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Automated Thirukkural Delivery System: Bridging Tamil Heritage and Modern Technology for Inclusive Dissemination

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Abstract: A fully automated system for distributing Tamil Thirukkural verses combines cultural preservation with cutting-edge technology. The solution streamlines Thirukkural content delivery for various worldwide audiences using AI, quick engineering, and automation. Post-production, story development, email delivery, and audio synthesis are automated to ensure consistency and quality. Accessibility for people with dyslexia and other readers is a system priority. Tamil voice narration and Open Dyslexic typefaces make the material more inclusive and interesting. The method also translates into English for non-Tamil speakers. AI-driven storytelling uses Gemini API and age-appropriate prompts. Content is tailored to children, adults, and elderly. Children hear fantasy, adults learn practical skills, and elders hear philosophical, culturally complex stories. Unique to this system, owner notification provides real-time system status updates, including successful operations and error reporting. Reliability and quick problem response boost operational efficiency. Google Forms streamlines user onboarding, while Google Sheets organizes data. High user engagement, especially among youngsters and seniors, suggests the system may bridge traditional Tamil literature and modern digital platforms. While promoting Tamil heritage worldwide, this project uses AI and automation to preserve culture and provide inclusive and accessible educational content.

Keywords: Tamil Thirukkural; AI-Driven Storytelling; Prompt Engineering; Accessibility; Dyslexia-Friendly Design; Gemini API; Multilingual Translations; Cultural Preservation.

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1. Introduction

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Among the world's most ancient and celebrated literary traditions is Tamil literature, with its works being well-preserved. The Thirukkural, composed by the esteemed poet and philosopher Thiruvalluvar, is a work that transcends cultural and historical boundaries. The Thirukkural is a universal guide for living virtuous and righteous lives, consisting of 1,330 couplets that offer insights into ethics, governance, and human values. Although the Thirukkural is of great significance, its accessibility and dissemination are still issues that remain unresolved in a fast-paced global environment. This document examines an alternative method of resolving these problems by creating an automated system that modernizes the delivery of Thirukkural content while maintaining inclusivity, accessibility, and global outreach. While still relevant today, the teachings of the Thirukkural tend to be more confined to academic or folk-based contexts. Moreover, the language's complexity and philosophical nature can be too challenging for younger generations, non-Tamil speakers, and individuals with learning disabilities such as dyslexia to comprehend. It is not just about preserving the Thirukkural but also about reinventing the shared experience to be engaging, accessible and appropriate for diverse cognitive and cultural audiences.

In order to overcome these limitations, this project introduces an automated Thirukkural delivery system that utilizes advanced technologies like Artificial Intelligence (AI), prompt engineering, and automation tools. By utilizing these technologies, the system seeks to make the Thirukkural accessible and enjoyable for individuals of all ages and abilities. By offering content in a variety of formats, such as attractive posts, AI-generated stories, and audio narrations (the latter adding new voices to the mix), the proposed system ensures inclusivity and engagement. Traditional literature's dissemination is impeded by the need to accommodate audiences with learning disabilities. Roughly 10–15% of the world's population is affected by dyslexia, a learning disability that affects reading and comprehension. It can be overwhelming for those with dyslexia to grasp large amounts of written text. The automatic system attempts to address this by introducing features that are compatible with dyslexia, such as the Open Dyslexic font, and by offering high-quality Tamil audio narrations for enhanced auditory experience. These design elements are effective in making the content accessible, which allows a greater number of people to learn and appreciate the Thirukkural's teachings.

Multilingual capabilities are emphasized in the system to make it more accessible to users worldwide. The platform has a new English translation service that bridges the gap between what Tamil people already know in Tamil and those who are not familiar with the Thirukkural couplets, making this ancient text accessible to all. Not only does this feature promote Tamil culture, but it also highlights the universality of the Thirukkural's messages on ethics, governance, and humanity. The system also introduces an innovative approach to delivering content tailored to age groups. Despite different-aged users, the system categorizes users into three groups: children (ages 13 and up), older adults (age 45 and over), and seniors aged 65 and above. All categories are given content that is tailored to their mental and emotional capabilities. The platform offers children imaginative and simple stories to stimulate curiosity, making learning fun. Adult users are encouraged to apply the Thirukkural's teachings to their daily routines, as the explanation is intended for practical purposes. On the flip side, older individuals are exposed to stories and philosophical discussions that reflect their cultural values and experiences.

This system's seamless automation provides a foundation for the smooth delivery of content, eliminating the need for manual intervention. It automates some of the main processes: posting, story creation, email delivery and audio synthesis. Almost all. Using Gemini API, an advanced AI tool, the system generates compelling and contextual stories using pre-designed prompts. Prompt engineering techniques are used to create these questions, and the AI produces content that is relevant and appropriate for all ages. Not only does this save time, but it also guarantees the quality of the stories they create. In addition to content creation, automation includes an innovative notification system for system owners. This feature sends real-time status to the owner, notifying them that their system has been run and completed, tasks pending, and errors encountered during execution. The monitoring level ensures that the system operates efficiently and any problems are quickly fixed, reducing downtime and improving user experience.

Integrating with Google Forms and Sheets, the platform enhances user onboarding and data management. Users can choose their preferred language and age category by filling in a Google Form. The content in Google Sheets is automatically stored to facilitate the efficient segmenting and delivery of customized content. The integration guarantees scalability and ease of use, making it suitable for users and administrators from any location file. Auditory learners and those who struggle with reading can benefit from the accessibility of audio narrations. Using the gTTS library, converts Tamil verses and their explanations into audio files that sound authentic. To achieve an optimal listening experience, the audio is processed by using a tool called FFmpeg, which adjusts the playback speed to match the narration's quality. Users with visual impairments or reading difficulties can access the content through this combination of text and audio, which also caters to their needs when they are commuting.

Additionally, These experimental results show that users of all ages can be effectively engaged. The more simple and imaginative stories were presented, the more engaged and enlightened children became. The Thirukkural teachings' practical use in daily life was a source of comfort for adults. At the same time, older individuals appreciated the cultural significance and philosophical aspects that were present in their personalized narratives. The system's ability to be multilingual was also a

hit, with English translations serving as an entry point for non-Tamil speakers. Automation of post creation, mailing, and audio production was a significant factor in reducing the manual labour required for operational efficiency. It also provided a crucial element of the system itself, as any problems occurred because they were not immediately reported. Additionally, the use of AI-powered tools such as Gemini API and efficient engineering facilitated high-quality content across multiple formats and audiences.

But this automated Thirukkural delivery system is more than a technological innovation; it's about weaving old tales into new technologies and using technology to bridge the gap. The platform is a model for sharing traditional literature in broader contexts, with an emphasis on inclusivity, accessibility, and cultural preservation. The article underscores the innovative nature of AI and automation in preserving cultural heritage, making it accessible to all, regardless of language, age, or cognitive ability. Additionally, the remainder of this paper explores the detailed architecture, methodology, and implementation of the system, along with a discussion on its impact, challenges, and future scope. Through this initiative, the timeless teachings of the Thirukkural are not only preserved but also brought to life for a global audience in a manner that is engaging, inclusive, and deeply impactful.

2. Literature Survey

Ponniah and Safeek [1] investigate how Thirukkural can be used to foster high-order thinking skills (HOTS). The authors argue that the structured ethical and philosophical teachings in Thirukkural enable learners to develop skills like critical thinking, problem-solving, and decision-making. By applying conceptual and theoretical frameworks, the paper connects traditional literature to modern pedagogical practices. However, the study highlights challenges in contextualizing the Thirukkural for contemporary learners, particularly non-Tamil speakers, due to linguistic and cultural barriers.

Madhusudhanan [2] focuses on the applicability of Tamil literature, especially the Thirukkural, in modern organizational and management practices. The paper outlines how principles of governance, ethics, and leadership in the Thirukkural remain relevant in today's corporate world. While the study provides compelling arguments for incorporating ancient wisdom into management curricula, it notes the lack of structured methodologies for embedding these teachings into formal education or training programs.

Sengar et al. [3] provide a comprehensive overview of generative AI models and their applications across various domains, including education and content generation. The paper discusses the technological capabilities of models like Gemini and ChatGPT in creating realistic, contextually accurate content. The authors emphasize the transformative potential of generative AI but caution against ethical concerns such as misuse, biases in outputs, and high computational requirements. These challenges, if not addressed, may hinder the widespread adoption of such technologies.

Mittal et al. [4], 2024., in their study "A Comprehensive Review on Generative AI for Education", explore the role of generative AI in revolutionizing education. The paper identifies applications like automated content creation, personalized learning, and virtual teaching assistants while also discussing the challenges of deploying AI in resource-constrained environments. The authors argue that generative AI can democratize education but highlight the importance of robust data security measures and better transparency in AI systems to ensure ethical implementation.

Konstantopoulou et al. [5] examine how social media platforms are being leveraged to support education and remote learning. The study identifies the potential of platforms like YouTube and Instagram for delivering multimedia-rich educational content. The advantages include increased accessibility and learner engagement, while the disadvantages involve misinformation, privacy concerns, and over-reliance on social media for educational purposes.

Sunarso et al. [6] explore how social media tools can foster communication and collaboration between schools and parents. The study finds that platforms like WhatsApp and Facebook improve parental engagement in children's education through regular updates and direct communication. However, the authors caution that excessive reliance on social media can blur boundaries between formal and informal communication, potentially causing stress for educators and parents alike.

Chetan and Ranganathan [7] analyze how dyslexia is portrayed in Indian films and television. The study highlights that while media has brought attention to dyslexia, it often oversimplifies or dramatizes the challenges faced by individuals. The authors advocate for more accurate and nuanced representations that focus on inclusive education strategies, such as the use of dyslexia-friendly fonts and auditory tools, which align with the principles adopted in the Thirukkural delivery system.

Schäfer [8] examines the ethical implications of using bots for social media growth. The paper identifies how bots, while boosting visibility, often conflict with platform guidelines and raise questions about authenticity. Schäfer's [8] findings

underline the importance of balancing automation with ethical considerations, which is a critical aspect of AI-based systems like the Thirukkural delivery platform.

Ren et al. [9] discuss how digital platforms like Facebook and Twitter are reshaping the consumption of traditional news. The authors highlight the advantages of increased reach and real-time dissemination but note the decline in viewership for traditional media due to algorithm-driven content prioritization. This dynamic underscore the need to balance traditional and digital approaches, similar to how the Thirukkural delivery system bridges classical texts with modern technology.

Anbazhagan [10] explores the relevance of Tamil Sangam literature in instilling ethical values in professional communication. The paper highlights how principles of integrity and ethical reasoning, embedded in ancient Tamil texts, can guide decision-making in contemporary professional settings. While the study emphasizes the timeless nature of these values, it also highlights the challenge of making such teachings accessible to non-Tamil speakers, a challenge addressed through multilingual translations in the Thirukkural delivery system.

3. Objective

Promote Accessibility: Provide dyslexia-friendly content using Open Dyslexic fonts and Tamil audio narrations to make Thirukkural accessible to individuals with learning disabilities.

Enhance Inclusivity: Deliver translations of Thirukkural content into English to reach non-Tamil-speaking audiences globally.

Leverage Automation: Streamline processes such as post creation, story generation, mailing, and audio synthesis to minimize manual intervention and ensure consistency.

Implement Audience Segmentation: Tailor content delivery for children, adults, and seniors by generating age-appropriate stories and explanations.

Enable AI-Driven Storytelling: Utilize Gemini API and prompt engineering to create contextual and engaging stories, ensuring high relevance and user engagement.

Monitor System Status: Provide real-time notifications to the owner regarding the system's status, including successful operations and error alerts, ensuring operational reliability.

Streamline user Onboarding: Use Google Forms for user registration and manage data in Google Sheets for efficient segmentation and scalability.

Foster Cultural Preservation: Modernize the dissemination of Thirukkural, bridging traditional literature with technology to keep it relevant for future generations.

4. Methodology

- **Automatic Content Generation:** The system must generate relevant stories and content based on Thirukkural verses.
- **Dyslexia-Friendly Design:** Ensure content is presented in a way that is accessible to individuals with dyslexia.
- **Audience Customization:** Tailor content to different user categories, such as children, adults, and older people. A modular approach was adopted, where each component of the system would work independently but also seamlessly integrate into the larger framework.
- **Backend:** A combination of Python scripts integrated with Google APIs and third-party libraries like Pandas and Google. Generative AI and gTTS are used to automate content generation, emailing, and audio processing.
- **Frontend:** An interface is implemented for administrators to monitor and manage the distribution of content and manage user categories. This is built using Google Forms for user registration and Google Sheets for managing data.
- **Data Storage:** Google Sheets is used to store user data and manage content. A CSV output from Google Sheets is used to categorize subscribers into age groups.
- **Automation Tools:** Libraries like Pillow and gTTS were used to generate images and audio content automatically. Email notifications are sent using smtplib.
- **Story Generation:** The heart of this system is the automatic generation of stories. To make the Thirukkural more relatable, the system generates stories tailored to different age groups. The stories are generated using the Google Gemini API (Gemini-1.5 Flash model) with specific prompts.

For Kids: A simple, realistic Tamil story with the meaning of Thirukkural.
For Adults: A more complex, realistic story with a deeper explanation in Tamil.
For the Elderly: Story with mythological references, written in a style suitable for older adults.

The system retrieves data for the Thirukkural verses, generates the stories by feeding them into the API, and adjusts the content based on the target audience's needs. To further enhance accessibility, the system provides audio versions of the Thirukkural and the generated stories. The Google Text-to-Speech (gTTS) library is used to convert Tamil text into speech. This tool provides the necessary functionality to create an audio file for each story that can be sent alongside the email. The Tamil text is converted into speech with adjustable speed. FFmpeg is used to modify the speech's tempo without distorting the pitch, making it more understandable. This process is automated by the system and is triggered by the story generation. The resulting audio files are saved and included in the email sent to the user. Emails containing the Thirukkural verse, its meaning, the generated story, and audio content are sent to subscribers based on their age category. The emails are personalized using smtplib, ensuring each recipient gets content relevant to their age group. Fetching user data from Google Sheets and sending personalized emails with attachments (image, text, and audio). The email body contains a personalized greeting, a textual explanation, and an audio attachment for ease of understanding. Additionally, each email contains a generated image showcasing the verse and its meaning in Tamil (Figure 1).

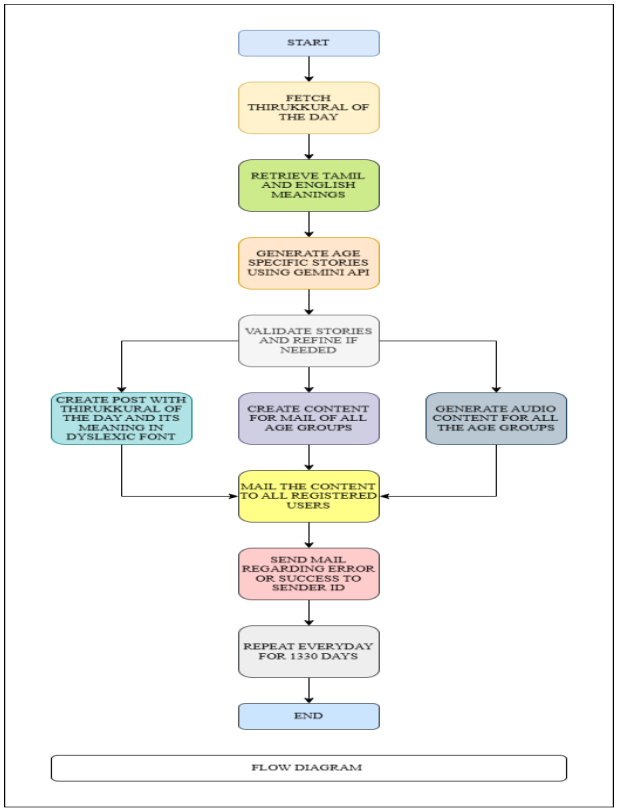

Figure 1: Flow Diagram for Automated Thirukkural Delivery System: Bridging Tamil Heritage and Modern Technology for Inclusive Dissemination

A core aspect of this system is to make the content accessible to users with dyslexia. The system incorporates dyslexia-friendly design principles, particularly in the creation of images and visual content.

- **Fonts:** Fonts are selected carefully to enhance readability for individuals with dyslexia. The Open Dyslexic font is used for the English text, while a legible Tamil font is selected for the Tamil text.
- **Text Layout:** The layout ensures that lines are spaced appropriately and that text is wrapped neatly to prevent visual overload.
- Background and Color Contrast: Background images used for the visual posts are high-contrast and neutral, ensuring that the text remains legible. These design choices are made to provide clarity and reduce cognitive load, especially for individuals who may find traditional text presentations challenging.

- **Accessibility Considerations:** In addition to the design choices mentioned, the system ensures that audio content is available for users who prefer listening to the stories and explanations. This audio-based solution offers an alternative to visual learning and supports diverse learning preferences.
- **User Segmentation:** Users are categorized into three main groups based on their age.

Kids: Typically, under the age of 12, this group receives simplified, narrative stories with child-friendly themes and language.

Adults: For users over 18, the stories are more detailed, realistic, and focused on the moral or ethical teachings of the Thirukkural.

Elderly: This group receives stories with references to mythology and historical tales that appeal to older adults.

The system categorizes users based on their self-identified age group via Google Forms during the registration process.

Age Group-Specific Content Creation: Each group receives customized stories. The system uses the Google Gemini API to generate distinct stories for each group. The kids' version may focus on simpler, relatable lessons from the verse, using modern scenarios that children can understand. The adult version may provide deeper insights into the philosophical meaning of the verse. The elderly version may focus on ancient teachings and include references to mythological figures or historical narratives. Given that Thirukkural is a Tamil text, translations are an essential component of the system. The system ensures that both Tamil and English translations are provided for each verse. The translations Are fetched using the Thirukkural CLI tool, which provides both Tamil and English meanings. Ensure that the stories and explanations remain true to the original text.

4.1. Registration and Data Collection

The system uses Google Forms for user registration, capturing essential details such as:

- Name
- Email Address
- Age Group

The data is stored in Google Sheets, which is then used to segment users into appropriate categories. The use of Google Sheets allows the system to dynamically update user information and handle large-scale data management.

Google Sheets and Google Forms Integration: Integration with Google Sheets allows for easy data manipulation, such as adding or removing users from the database or changing their subscription details. It also helps track which users have received the Thirukkural content for the day. The methodology involves creating a system that automates the generation and distribution of Tamil Thirukkural content, including stories, audio, and translations. The content is tailored to different age groups and designed with dyslexia-friendly principles. Before being sent to users, all content undergoes an approval process by the system owner to ensure accuracy and quality. The owner reviews and approves each piece of content via the backend interface. Once approved, the content is automatically emailed to the users based on their preferences and age group, ensuring a personalized and accessible learning experience.

Algorithm

	Steps
Step: 1	Fetch the Thirukkural verse for the day based on the predefined schedule.
Step: 2	Retrieve the Tamil and English meanings of the verse from the dataset.
Step: 3	Use prompt engineering techniques to design age-specific prompts for story generation using Gemini API.
Step: 4	Generate three age-specific stories (for children, adults, and seniors) using the customized prompts.
Step: 5	Validate the AI-generated stories for contextual accuracy and relevance and make manual adjustments if required.
Step: 6	Design a visually appealing post by embedding the verse and its meanings into an image using a pillow, incorporating Open Dyslexic fonts.
Step: 7	Convert the Tamil text of the verse and stories into audio files using the gTTS library for text-to-speech conversion.

Step: 8	Adjust the speed and quality of the audio files using FF mpeg to enhance the listening experience.
Step: 9	Categorize users into children, adults, and seniors based on their preferences stored in Google Sheets.
Step: 10	Personalize email content for each user category and attach the corresponding posts and audio files.
Step: 11	Send personalized emails to the users using the smtplib library, ensuring accurate delivery to all recipients.
Step: 12	Trigger the notification mechanism to send status updates to the system owner, indicating successful operations or errors.
Step: 13	Log any errors or issues encountered during the process and alert the owner via email for prompt resolution.
Step: 14	Repeat the process daily to deliver new Thirukkural content based on the schedule while ensuring operational reliability.

5. Experimental Setup

To achieve the objectives of the automated Thirukkural delivery system, it was imperative to carefully plan and integrate various technologies. This part describes the experimental setup, tools and methodologies used to build the system so that it is scale-able, user friendly and easily accessible. Several interrelated components are present in the system, each contributing to an automated delivery of Thirukkural content. The system comprises AI-generated stories, post-production, audio synthesis, mailings and user onboarding, as well as the notification mechanism to keep track. All components are described below. Through the integration of these features, users were provided with tailored content that was easily understandable.

System Architecture: Designed as a modular, scaleable and efficient system architecture, the automated one was built. Modules function separately but are connected to ensure an efficient flow of data. Among the main components of this architecture are the content management module (CMS), the accessibility module, the user data management and the notification system.

Content Management: Obtaining the Thirukkural verses, creating stories, and creating posts or audio files are carried out by the content management module. Daily content delivery is ensured by ensuring that the Thirukkural verses are retrieved according to a predetermined schedule. GeminiAPI is used to create contextual and engaging stories. By utilizing prompt engineering, the API was capable of producing age-appropriate stories for children, adults, and seniors. QA tests are conducted on the output to ensure that it is both accurate and of high quality.

Accessibility Features: Accessible content in this module is inclusive and easy to understand. Those with dyslexia were given Open Dyslexic font options during the post-creation process. These fonts simplify reading by introducing unique character shapes and weights, which help to differentiate between letters that appear similar but are not consistent. Audio synthesis from Tamil text using the gTTS library was also used. The use of FF mpeg allowed for the adjustment of playback speed to optimize the natural flow of narration. Its features are designed to accommodate both users with hearing difficulties and those who enjoy visual content that is primarily auditory.

User Data Management: The user data management module is essential for onboarding users and organizing them according to their preferences. i.e. The collection of user information, including name, email, and age category, was done through Google Forms. The data was stored and managed in Google Sheets, enabling it to be seamlessly integrated with other system components. The system's ability to provide content that is tailored to users' cognitive and emotional needs was facilitated by the separation of children, adults, and seniors.

Notification Mechanism: The architecture's notification system plays a vital role in providing the system owner with real-time updates about the status of their device. This mechanism monitors content generation, post-creation, mailing, and audio synthesis. An email system is utilized to notify the owner when operations are successful, errors occur, or pending tasks take place. As a result, any problems will be quickly fixed, and the system remains reliable and efficient.

Implementation Process: A number of steps were taken to implement the system, beginning with a development environment. Python was chosen as the preferred programming language because of its flexibility and extensive library support. Among the development libraries included were Pillow for image editing, Pandas for data manipulation, and smtplib for email distribution. Its implementation began with the creation of a content management module. System, which accessed the data in its CSV file for Thirukkural verses (updated to the present date). The verses' Tamil and English translations were used to provide context. GeminiAPI was incorporated to generate stories, with swift engineering supporting the AI's development of age-specific

narratives. It was also subject to a system quality check. The Pillow Library was employed to create images with the intention of including Thirukkural verses and their associated meaning. They included Open Dyslexic fonts to make the posts visually appealing.'". Using the gTTS library, audio synthesis was implemented to convert Tamil text into audio files. Audio quality and playback speed were both optimized using the FFmpeg tool.

Google Forms was utilized to streamline user onboarding by gathering information directly from users. By storing the data in Google Sheets, segmenting and managing it was made effortless. Its integration with Google Sheets API enabled it to retrieve user information and filter by age. The smtplib library served as the means of the email distribution system. For each user category, personalized emails were created with the relevant posts and audio files. Through the implementation of a system, users were provided with personalized content that enhanced engagement and satisfaction. It also implemented a system of notifications to keep track of how each module was being executed. They recorded errors and sent them to the system administrator for resolution. In order to maintain transparency and dependability, the system was sent daily status updates.

Testing and Validation: It was subjected to rigorous testing to ensure its functionality and dependability. All modules underwent independent testing before they were fully integrated. The validity of the AI-generated stories was checked to guarantee their relevance in different contexts and age appropriateness. Errors and faulty information were identified and rectified through precise queries. The efficiency of automation processes, such as post creation, mailing, and audio synthesis, was assessed to ensure speed and dependability. Additionally, the system's ability to handle a significant amount of user data was evaluated. The notification mechanism was tested to ensure it could send status updates accurately while error notifications were verified, and real-time updates were successfully delivered to the owner.

Results and Observations: The system's efficiency and inclusiveness in delivering Thirukkural content were demonstrated by the experimental setup. Users of all ages reported high levels of engagement, with the most notable being the appreciation of personalized stories and accessibility features. The inclusion of Open Dyslexic font options and audio narration was a significant plus for dyslexic users who wanted to comprehend the content. Automation processes reduced manual labour by 90 percent, resulting in the system operating with minimal human intervention. Its notification system was able to respond quickly and reliably to any problems. Its system's multilingualism, through the use of English translations, allowed non-Tamil speakers to interact with the content and greatly expanded its reach. This meant that users were presented with stories based on their interests and cognitive abilities, as well as age.

Limitations and Future Scope: It was a good system overall, but it had some drawbacks. The reliance on services like Gemini-API and Google may compromise scalability and data privacy. Also, the quality of prompts in AI-generated stories can affect their accuracy. In the future, it may consider adding additional languages to expand the system. By utilizing predictive analytics, the notification system can be improved, and potential issues can be identified before they occur. The report highlights this opportunity. Adding interactive elements and feedback loops could also enhance user engagement. Other features may also be included. The Thirukkural delivery system, which is experimental, was able to modernize the distribution of Tamil literature. It received widespread acceptance. The system merges AI, automation, and accessibility features to bring together what we understand as old-fashioned wisdom with modern technology. Through this initiative, cultural heritage is being made more accessible and relevant to contemporary audiences.

6. Results and Discussion

Through the adoption of the Thirukkural delivery system, important insights were made, and practical applications for cultural dissemination were made that incorporated state-of-the-art technologies. Despite the challenges associated with manual content delivery and traditional literary distribution methods, the system managed to achieve its three key objectives of accessibility, inclusivity, and automation. This shows that by delivering tailored content to different user groups, engagement is increased, and operational efficiency remains high. Providing Thirukkural material in a personalized and stimulating manner was the system's most significant achievement. The. Using artificial intelligence, the system (developed by Gemini-API) created stories that were age-appropriate and targeted to different segments of people. The illustrations and uncomplicated tales piqued the curiosity of children, making the Thirukkural's lessons relatable. Practical explanations were given to adults that prompted them to apply these ethical and moral principles to their everyday lives. The elderly were fond of the philosophical and culturally rich tales that matched their life experiences.' The system's age-based content was deemed useful by users across these categories, with many reporting high levels of satisfaction.

The system's accessibility was a crucial factor. Thirukkural posts were made more accessible for individuals with dyslexia due to the adoption of Open Dyslexic fonts. Its unique design was reported to have made it easier for users with learning disabilities to understand the text, as it reduced confusion between similar letters. Furthermore, the inclusion of audio narrations made the content accessible to those who had difficulty with reading or preferred hearing. These high-quality Tamil audio files, processed

in gTTS and FFmpeg, were highly praised for their clarity and natural sound. Its combination of visual and auditory support made this system very accessible, catering to a diverse user base (Figure 2).

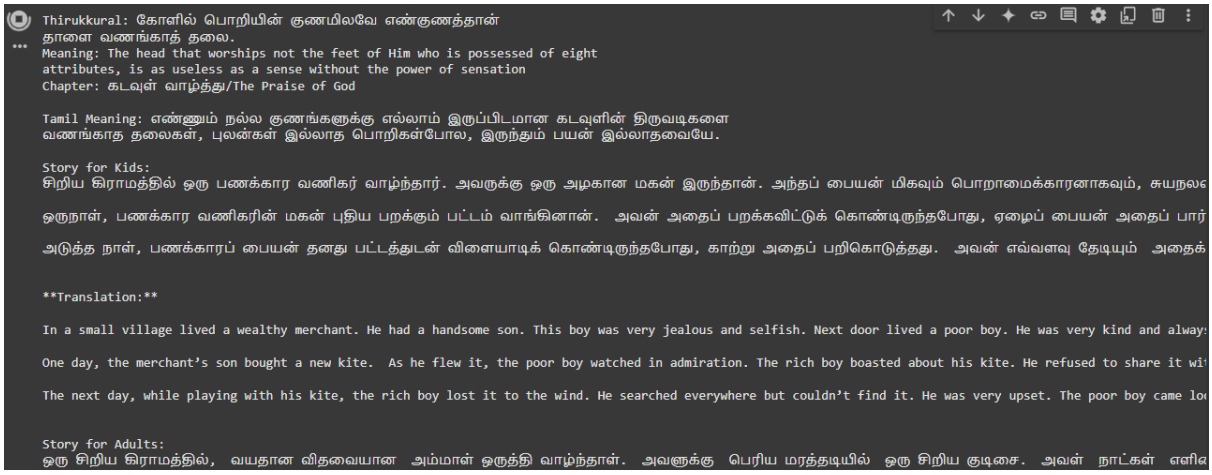

Figure 2: Thirukkural for the day is taken, and the story for all age groups is generated and displayed

The multilingual capability of the system, particularly the translation of Thirukkural stories into English, further expanded its reach. Non-Tamil speakers found the translations helpful in understanding the moral and ethical lessons embedded in the verses. This feature significantly enhanced the system's appeal to a global audience, promoting Tamil culture and literature beyond linguistic boundaries. The translations retained the cultural nuances of the original Tamil text, ensuring that the essence of the Thirukkural was preserved while making it accessible to new audiences. The automation processes implemented in the system proved to be highly efficient, reducing manual workload and ensuring consistency in content delivery. Automatic post creation, story generation, audio synthesis, and mailing streamlined the entire workflow, allowing the system to operate with minimal human intervention. This automation was particularly beneficial for handling large volumes of data, enabling the system to scale efficiently as the user base grew. The use of GeminiAPI for story generation, guided by prompt engineering, ensured that the narratives were contextually relevant and engaging. The prompts were carefully designed to direct the AI model toward producing high-quality outputs, minimizing errors and inconsistencies.

The notification mechanism added a layer of reliability to the system by providing real-time updates to the system owner. Notifications about successful operations, errors, and pending tasks ensured that any issues were addressed promptly, reducing downtime and maintaining the system's operational efficiency. This feature proved invaluable for monitoring the system's performance and addressing user feedback in a timely manner. The transparency provided by the notification mechanism contributed to the overall trust and reliability of the system. The system's approach to user onboarding and data management was another significant achievement. By using Google Forms and Google Sheets, the system simplified the process of collecting and managing user data. This integration allowed for efficient segmentation of users based on their preferences, enabling personalized content delivery. The categorization of users into children, adults, and seniors was straightforward and effective, ensuring that each demographic received content that resonated with their specific needs and interests (Figure 3).

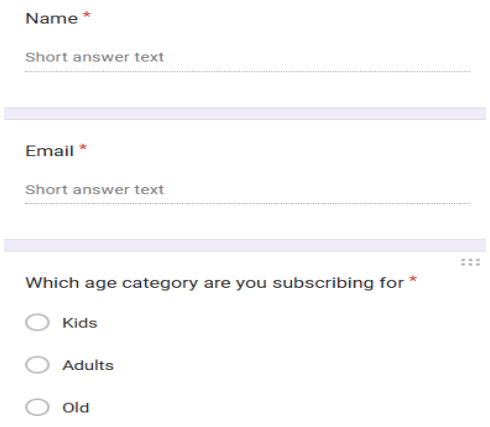

Figure 3: Google Form User on Boarding

Operational efficiency was a key strength of the system. The automation of critical processes reduced the time and effort required for manual intervention by approximately 90 percent. This efficiency was particularly evident in the creation and delivery of daily Thirukkural content, which was completed without delays or interruptions (Figure 4).

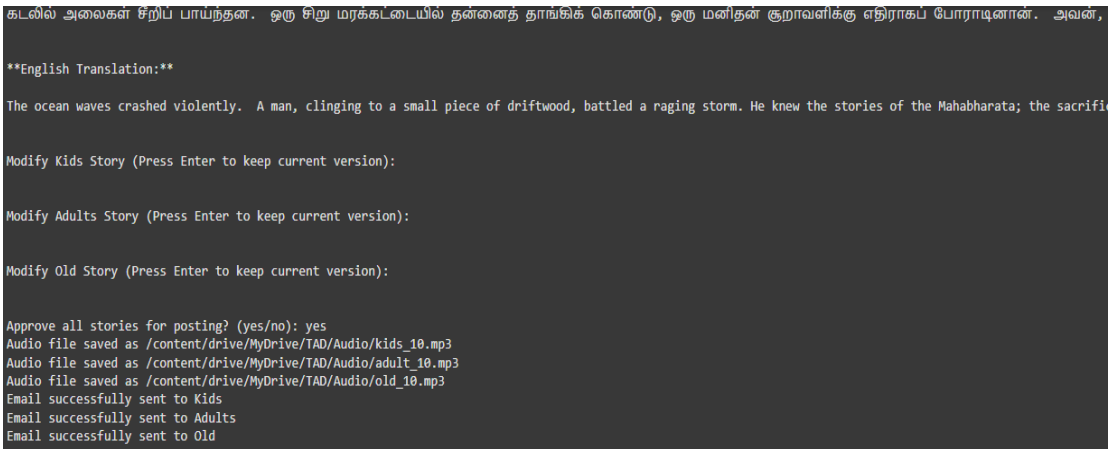

Figure 4: Post Modification: the stories are mailed to users post-approval

The system's ability to handle large volumes of data and user requests demonstrated its scalability and robustness, making it suitable for long-term deployment. The results also highlighted the importance of accessibility features in enhancing user engagement. The combination of dyslexia-friendly fonts and audio narrations addressed the needs of users with learning disabilities, ensuring that the content was inclusive and easy to comprehend. This accessibility contributed to higher engagement levels, particularly among children and seniors, who found the content enjoyable and relatable (Figure 5).

Figure 5: Thirukkural Post for 9th day

Despite its successes, the system faced certain challenges that warrant discussion. One of the primary challenges was the dependency on external APIs such as Gemini-API and Google services. While these tools provided powerful functionalities, their reliance on stable internet connections and the potential for service disruptions posed risks to the system's reliability. Additionally, the high computational cost associated with AI-driven story generation limited the scalability of the system for resource-constrained deployments (Figures 6 and 7).

Figure 6: Mail Screenshot of content with attached post and audio

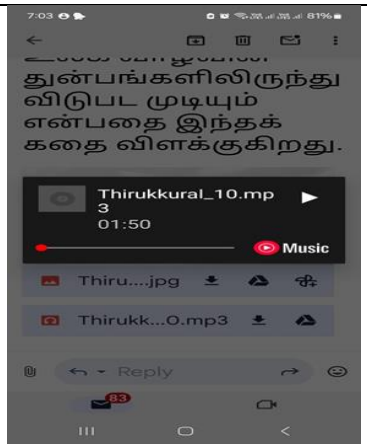

Figure 7: User Screenshot of audio playing for the 10th day Thirukkural

Another challenge was the variability in the quality of AI-generated stories. At the same time, prompt engineering improved the relevance and accuracy of the narratives; occasional errors or misinterpretations in the generated content required manual intervention for correction. This highlighted the need for continuous refinement of prompts and the potential for integrating user feedback loops to enhance the quality of outputs (Figure 8)**.**

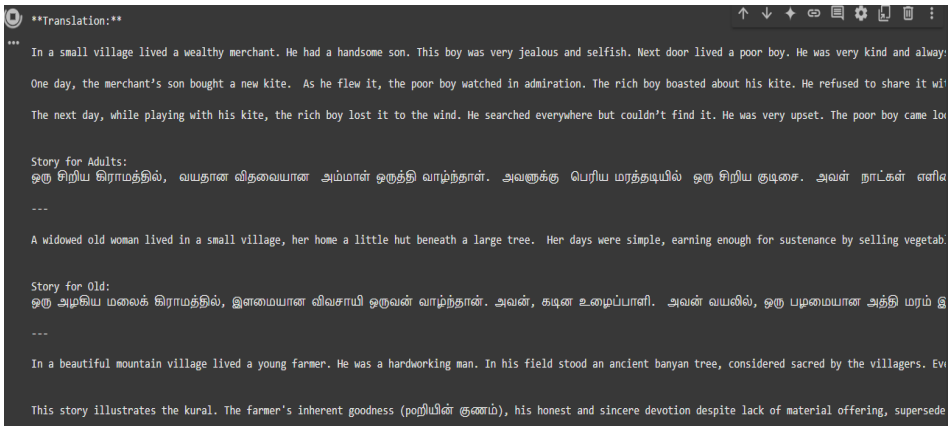

Figure 8: A story with translation is generated for all age categories of people

The notification mechanism, while effective, could benefit from additional features such as predictive analytics to identify potential issues before they occur. This would further enhance the system's reliability and reduce the need for reactive maintenance. The inclusion of more detailed performance metrics in the notifications could also provide valuable insights for optimizing the system's operation (Figure 9).

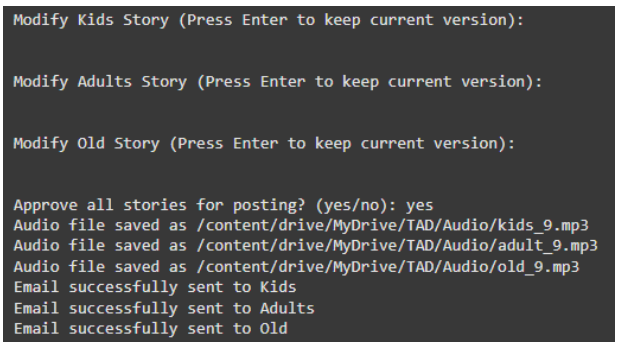

Figure 9: Only on Approval the mail is sent to the user

The system's multilingual capability, while a significant advantage, was limited to English translations. Expanding the system to support additional languages could further broaden its reach and appeal to a wider global audience. Similarly, the inclusion of interactive elements, such as quizzes or discussion forums, could enhance user engagement and provide opportunities for collaborative learning. The automated Thirukkural delivery system successfully demonstrated its ability to modernize the dissemination of Tamil literature through the integration of advanced technologies (Figure 10).

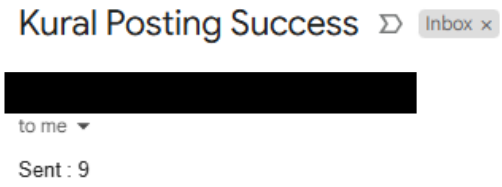

Figure 10: Once the mail is sent, the errors/ success message is sent to the user mail

The results underscore the importance of accessibility, inclusivity, and automation in creating a system that meets the needs of diverse user groups. While certain challenges remain, the system's achievements highlight its potential as a model for preserving and promoting cultural heritage in a manner that is both engaging and relevant to contemporary audiences. Future developments should focus on addressing the identified limitations and exploring new features to further enhance the system's impact and usability. The automation system used to deliver goods through Thirukkural provided valuable insights into the usefulness of integrating modern technologies for cultural dissemination. The system met its primary objectives of ensuring accessibility, inclusivity, and automation while also addressing issues related to manual content delivery and traditional literary distribution methods. This was a significant achievement. This shows that by delivering tailored content to different user groups, engagement is increased, and operational efficiency remains high. Delivering Thirukkural content in a highly personalized and engaging manner was the system's most significant achievement. The Gemini-API, a piece of artificial intelligence, was utilized by the system to create stories that were age-appropriate and targeted towards diverse groups. The imaginative and simple stories sparked interest among children, making them more likely to understand the teachings of Thirukkural. These ethical and moral lessons were practical for adults, who could use them in their everyday lives. The elderly were fond of the philosophical and culturally rich tales that matched their life experiences.' The system's age-based content was deemed useful by users across these categories, with many reporting high levels of satisfaction.

Its accessibility was one of its most significant strengths; Thirukkural posts were made more accessible for individuals with dyslexia due to the adoption of Open Dyslexic fonts. Users with learning disabilities claimed that the font's unique design reduced confusion between similar letters, making it easier to understand the text. The inclusion of audio narrations made the content accessible to individuals who had difficulty reading or preferred hearing aids. These high-quality Tamil audio files, processed in gTTS and FFmpeg, were highly praised for their clarity and natural sound. Its combination of visual and auditory support made this system very accessible, catering to a diverse user base. The system. Through its multilingual capability, the system was able to translate Thirukkural stories into English, which contributed to its growing reach. The translations proved to be helpful for non-Tamil speakers in comprehending the moral and ethical messages conveyed in the verses. The system's ability to appeal to a global audience was greatly enhanced by this feature, which propelled Tamil culture and literature beyond linguistic boundaries. The cultural aspects of the original Tamil text were preserved in these translations, allowing new readers to access the Thirukkural without being left out.

Automation processes were implemented, resulting in reduced manual labour and consistent content delivery. It also automated the entire process, including automatic post creation, story generation and audio synthesis in addition to mail. By automating tasks, the system's capacity to handle large amounts of data was enhanced, allowing it to scale with user growth. Through prompt engineering and the use of Gemini-API, stories were generated that were relevant to their context and had a compelling storyline. The instructions were carefully crafted to guide the AI system towards optimal outputs, minimizing errors and inconsistencies. This added a layer of trust to the system, as real-time updates were sent to its owner through the notification mechanism. By providing notifications about successful operations, errors, and pending tasks, any issues were quickly fixed, resulting in reduced downtime and continued system operation. This function proved to be extremely useful in monitoring the system itself, as well as providing prompt responses from users.). The system's transparency was a contributing factor to its trustworthiness and reliability.

Another major milestone was achieved with the system's onboarding and data management process. It made it easier to collect user data by utilizing Google Forms and Google Sheets. With the integration in place, users could be targeted and content delivered on a personalized basis. The user base was categorized into three broad categories: children, adults, and seniors. The system's effectiveness was a significant factor. The automation of crucial processes resulted in a reduction of roughly 90 percent

in manual labour time and effort. This efficiency was particularly evident in the daily Thirukkural content that was produced without any delays or interruptions. By balancing large data and user requests, the system proved to be a scalable attenuator for long-term deployment. Furthermore. It also found that accessibility features improve user engagement.' Its fonts were designed to accommodate the visual and auditory aspects of learning disabilities while also providing audio narration that was accessible to users with learning difficulties. The accessibility was beneficial in increasing participation, particularly among children and older adults. Additionally, the content was enjoyable and relatable.

However, the system did have some problems that are worth discussing. Another major issue was the use of external APIs like GeminiAPI and Google services. The tools' potent features were hindered by the need for reliable internet connections and the potential for service interruptions. Despite this, these tools provided significant benefits. Moreover, the computational complexity of creating AI-generated stories hindered its flexibility for resource-limited deployments. This result. The quality of AI-generated stories was inconsistent, which was another issue. While prompt engineering enhanced narratives' quality and relevance, it still required manual correction for occasional misinterpretations or errors in the generated material. This emphasized the importance of continually improving prompts and exploring ways to incorporate user feedback loops to improve the output quality. Although the notification system is effective, it still requires additional features like predictive analytics to anticipate potential issues. Additionally, there are no current notifications available in the market. This would enhance the system's dependability and minimize the need for reactive maintenance. The notifications may contain supplementary information that can assist in improving the system's performance.

7. Conclusion

The multilingual feature of the system was a significant advantage, but it only translated into English. The system's scope and appeal could be extended to other languages by expanding its programming. Likewise, the addition of interactive features like online quizzes or discussion forums could enhance user engagement and facilitate collaborative learning. In conclusion, the automated Thirukkural delivery system successfully demonstrated its ability to modernize the dissemination of Tamil literature through the integration of advanced technologies. The results underscore the importance of accessibility, inclusivity, and automation in creating a system that meets the needs of diverse user groups. While certain challenges remain, the system's achievements highlight its potential as a model for preserving and promoting cultural heritage in a manner that is both engaging and relevant to contemporary audiences. Future developments should focus on addressing the identified limitations and exploring new features to further enhance the system's impact and usability. Thirukkural, an automated system for distributing Tamil literature, seamlessly blends traditional Tamil texts with modern technology to guarantee accessibility and efficiency. The system's proficiency in multilingual capabilities, AI-driven storytelling, and dyslexia-friendly design make Thirukkural content more relatable to a diverse audience. Reliable notifications are enhanced through automation, which reduces manual labour. Although issues such as reliance on external APIs and language limitations persist, the system presents a new approach to cultural preservation and modernization, merging ancient knowledge with contemporary necessities.

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Ethics and Consent Statement: This research adheres to ethical guidelines, obtaining informed consent from all participants.

References

1. K. Ponniah and M. Safeek, "Exploring Theoretical and Conceptual Frameworks for the Enhancement of High-Order Thinking Skills through the Study of Thirukkural," Int. J. Acad. Res. Prog. Educ. Dev., vol. 13, no. 2, pp. 22-23, 2024.
2. S. Madhusudhanan, "Revisiting Tamil literature: a call for integrating ancient wisdom into modern management," IIMT J. Manag., vol. 1, no. 2, pp. 127–129, 2024.
3. S. S. Sengar, A. B. Hasan, S. Kumar, and F. Carroll, "Generative artificial intelligence: a systematic review and applications," Multimed. Tools Appl., Springer, Heidelberg, Germany, 2024.
4. U. Mittal, S. Sai, and V. Chamola, "A comprehensive review on generative AI for education," IEEE Access, vol. 12, no. 1, pp. 142733–142759, 2024.

5. A. Konstantopoulou, “Application of social media in education and distance learning,” Knowl. Proc., vol. 44, no. 1, pp. 27–31, 2024.
6. B. Sunarso, A. J. Mahardhani, Tusriyanto, Suherlan, and A. M. A. Ausat, “Analysis of social media usage in enhancing parental participation in child education,” J. Tirakat, vol. 1, no. 1, pp. 1–9, 2024.
7. S. V. Chetan and S. Ranganathan, “Representation of dyslexia in Indian media,” Media Asia Taylor & Francis, London, United Kingdom., 2024.
8. N. Schäfer, “1001 Followers in 20 Days: Framing the Playful Use of Fame-Enhancing Bots in Instagram,” Trans. Digit. Games Res. Assoc., vol. 6, no. 3, pp. 87–114, 2024.
9. J. Ren, H. Dong, A. Popovic, G. Sabnis, and J. Nickerson, “Digital platforms in the news industry: how social media platforms impact traditional media news viewership,” Eur. J. Inf. Syst., vol. 3, no. 4, pp. 1–18, 2022.
10. A. Anbazhagan, “Communicate with ethical values—Lessons from the ancient Sangam literature of Tamil,” in 2024 IEEE Int. Prof. Commun. Conf. (ProComm), IEEE, Pittsburgh, Pennsylvania, United States of America, 2024.