

GENERATIVE AI AGENTS FOR MULTILINGUAL ACCESS TO GOVERNMENT AND COMMUNITY SERVICES

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Abstract— Intelligent and adaptive communication technologies are needed to ensure equal access to government and community services by the increasing number of people who require to speak more than one language. The architecture demonstrated in the work is generative AI-based and is supposed to ensure a seamless process regarding both text and speech interaction. The algorithm corrects and sanitizes what users spell out, identifies what language the user is typing and within a few seconds, the text based speech query is translated into text. It extracts relevant information based on orderly data sets and indexed government portal and applies the information to generate relevant responses based on the fit of the situation. To build an LLM-fine-tuned and multilingual structural payload, a context builder employs information that is available to it, including user purpose, facts received, and profile information. Therefore, the generative agent produces brief, sequential instructions which are supported by source references which can be located. Text-to-speech synthesis allows providing the information in any language and postprocessing ensures that the answers are safe, facts are consistent, and linguistic and ethical standards are observed. They make the system more inclusive and trustworthy by having optional analytics modules that monitor the performance of the system, pattern of queries, and language distribution. This design is multilingual and creatively intelligent to ensure that all people have equal access to the tools they require, the tools are made more open and the language barriers are eliminated.

Keywords— Generative AI, Multilingual Access, Speech Recognition, Information Retrieval, Language Identification, Large Language Model, Text-to-Speech, Government Services.

I. INTRODUCTION

The public service acquisition has become easier and quicker due to the digital governance and community service platforms. The government wastes a lot of time on welfare and administrative portals, platforms, and information services. It is hard to provide everyone, irrespective of their language and income, with these services despite these advances. The language problem is enormous since most of the government websites and other media online are limited

to a few languages. Local or minor speakers of languages find it difficult to know how to apply to government assistance and news of government services [1]. The fact that sound interaction technologies are underdeveloped implies that most digital systems do not enable illiterate or blind individuals to receive the services of the government [2].

Generative AI can allow human beings and machines to relate to each other in a natural and intelligent manner, addressing many challenges of accessibility. The text-to-speech systems, natural language processing, and automatic speech recognition enable AI-generated platforms to interpret what a person speaks or writes, identify his/her language/dialect, locate any information, and give a meaningful response depending on the situation [3][4]. Such properties encourage transparency and availability of public services because internet platforms are more convenient to operate. The AI technologies empower consumers because they can easily access reliable information and simplify communication [5].

The minority/low-resource language speakers can also receive relevant information with the assistance of generative AI models. This can be done by feedback mechanisms, prejudice reduction and language standardization, that can ensure communication is more reliable, friendly, fair, and trustworthy [6][7][8][9]. Multilingual text and speech communication solutions based on AI are gradually being introduced at the public services platforms. These applications will enable users to ask questions, receive step-by-step instructions and fact verification on-the-fly [10].

This experiment will develop a multilingual communication protocol based on generative AI and is able to analyze inputs provided by users intelligently and automatically identify languages, search relevant information and respond in a specific and contextualized way. The proposed system embraces multiple languages and communicative systems to provide equal and equitable opportunities to people with diverse language and literacy backgrounds to access government and community services.

The key contributions of this work are as follows:

This work presents a novel generative AI-based architecture that integrates language detection, natural language understanding, and speech processing to enable seamless multilingual interaction with government and community service platforms.

A context-driven mechanism is developed to analyze user intent, sanitize inputs, and retrieve relevant information from structured government datasets, generating accurate, situation-specific, and step-by-step responses.

The proposed system supports both text and speech interfaces with multilingual capabilities, ensuring accessibility for diverse users, including low-literacy and minority language populations, while maintaining ethical and reliable output generation.

II. LITERATURE SURVEY

In the recent past, with the developments in the field of generative AI, it has been possible to develop intelligent multilingual communication systems to deliver services to the people and involve them in their community. Generational AI applies predictive analytics, system dynamics, and big language models to assist in complex policy analysis and administrative decision-making. These systems use natural language processing and predictive modeling that examine a vast amount of text input, examine the effects of policies, and provide valuable information. Thus, public managers are able to comprehend the influence of policies more appropriately and make a decision regarding the social, political, and governance concerns with the help of data [11].

It is also highly significant that research be conducted on the inclusiveness of multilingual AI systems. This would be critical in assisting mentally ill persons as well as discussing with other members of the society. Studies indicate that multilingual AI chatbots, which are also spoken by the users, render them more helpful, entertaining, and joyful. Multilingual mothers across cultures might be able to communicate more effectively with the assistance of language-sensitive AI. These approaches emphasize the necessity to develop AI systems that consider language diversity and cultural backgrounds. This makes them simpler to use and are more likely to be adopted by various groups [12]. The way conversational AI could be used to enhance service delivery is demonstrated by government services such as housing assistance platforms. Chatbots have the ability to respond faster, open administration, and also make services fair and effective [13].

Multi-agent and single-agent AI systems have facilitated the processes of machines translating and people communicating in more than one language. In multi-agent systems, there are specialized agents which collaborate to translate, determine the context, and discover bias. This is a more effective way of translating and understanding the context than single-agent models. Thus, such algorithms produce more trustworthy, culturally appropriate, and inter-linguistic solutions [14]. Generative AI simplifies the procedures of people in reading complex government

regulations and texts. The AI technologies ensure that individuals can easily retrieve important information independently because administrative documents become simpler to comprehend without altering their meaning [15].

Generative AI technologies are beneficial to refugees and migrants. Artificially intelligent platforms have the potential to provide individuals with educational resources, communication devices, and valuable tips in most languages to help them to get accustomed to new cultures and societies. These technologies allow the external people to take advantage of digital systems and receive valuable services [16]. The participation in democracy has been improved with the help of AI-driven platforms engaging more people in the participatory budgeting process and in the decision-making process of local governments. The platforms allow more open policy discussions and community building and allow more people to participate [17].

Understanding other cultures is increasingly becoming crucial to developing generative AI systems that are just and open to all. To illustrate, AI applications in the African American tourist business can be used to educate the users on their cultural heritage and provide tips which are helpful both to the business and the community [18]. Autonomous agentic systems in intelligent environments use resources optimally, provide flexible services and motivate community participation using generative AI [19]. The AI should be able to generate responses to these complex situations, and in the process of doing so, it has assisted policymakers to develop more attentive and inclusive forms of governance by predicting policy outcomes and assisting them in formulating superior policies to address the issues of immigration [20].

III. EXISTING SYSTEM

The existing digital public services are largely based on web portals and mobile applications providing the information in form of preset text-based interfaces. The consumers need to search most of the time to obtain the services they require and navigate through a number of pages to get the information they require. The existing solutions are mostly able to support a handful of major languages and most of them generate their results through written text. This renders them difficult to operate by individuals with poor reading abilities or those people who like to speak. Further, conventional systems do not understand the context or produce smart response, and that is why it is difficult to use them to assist individuals in navigating the process of government and community services.

Issues in Existing System

- Not many languages are supported and so, it is difficult to be used by people speaking regional languages or with low resources.
- No voice-based interface which is difficult to use by those with low literacy levels.
- No AI assistance that considers the situation and provides personalized and accurate service advice.

IV. PROPOSED SYSTEM

The suggested system will also involve a multilingual communication system that involves the use of generative AI to simplify access to government and community services by individuals by text and voice messages. A clever algorithm is to interpret anything that the user says with the help of speech recognition, language identification, information retrieval and response synthesis and keep the context in mind. Text inputs are handled and utilized and voice inputs typed in by an automatic speech recognition program. In order to ensure that multilingual interactions are identical, the language used is similar and identical. The generative AI model obtains the appropriate data to the portals of governments where the datasets are structured and indexed. Then it puts this information to give you the correct step-by-step instructions. Postprocessing has the responsibility of ensuring that the answers are correct in fact, correct on the use of words and even sensitive to foreign cultures before they are disseminated either in text or synthetic voice. It also possesses a regional language support system with limited resources that operate by adapting to each learner and comprehending numerous languages. This brings it closer and easier to the user of various origins [21]. The model addresses the literacy and accessibility gaps hence enabling all people to access digital public services [22]. Generative AI is also applied to provide the system with a context of communication, and this makes the system more open and trustworthy. This is also useful in the case of linguistic and social-technical issues that arise when individuals of other languages meet online [23].

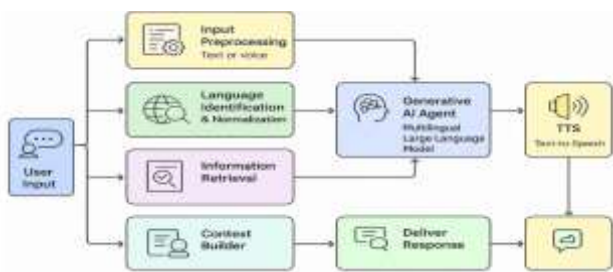


Fig. 1. System Architecture

Figure 1 demonstrates the process of a Generative AI system as the input from users is processed. The User input undergoes the following steps simultaneously, namely, the Input Preprocessing (text or voice), Language Identification and Normalization, Information Retrieval, and Context Builder. The Generative AI Agent that is able to assemble the processed information to generate a solution is the Multilingual Large Language Model. This response is then delivered to a TTS module and the third step which finalizes the output is the Deliver Response step.

A) User Input Acquisition and Interface Design

The system begins with users initiating questions by a web based chat interface which allows users to type or talk. The users are capable of posting questions on a normal input form or leaving brief voice records in order to hold conversations. This is a dual input architecture that ensures

that anyone with varying degrees of literacy and style of communication can utilize it. The interface is capable of managing conversations with over one language and distinguishing various dialects, language structures and scripts. The audio segmentation ensures that speech queries which are lengthy can be analyzed in a short time without errors or latency. The platform has an increase in the features that make it easier to use by people who are blind or like to talk. It also tracks the session information of the users such that the answers which are made are dependent on the situation. The technique eliminates the need of the middle people when individuals desire to utilize government or community facilities by allowing them to talk or write naturally. Input validation prevents frivolous or incorrect queries as well, and metadata such as language, question type, and time is logged to assist in speech recognition, language recognition and ensuring that the correct answer is provided.

B) Preprocessing and Language Identification:

The input is prepared before the processing in AI by the process of preprocessing following data collection. The system removes the additional space, ensures that letters with the unicode are all identical and ensures that the punctuation and the number formatting are identical across all the multilingual queries. ASR method converts voice inputs, in audio formats, into transcripts of voice samples. The system embraces an audio chunking technique to divide large files into small units to ensure that they do not slow down. It becomes easier to control massive recordings. Once the process of transcription has been carried out, a language identification module automatically determines the language or dialect that was employed in the question. This module is able to perceive the various language patterns when it recognizes regional dialects, various scripts, and text that is written in transliterated form. Normalization techniques render culturally-distinct entities, such as dates, figures and ordinary words more ordinary. In the case of downstream processing, preprocessing and language identification collaborate with each other to create a uniform input to the user. This step minimises errors which may occur by differences in formatting, speech recognition or odd language use. This ensures that the generative AI system receives quality input and provides reliable and context-specific responses to services in the government and communities.

C) Information Retrieval and Contextualization:

The system retrieves the information in structured databases, indexed government web pages, and verified sources, which are pertinent to the task under consideration after preprocessing. Similarity matching and ranking methods are employed in retrieval module to locate the most significant information such as procedures, eligibility requirements, deadlines, and service rules. In order to make matters clear and easy to track along, there is a source reference attached to every item that has been retrieved. A structured context payload is then assembled by the system

as a combination of the information it received back and the interpreted intent of the user and any user profile data that is available. The context builder allows the generative AI agent to provide answers, which are correct, user-specific, and contextual. The technique allows the system to respond to general and more special queries, even when the data is about a regional or low-resource language. The system is able to provide step-by-step directions on how to access government and community services in case the data it receives is arranged in the correct fashion. Placing validated information on the first page also reduces the possibility of disseminating fake information, user trust and the ability of individuals to abide by the official processes is enhanced, and services become more accessible.

D) Generative AI Response Generation:

The system is most significant in the generative AI agent. It means that it takes a highly-tuned multilingual large-language model to generate answers which sound natural and are accurate in context. It receives the structured context payload and the question that the user asks, determines what the user is interested in and provides clear and useful answers. Under established guidelines, response generation ensures that products are understandable, precise, and they are delivered in a manner that can be comprehended easily. The sources have supplementary references to enable users verify the content independently. The system is more accessible as the AI agent can understand and react in a variety of languages and dialects. A post processing phase reviews the output one more time to ensure it is sensible and conforms to a standard language style and eliminates hallucinations or unapposite material. Incorporating retrieval based contextual knowledge with generative functions, the system provides credible and multi-lingual responses and eases the process of users communicating in other languages and modes.

E) Text-to-Speech Conversion and Response Delivery:

There is a TTS that converts text responses to audio that is realistic. This eases the burden of people who would like to or have to communicate with the system. Cloud-based TTS provides you with a voice output that is of high quality whereas local TTS ensures that processing occurs fast thus you can get answers within a short time. There are a number of languages and regional accents and phonetic variations that this module works with and thus users can access information in their preferred language or dialect. Final results are sent out by the user interface in either text or speech form depending on the input option that is selected. Long instructions have been divided into numbered steps so that they become easy to read and follow. The system must also be able to log such issues as search queries, the number of languages recognized, answers and comments that the user made. Such logs allow us to examine the level of the system functioning and improve it continuously. The combination of TTS and structured response delivery ensures the system maintains government and community

services to individuals who find it difficult to read, see, or think.

V. IMPLEMENTATION



Fig.2 Home Page

Fig. 2 demonstrates the Government AI Assistant interface, which provides the section on the popular papers and social assistance programs and the means of entering either text or speech.



Fig.3 Ask Question AI Assistant

Figure 3 has a Government AI Assistant welcoming the user and providing a list of the services that the Government AI can assist them with.



Fig.4 Ask Question – PAN Card Benefits

In Fig. 4, the AI Assistant responds to one of the questions of the user providing a list of the advantages of possessing a PAN Card.



Fig.5 Reply to the Given Question

Fig. 5 indicates the eight steps that you should follow to apply a PAN Card. The processes comprise handing over of documents, completing the online application, paying the fee, and receiving the card.



Fig.6 Language Change

The language can be selected in the dropdown menu on the interface of the Government AI Assistant, presented in Fig. 6. It has both English and some Indian languages.



Fig.7 Question Ask in Telugu Language

On selecting a language, the AI Assistant UI in Fig. 7 displays the list of recommended questions in Telugu.



Fig.8 Reply for the Given Question

The AI Assistant (Figure 8) responds to a query about the PAN Card penalty in the Telugu language and provides you with some useful questions to be asked.

VI. CONCLUSION

The generative AI-created multilingual access system is useful in having people communicate with the government or community service sites without any issues, whether in text or voice. The automatic language identification, normalization, and adaptive speech-to-text processing can be used simultaneously to enable the system to process quite

a diverse set of language inputs. The retrieval process ensures that the appropriate information is that of the proven government sources. A reasonable method of amalgamating what the user desires and actual facts during a query-based environment is the context builder. The large language model which is multilingual generates short, context specific and reliable answers indicating clearly the source of the answers. Postprocessing also ensures that the language is always consistent, the facts are right and the rules governing ethics are adhered to. This instills confidence to the user and makes the answers more accurate. The app is also more accessible since the text-to-speech option helps people with limited literacy and eyesight leaving them with fewer challenges. There are numerous areas where the system can be enhanced as time moves on because it is able to monitor how the users interact with the system and performance is reflected. Generally, it is demonstrated that the development of generative AI may allow benefiting individuals speaking other languages, simplifying access to essential government services, and offering easy-to-use, accurate, ethical, and reliable multilingual online support that promotes openness, accessibility, and empowerment of citizens receiving government services.

Future development is focused on having the system more scalable, adaptive, and inclusive by enhancing the capability of the system to understand more than a single language and connect to more individuals. Dialect-customized real-time translation will help to make the translation process more precise regarding the languages and areas that are not well represented. The introduction of unique user profiles which are emotional in nature will render the responses more relevant and understanding of the circumstance. It is possible to process visual searches, read forms, by adding multimodal functions, such as the ability to interpret pictures or documents. It will also mean an increase in the work done to incorporate safe login procedure, offline access in areas with low internet, and potent analytics to keep an eye on the way people are using the services. In order to maintain the multilingual digital assistance useful and transparent, the language models should be continuously updated and fixed to correspond to the changes in government data.

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