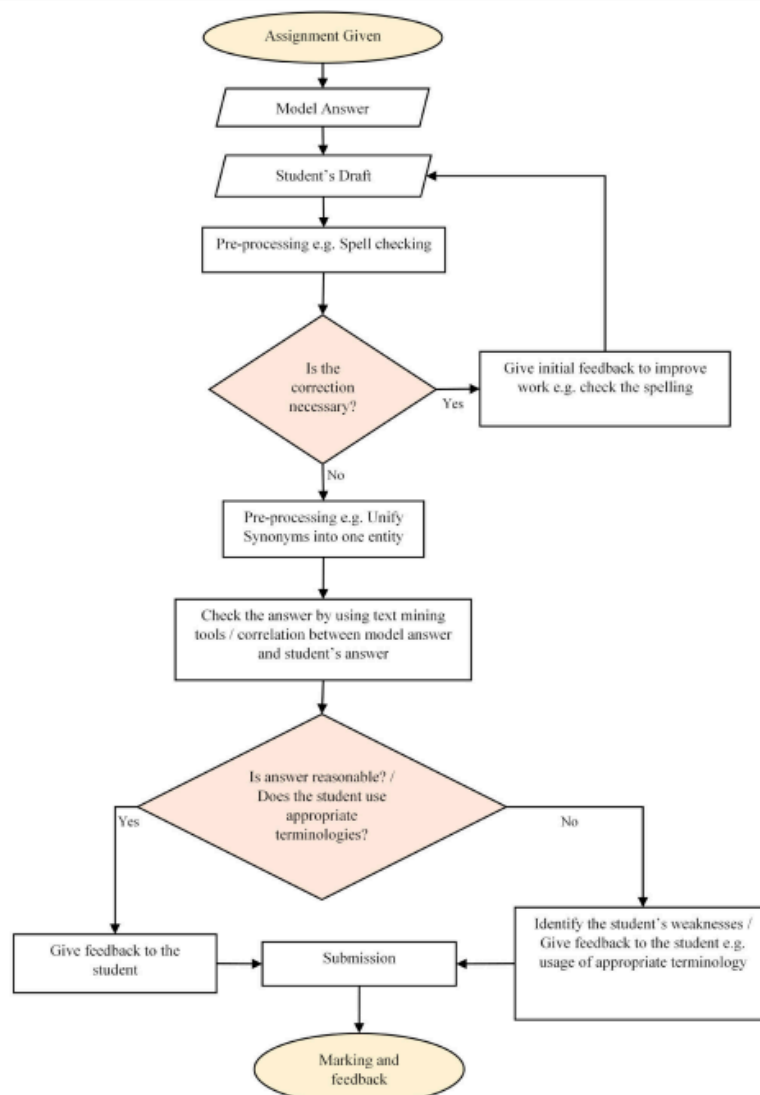


Fig. 1. Steps and challenges in manual assessment



- 1) Student Submits Assignment -> Students submit their written responses via the LMS.
- 2) Data Preprocessing -> The system preprocesses the text data, including steps like tokenization, lemmatization, and removing stopwords.
- 3) NLP Analysis -> Advanced NLP models analyze the responses for content, grammar, and context.
- 4) Automated Grading -> The AI assigns grades based on predefined rubrics and similarity to model answers.
- 5) Feedback Generation -> The system generates detailed, personalized feedback for each student.
- 6) Integration with LMS -> Grades and feedback are sent back to the LMS for students and educators to review.
- 7) Continuous Improvement -> User feedback is collected to continuously refine and improve the system.

## Technologies Used

Our innovative grading system is powered by a suite of cutting-edge tools and platforms:

1. **Python:** The primary programming language for developing the system.
2. **TensorFlow and Keras:** For building and training deep learning models.
3. **NLTK and SpaCy:** For advanced NLP tasks such as tokenization, lemmatization, and entity recognition.
4. **Scikit-learn:** For traditional machine learning algorithms and preprocessing.
5. **Flask:** To create the REST API for integrating with LMS platforms.
6. **PostgreSQL:** For managing and storing data.
7. **Docker:** For containerizing the application, ensuring easy deployment and scalability.
8. **REST API:** For seamless communication between the grading system and LMS.
9. **JavaScript, HTML, CSS:** For developing the user interface components.

## Conclusion

Our AI-powered grading system for the HumanAlze Hackathon represents a significant leap forward in educational technology. By combining the latest in AI and NLP, we provide a solution that is not only efficient and reliable but also profoundly impactful for students, educators, and institutions. Our participation in Hack2skill's GenAI event exemplifies our commitment to

leveraging AI to enhance human capabilities and transform the educational landscape.