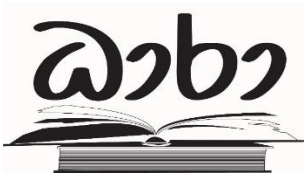

AUTONOMOUS GRADING SYSTEM FOR SINHALA LANGUAGE ESSAYS OF GRADE 5 STUDENTS

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Sri Lanka

DECLARATION

We declare that this is our own work, and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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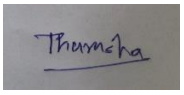
Amarasena J.H.T	IT20604394	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Supervisor *Date*

Ms. Jenny Krishara

Co-Supervisor

Date

Ms. Wishalya Thisara

ABSTRACT

In the realm of educational assessment, particularly focusing on enhancing the writing skills of Grade 5 scholarship students, this project proposes the development of an innovative application leveraging Natural Language Processing (NLP) techniques. The primary objective is to create a Grammar Check functionality based on the identification of sentence objects and subjects. By harnessing techniques such as post-stacking, tokenization, and brute force searching, the application aims to provide comprehensive support to students in improving their writing proficiency and accuracy in answering exam questions.

The proposed system aligns with the broader goal of facilitating better performance in exams by fostering a deeper understanding of grammatical structures and language usage. Through meticulous design and implementation, the Grammar Check functionality will analyze sentences to identify objects and subjects, thereby assisting students in rectifying grammatical errors and enhancing the coherence and clarity of their writing.

This project is part of a larger collaborative effort involving four members, with each contributing expertise in various aspects of educational assessment and technology development. The target demographic for this application is Grade 5 scholarship students, with the ultimate aim of equipping them with the necessary tools to excel in their academic endeavors.

By harnessing the power of NLP and incorporating advanced techniques in linguistic analysis, the proposed application represents a significant step towards providing tailored support for students in the context of Sinhala language assessments. Through this endeavor, we seek to not only improve exam results but also foster a deeper appreciation and mastery of language skills among young learners

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1. INTRODUCTION

In the realm of education, particularly in the context of Grade 5 scholarship examinations, the ability to effectively communicate through writing is paramount. However, mastering the intricacies of grammar and sentence structure can pose significant challenges for students, impacting both their academic performance and confidence. Recognizing this need for targeted support, our project endeavors to develop an innovative application harnessing the power of Natural Language Processing (NLP) to enhance the writing skills of Grade 5 scholarship students.

The Grade 5 scholarship examination holds considerable importance in the educational landscape of our country, serving as a crucial milestone for students transitioning to higher levels of education. Success in this examination not only opens doors to prestigious educational opportunities but also lays the foundation for future academic endeavors. Therefore, it is imperative to equip students with the necessary tools and resources to excel in this critical assessment.

Our project aims to address the specific challenges faced by Grade 5 scholarship students in effectively expressing themselves through writing. Central to our approach is the development of a Grammar Check functionality embedded within an intuitive application interface. Leveraging advanced techniques in NLP, including post-stacking, tokenization, and brute force searching, the application will analyze sentences to identify grammatical errors and provide corrective feedback.

The significance of this project extends beyond mere error correction. By focusing on the identification of sentence objects and subjects, our Grammar Check functionality will not only rectify grammatical mistakes but also enhance the coherence and clarity of students' writing. This, in turn, will enable students to convey their thoughts and ideas more effectively, thereby improving their overall communication skills.

Collaboration lies at the heart of our project, with a multidisciplinary team comprising experts in educational assessment, linguistics, and technology development. Through our collective expertise and shared commitment to educational advancement, we aim to create a transformative tool that empowers Grade 5 scholarship students to realize their full potential.

In the following sections of this proposal, we will delve deeper into the methodology, system architecture, and anticipated outcomes of our project. By documenting our research process and outlining our objectives in detail, we aim to provide a comprehensive overview of our endeavor to enhance the writing skills of Grade 5 scholarship students through innovative technological solutions.

2.Research Gap

In the landscape of educational technology and language assessment, there exists a notable gap concerning the tailored support for Grade 5 scholarship students in improving their writing skills, particularly in the context of the Sinhala language. While various tools and resources exist to aid students in grammar correction and language proficiency, there is a dearth of solutions specifically designed to cater to the linguistic and educational needs of Grade 5 scholarship students, who face unique challenges in preparing for their examinations.

To visualize this research gap, we can construct a chart illustrating the current state of available resources and the specific needs of Grade 5 scholarship students:

	[1] "Computational model for detecting grammatical mistakes in Sinhala text"	[2] "Grammatical error detection and correction model for sinhala language sentences"	[3]"An automated essay evaluation system using natural language processing and sentiment analysis"	[4]" Automated Essay Grading System using NLP Techniques"	"Dhara" Android Application
Integrate with mobile app	NO	NO	NO	NO	YES
Detecting grammatical mistakes	YES	YES	YES	YES	YES
Grammatical error detection and correction	NO	YES	YES	YES	YES
Targeting school students scope	NO	NO	NO	YES	YES
Using only Sinhala Language	YES	YES	NO	NO	YES

This chart visually depicts the gap between existing solutions and the specific needs of Grade 5 scholarship students. While generic grammar checkers, educational apps, and manual correction methods offer some support, they fall short in addressing the unique requirements of Grade 5 scholarship students preparing for Sinhala language examinations. Thus, there is a clear research gap for specialized tools tailored to the linguistic and educational needs of this demographic

3. Research Problem

The research problem identified in this project revolves around the lack of tailored technological solutions to support Grade 5 scholarship students in improving their writing skills, particularly in the context of the Sinhala language. Despite the availability of various educational tools and resources, there remains a significant gap in addressing the specific grammatical challenges and educational requirements faced by Grade 5 scholarship students as they prepare for their examinations.
To illustrate this research problem, we can construct a chart highlighting the key issues and challenges faced by Grade 5 scholarship students in the context of writing proficiency

Key Issues	**Challenges**
Limited Access to Tailored Resources	- Lack of specialized tools for Sinhala language assessment- Inadequate support for advanced grammar correction and writing skills enhancement
Difficulty in Identifying Grammatical Errors	- Complex grammatical structures specific to the Sinhala language- Lack of immediate feedback on grammatical accuracy
Time Constraints during Exam Preparation	- Limited time for extensive manual correction and tutoring- Need for instant feedback to optimize study time and effort
Cultural and Linguistic Sensitivity	- Importance of preserving cultural nuances and linguistic diversity in assessment tools- Need for solutions sensitive to the linguistic context of Grade 5 scholarship examinations

4. OBJECTIVES

4.1. Primary Objectives:

1. **Development of Grammar Checking Algorithm:**
    - Design and implement a sophisticated Grammar Checking Algorithm capable of identifying and correcting grammatical errors in Sinhala language text.

2. **Integration with Automated Educational Assessment System:**
    - Seamlessly integrate the Grammar Checking Algorithm into the Automated Educational Assessment System to enhance the system's capability to provide constructive feedback on grammar and sentence structure.

3. **Accuracy and Precision:**

    - Ensure the Grammar Checking Algorithm achieves a high level of accuracy and precision in identifying and correcting grammatical errors specific to Sinhala language, addressing common linguistic nuances and variations.

4.2. Specific Objectives

1. **Grammar Rule Identification:**

    - Develop a mechanism to identify and incorporate Sinhala language-specific grammar rules into the Grammar Checking Algorithm.

2. **Sentence Structure Analysis:**

    - Implement a module within the algorithm to analyze sentence structures in Sinhala text, focusing on the identification of sentence objects and subjects.

3. **Error Categorization:**

    - Categorize identified grammatical errors into different types, such as syntax errors, agreement errors, and tense errors, to provide specific and actionable feedback to users.

4. **Rule-Based Corrections:**

    - Establish a rule-based correction mechanism to suggest appropriate corrections for identified grammatical errors based on Sinhala language grammar rules.

5. **Contextual Sensitivity:**

    - Incorporate contextual sensitivity in the Grammar Checking Algorithm, considering the meaning and context of sentences to avoid unnecessary corrections and enhance the algorithm's relevance.

6. **Integration Testing:**

    - Conduct rigorous integration testing to ensure the Grammar Checking Algorithm seamlessly integrates with other components of the Automated Educational Assessment System without compromising overall system performance.

7. **User Interface Integration:**

    - Integrate the Grammar Checking Algorithm into the user interface of the assessment system, providing users with clear and user-friendly feedback on grammar and sentence structure.

8. **Feedback Mechanism:**

    - Implement a feedback mechanism within the system to communicate identified grammatical errors and suggested corrections to users, fostering an environment for learning and improvement.

5. METHODOLOGY

The methodology for this project involves a systematic approach to the development and implementation of the Grammar Check functionality within the application designed to enhance the writing skills of Grade 5 scholarship students. The methodology encompasses several key stages, including data collection, algorithm development, system implementation, and evaluation.

- **Data Collection:**

  Gather a diverse dataset of Sinhala language text samples, including essays, articles, and exam questions, to train and validate the Grammar Check algorithm.
  Ensure the dataset represents a wide range of grammatical structures, vocabulary, and writing styles encountered in Grade 5 scholarship examinations.

- **Algorithm Development:**

  Utilize Natural Language Processing (NLP) techniques, including tokenization, part-of-speech tagging, and syntactic parsing, to analyze Sinhala language text and identify sentence objects and subjects.

  Develop algorithms to detect and correct grammatical errors related to subject-verb agreement, tense consistency, word order, and other common pitfalls in Sinhala language writing.

- **System Implementation:**

  Design and implement the Grammar Check functionality within the application interface, ensuring user-friendly accessibility and seamless integration with existing educational platforms.

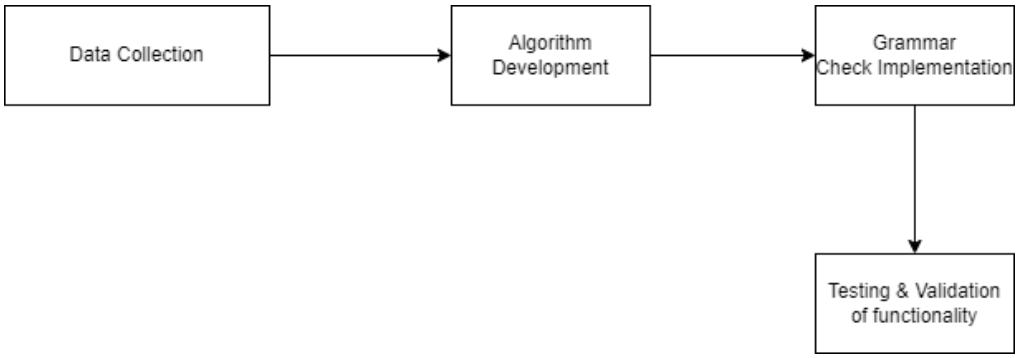
  Leverage post-stacking techniques to optimize the performance and accuracy of the Grammar Check algorithm in real-time sentence analysis.

- **Evaluation:**

  Conduct rigorous testing and validation of the Grammar Check functionality using a separate dataset of Grade 5 scholarship student essays and exam responses

  Evaluate the effectiveness of the Grammar Check in identifying and correcting grammatical errors, enhancing the coherence and clarity of writing, and improving overall writing proficiency.

Gather feedback from Grade 5 scholarship students and educators to assess user satisfaction, usability, and potential areas for improvement.



This methodology chart outlines the sequential steps involved in the development and evaluation of the Grammar Check functionality, from data collection and algorithm development to system implementation and evaluation. Each stage is essential for ensuring the effectiveness, accuracy, and usability of the proposed solution in enhancing the writing skills of Grade 5 scholarship students in the Sinhala language.

6. System Architecture

The system architecture for the proposed application encompasses several interconnected components designed to facilitate the Grammar Check functionality and support the enhancement of writing skills for Grade 5 scholarship students. The architecture comprises data processing modules, NLP algorithms, and user interface components, all integrated to provide a seamless and effective user experience

User Interface:

Interface designed for Grade 5 scholarship students to interact with the application easily.

Allows users to input text for grammar analysis and receive feedback on corrections**.**

Input Processing Module:

Responsible for receiving and preprocessing user input text before analysis

Tokenization: Breaks input text into individual words or tokens for analysis.

Sentence Segmentation: Identifies separate sentences within the input text for granular analysis.

Natural Language Processing (NLP) Engine:

Core component for grammatical analysis and error detection.

Part-of-Speech Tagging: Assigns grammatical labels (e.g., noun, verb) to each word in the input text

Syntactic Parsing: Analyzes the grammatical structure of sentences to identify objects, subjects, and other linguistic elements.

Grammar Rule Engine: Implements rules and algorithms for detecting and correcting grammatical errors.

Grammar Check Module:

Utilizes the output from the NLP engine to identify and correct grammatical errors in the input text.

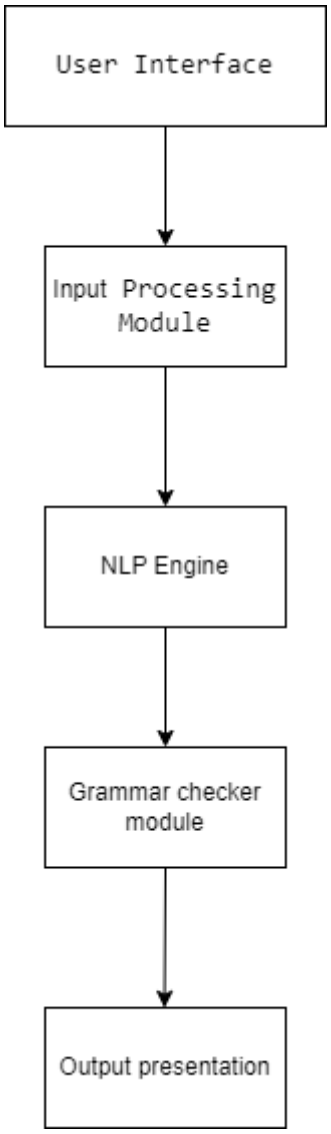
Subject-Verb Agreement: Checks for agreement between subjects and verbs within sentences.

Tense Consistency: Ensures consistency of verb tenses throughout the text.

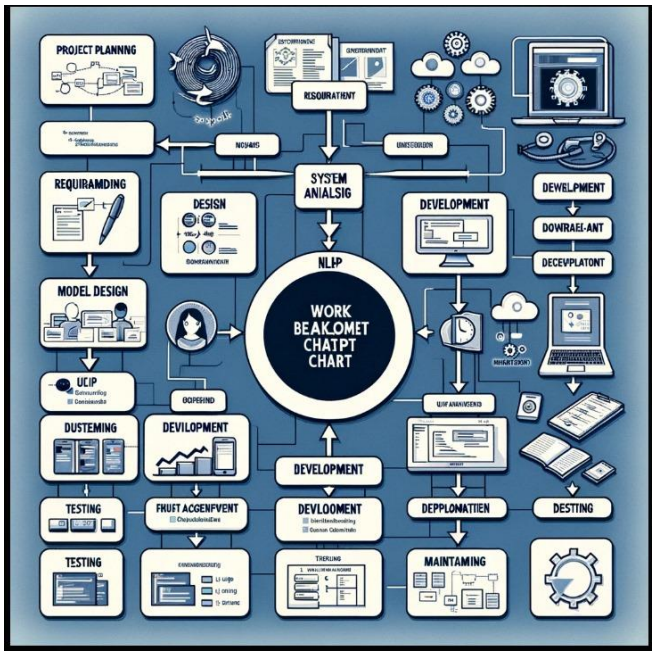
Word Order Correction: Detects and corrects errors related to word order and sentence structure.

Output Presentation: Displays feedback and corrections to the user in a clear and understandable format.

Provides explanations for detected errors and suggested corrections to aid learning.



This system architecture chart illustrates the flow of data and interactions between the various components of the proposed application. User input is processed and analyzed by the NLP engine, which identifies grammatical errors and provides feedback through the Grammar Check module. The output presentation component then displays corrections and explanations to the user, facilitating learning and improvement in writing skills for Grade 5 scholarship students.



7. Budget

Item	(USD) Budget	(LKR) Budget
Desing tool	25.03	9000.00
Printing documents	10.26	4500.00
field visits	16.52	5000.00
Server Cost	6.50	3000.00
Total	52.31	21500.00

8. Project Requirements:

1.Nonfunctional Requirements:

- **Usability:**

The Grammar Checking Algorithm should provide a user-friendly interface within the Automated Educational Assessment System, ensuring ease of use for both students and educators.

- **Performance:**

  The algorithm should demonstrate high performance in real-time grammatical error identification and correction to provide instant feedback to users.

- **Accuracy:**

  Achieve a high level of accuracy in detecting and correcting grammatical errors, minimizing false positives and false negatives**.**

- **Contextual Sensitivity:**

  Ensure the algorithm exhibits contextual sensitivity, considering the meaning and context of sentences to avoid suggesting unnecessary corrections.

- **Scalability:**

  Design the algorithm to scale efficiently with an increasing volume of text inputs, accommodating a growing user base without compromising performance.

2.Functional Requirements:

- **Grammar Rule Implementation:**

  Implement Sinhala language-specific grammar rules into the Grammar Checking Algorithm to accurately identify and correct grammatical errors.

- **Sentence Structure Analysis:**

  Develop a module for analyzing sentence structures, focusing on identifying sentence objects and subjects to improve overall writing proficiency.

- **Error Categorization:**

Categorize identified grammatical errors into types, such as syntax errors, agreement errors, and tense errors, to provide detailed feedback to users.

- **Rule-Based Corrections:**

  Establish a rule-based correction mechanism to suggest appropriate corrections based on Sinhala language grammar rules

- **Integration with Assessment System:**

  Integrate the Grammar Checking Algorithm seamlessly into the Automated Educational Assessment System to enhance the overall evaluation process.

- **Feedback Mechanism:**

  Implement a user-friendly feedback mechanism within the system to communicate identified grammatical errors and suggested corrections to users.

3.System Requirements:

- **Technology Stack:**

  Choose a technology stack that supports the efficient implementation and integration of the Grammar Checking Algorithm with the existing Automated Educational Assessment System.

- **Data Security:**

  Ensure the security of user data and text inputs, implementing encryption and secure transmission protocols to protect sensitive information.

- **Compatibility:**

  Design the Grammar Checking Algorithm to be compatible with various devices and platforms to accommodate a diverse user base.

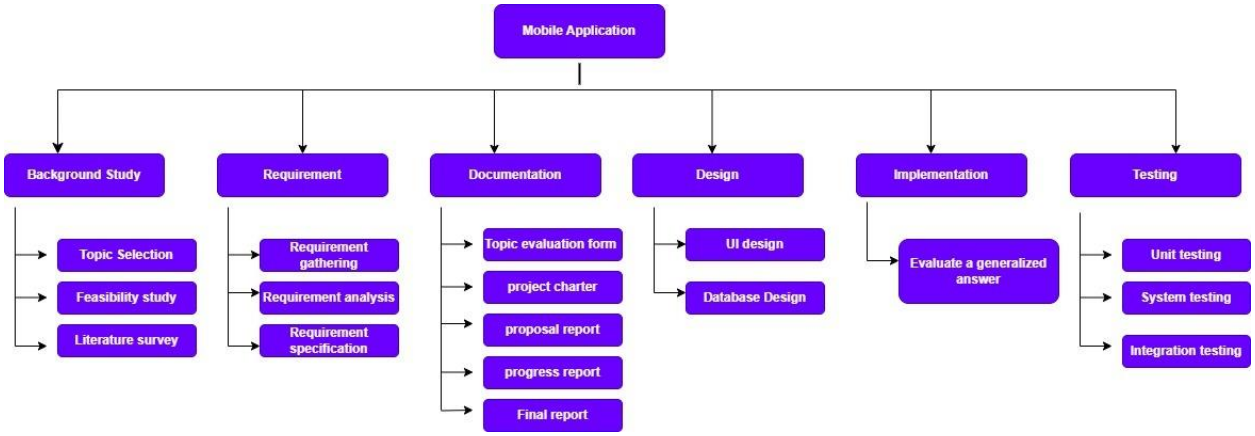
- **System Integration Testing:**

Conduct thorough system integration testing to validate the seamless integration of the Grammar Checking Algorithm with other components of the assessment system.

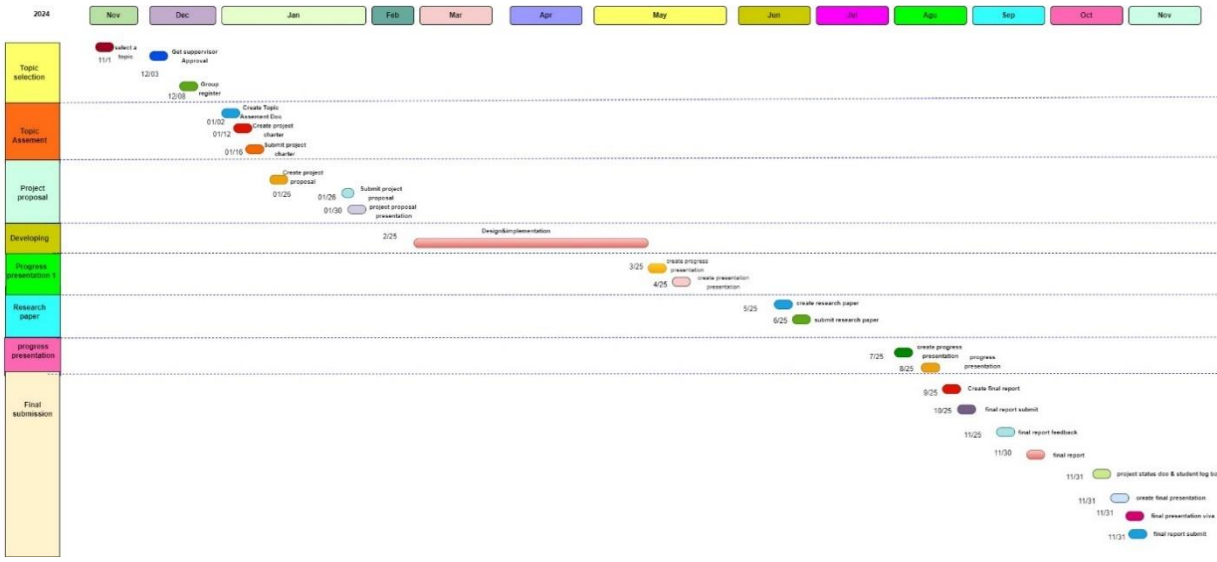
- **Scalability Testing:**

  Perform scalability testing to ensure the system can handle increased user loads and data inputs without degradation in performance.

9. WORK BREAKDOWN CHART



10. GANTT CHARTS



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