International Journal of Scientific Research & Engineering Trends
Volume 12, Issue 2, Mar-Apr-2026, ISSN (Online): 2395-566X

An Intelligent Tamil Learning Platform for Children

Prakash T [1], Sakthivelan K [2], Dharun M [3], Mrs. M. Vanitha [4]
[123]B.Tech AI&DS, Kongunadu College of Engineering and Technology, Trichy.
[4]Mrs. M. Vanitha, Assistant Professor,AI & DS,Kongunadu College of Engineering and Technology, Trichy.

Abstract- — This project presents an AI-based Tamil Learning Platform for Children aimed at improving early Tamil language education through intelligent and interactive methods. Traditional teaching approaches often lack interactivity and effective feedback for pronunciation, handwriting, and grammar. To address this issue, the proposed system integrates three AI-driven components: a Tamil Voice Model, a Tamil Letter Writing Recognition Model, and a Tamil Grammar Checker Model. The voice model evaluates pronunciation accuracy using speech processing techniques, while the handwriting recognition model analyzes written Tamil characters on a digital canvas. The grammar checker uses natural language processing to identify errors in simple Tamil words and sentences and provide corrections. By integrating speech, handwriting, and language processing, the platform creates an interactive learning environment that supports children in improving their Tamil language skills.

Keywords: Tamil Language Learning, Speech Processing, Handwriting Recognition, Grammar Checking, NLP, Educational AI.

I. INTRODUCTION

Language learning during childhood is essential for developing communication skills and preserving cultural heritage. Tamil, one of the oldest classical languages, plays an important role in cultural identity. However, traditional teaching methods often rely on textbooks and classroom instruction, which may not provide interactive learning or immediate feedback for students.

With the advancement of artificial intelligence, educational systems can now offer personalized and interactive learning experiences. Technologies such as speech recognition, computer vision, and natural language processing enable automated evaluation of pronunciation, handwriting, and grammar.

This paper proposes an AI-based Tamil learning platform designed for children. The system integrates speech processing for pronunciation training, handwriting recognition for letter writing evaluation, and natural language processing for grammar checking. The aim of the system is to provide an interactive environment that improves Tamil language learning through real-time feedback and intelligent assistance.

II. RELATED WORKS

Artificial intelligence has increasingly been used in educational technology to enhance language learning through automated evaluation and interactive learning tools. One of the most widely used technologies in this field is Automatic Speech Recognition (ASR), which enables computers to analyze spoken language and evaluate pronunciation accuracy. In many computer-assisted language learning systems, ASR is used to compare the learner's spoken words with predefined speech patterns. Research studies have shown that speech recognition tools help learners improve pronunciation skills by providing immediate feedback and allowing repeated practice in a self-learning environment. These systems analyze acoustic features of speech signals and determine the similarity between the learner's pronunciation and the standard pronunciation.

Handwriting recognition technologies have also been applied in educational applications to assist children in learning alphabets and character writing. These systems use computer vision and pattern recognition techniques to analyze the shape, strokes, and structure of handwritten characters. The written characters are captured through a digital interface and compared with standard templates stored in the system. Based on the similarity between the handwritten character and the reference character, the system can determine whether the writing is correct. Such systems help children practice writing while receiving immediate feedback, which improves writing accuracy and motor learning skills.

Natural Language Processing (NLP) has further contributed to language learning systems by enabling automated grammar checking and sentence analysis. NLP-based grammar checking tools analyze the structure of words and sentences to detect grammatical errors, spelling mistakes, and incorrect word usage. These systems provide suggestions and corrections that

help learners understand proper sentence formation. Grammar checking systems are widely used in writing assistants and educational platforms to support language learning.

In recent years, the integration of AI technologies in educational platforms has enabled more personalized and adaptive learning experiences. AI-based systems can monitor student performance, identify learning difficulties, and provide customized feedback based on individual progress. Such intelligent learning systems help students practice language skills independently while improving their confidence and engagement.

Although previous research has explored speech recognition, handwriting recognition, and grammar checking technologies individually, most existing systems focus on a single learning aspect. There are limited platforms that combine these technologies into a unified learning environment for regional languages such as Tamil. Therefore, the proposed system integrates speech processing, handwriting recognition, and natural language processing to create a comprehensive AI-based Tamil learning platform designed specifically for children. Therefore, this research integrates these AI technologies into a single Tamil learning platform for children.

III. SYSTEM OVERVIEW

The proposed AI-based Tamil learning platform is designed to create an interactive environment where children can learn Tamil pronunciation, writing, and grammar using intelligent technologies. The system combines speech processing, computer vision, and natural language processing to evaluate user inputs and provide feedback.

The platform consists of three major functional modules: the Tamil voice learning module, the Tamil letter writing recognition module, and the Tamil grammar checker module. Each module focuses on a different aspect of language learning while working together to provide a comprehensive learning experience.

Children interact with the system through a graphical user interface that allows them to listen to Tamil words, practice speaking, write characters on a digital canvas, and input sentences for grammar analysis. The system processes these inputs using AI algorithms and provides feedback in real time. The platform is designed with a simple and child-friendly interface that allows learners to easily interact with different learning modules. Each module focuses on a specific aspect of Tamil language learning, such as pronunciation, writing, and grammar understanding. The system processes user inputs using AI-based models and provides instant feedback to help children recognize mistakes and improve their skills. By offering continuous practice and real-time guidance, the platform supports independent learning while making the learning process more engaging and effective.

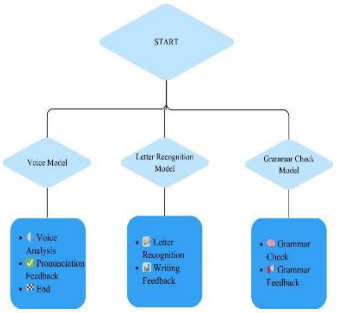
IV. SYSTEM ARCHITECTURE

The architecture of the proposed system is designed to support multiple forms of input and processing. The system can be divided into three primary layers: the input layer, the processing layer, and the feedback layer.

The input layer is responsible for collecting user inputs through different interfaces. The system captures voice input using a microphone when children practice pronunciation. Handwritten characters are captured through a digital writing canvas, while grammar learning is supported through a text input interface where children can type Tamil words or sentences.

The processing layer contains the artificial intelligence models responsible for analyzing the input data. Speech processing algorithms analyze the audio signal captured from the microphone and extract relevant acoustic features. Computer vision techniques analyze handwriting strokes and compare them with reference character patterns. Natural language processing algorithms analyze text inputs to identify grammatical errors and suggest corrections.

The feedback layer presents the evaluation results to the learner. Pronunciation scores, writing accuracy results, and grammar correction suggestions are displayed through the user interface. This immediate feedback helps children understand mistakes and improve their language skills through repeated practice. The architecture ensures smooth and efficient interaction between input modules, AI processing components, and the feedback system to provide accurate and real-time learning assistance.



V. TAMIL VOICE LEARNING MODULE

The Tamil voice learning module is designed to improve pronunciation skills among children learning Tamil. In this module, the system first plays a recorded pronunciation of a Tamil word or phrase. The pronunciation is presented in a clear and slow manner so that children can easily understand the correct sound.

After listening to the pronunciation, the child repeats the word using a microphone. The recorded speech is then processed by the system using speech processing techniques. The audio signal is converted into digital features that represent the phonetic structure of the spoken word.

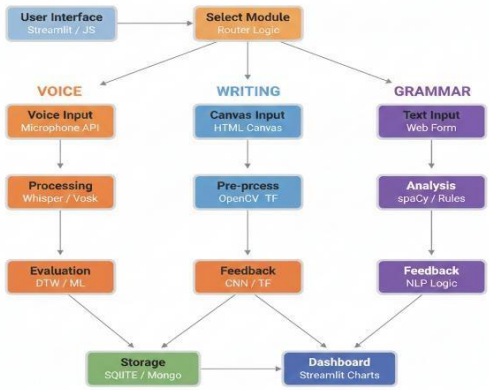
These features are compared with reference pronunciation patterns stored in the system database. Based on the similarity between the recorded speech and the reference pattern, the system determines whether the pronunciation is correct or requires improvement. Feedback is then provided to the learner, encouraging further practice if necessary.

This module helps children develop correct pronunciation habits while improving their listening and speaking abilities. In addition, the voice learning module encourages children to practice pronunciation repeatedly until the correct sound pattern is achieved.

VI. TAMIL LETTER WRITING RECOGNITION MODULE

The handwriting recognition module assists children in learning how to write Tamil characters correctly. In this module, children use a digital writing interface where they can draw Tamil letters using a mouse, stylus, or touchscreen.
When a character is written, the system captures the shape and stroke sequence of the handwritten letter. The captured image is processed using computer vision techniques that analyze the structural features of the character.

The system compares the handwritten character with a standard template of the Tamil letter stored in the system database. By measuring the similarity between the two patterns, the system determines whether the character is written correctly.
If errors are detected, the system provides suggestions to guide the learner in improving their writing technique. This process helps children practice writing while receiving immediate feedback on their performance.



VII. TAMIL GRAMMER CHECKER MODULE

The grammar checker module focuses on helping children understand the structure of Tamil words and sentences. In this module, learners can enter Tamil text through a typing interface. The system then analyzes the text using natural language processing algorithms.

The grammar checker examines the input sentence and identifies potential grammatical errors. These errors may include incorrect word order, missing grammatical markers, or spelling mistakes.
Once an error is detected, the system suggests possible corrections and explains the correct structure. This helps children learn proper sentence formation and improves their writing skills over time.

By combining grammar analysis with interactive feedback, the system encourages learners to experiment with language while learning correct grammatical structures.

VIII. EXPECTED OUTCOMES AND DISCUSSIONS

The proposed Tamil learning platform is expected to improve language learning outcomes by providing interactive and automated feedback to children. The speech learning module encourages learners to practice pronunciation repeatedly until they achieve accurate speech patterns.

The handwriting recognition module helps children develop correct writing habits by guiding them through character formation.Similarly, the grammar checker module assists learners in understanding sentence structures and grammatical rules. The integration of these modules creates a comprehensive learning environment that supports multiple aspects of language learning simultaneously.

The use of artificial intelligence in education also promotes personalized learning experiences. Unlike traditional classroom environments where teachers must divide their attention among many students, AI-based systems can provide individualized feedback to each learner.

The proposed system is also expected to increase student engagement in language learning by providing an interactive and technology-driven learning environment. By receiving immediate feedback on pronunciation, handwriting, and grammar, children can quickly identify their mistakes and correct them through continuous practice. This approach not only improves learning efficiency but also encourages independent learning.

IX. CONCLUSION

This paper presented an AI-based Tamil Learning Platform designed to support children in learning Tamil language skills through an interactive and intelligent environment. The proposed system integrates three important components: a Tamil Voice Learning Module for pronunciation practice, a Tamil Letter Writing Recognition Module for handwriting evaluation, and a Tamil Grammar Checker Module for analyzing sentence structure. By combining speech processing, handwriting recognition, and natural language processing technologies, the platform provides automated evaluation and real-time feedback to learners.

The system aims to address limitations of traditional teaching methods by providing a more engaging and interactive learning experience. Children can practice pronunciation, writing, and grammar while receiving instant feedback that helps them identify mistakes and improve their language skills. The integration of these AI technologies creates a supportive learning environment that encourages repeated practice and independent learning. Overall, the proposed platform demonstrates how artificial intelligence can enhance early Tamil language education and make the learning process more effective and accessible for young learners.

X. FUTURE WORKS

In the future, the proposed system can be further improved by integrating advanced deep learning models to increase the accuracy of speech recognition and handwriting analysis. Larger datasets of Tamil speech and handwritten characters can be used to train more robust models that provide better evaluation results. Additionally, advanced natural language processing techniques can be implemented to improve grammar correction and sentence analysis capabilities.

The platform can also be extended into a mobile application to increase accessibility for students in different learning environments, including rural and remote areas. Features such as gamification, progress tracking, and personalized learning recommendations can be added to enhance student engagement. Furthermore, the system can be expanded to support additional learning activities such as vocabulary building, storytelling, and interactive quizzes to create a more comprehensive AI-powered Tamil learning platform for children.

REFERENCES

1. E. Hayashi, "Effect of Speech Recognition–Based Pronunciation Instruction on English Speaking Fluency," International Journal of Linguistics, 2024.
2. Deep Learning Based Mobile Language Learning System for Pronunciation Analysis, Applied Sciences Journal, 2024.
3. L. Li et al., "Effectiveness of Automatic Speech Recognition in Pronunciation Learning," ReCALL Journal, Cambridge University Press, 2024.
4. R. P. Yaniafari et al., "The Potential of ASR for Improving English Pronunciation: A Review," KnE Social Sciences, 2022.
5. D. Liakin, W. Cardoso, and N. Liakina, "Mobile Speech Technologies for Language Learning," Languages Journal, 2017.