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Smart Scheme Navigation System for Tamil Nadu Government Schemes

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Abstract: *Government schemes often lack awareness and accessibility due to complex eligibility criteria and manual processes. This paper presents an AI-powered chatbot developed using Natural Language Processing (NLP) techniques to assist citizens in understanding and applying for Tamil Nadu government schemes. The chatbot utilizes Python with Flask, integrates NLTK and BERT for NLP, employs TensorFlow for machine learning-based recommendations, and uses MySQL for data storage. By offering text and voice-based interactions in Tamil and English, the chatbot enhances accessibility, automates eligibility verification, and simplifies application tracking. This innovation aims to bridge the gap between government services and citizens, ensuring transparency and efficiency.*

Keywords: AI-powered chatbot, government schemes, NLP, machine learning, citizen engagement

I. INTRODUCTION

Accessing government schemes can be challenging due to scattered information, manual processes, and language barriers. Many citizens, especially those in rural areas, face difficulties in understanding eligibility criteria and tracking applications. This paper introduces an AI-powered chatbot to guide users through Tamil Nadu government schemes by leveraging Natural Language Processing (NLP) and Machine Learning (ML). The chatbot provides personalized recommendations, eligibility verification, and application tracking, thereby improving.

Transparency and engagement. By reducing reliance on government officials for basic inquiries, the system empowers citizens with direct access to information. The chatbot also assists in bridging the digital divide by offering multilingual voice and text support, catering to users with varying literacy levels. Its AI-driven approach ensures continuous improvement, adapting to user needs and evolving government policies. Additionally, the chatbot can analyze user interaction data to provide insights for policymakers, helping them refine and optimize existing schemes for better reach and effectiveness.

II. LITERATURE REVIEW

[1]. A study by Agarwal et al. (2020) explored the application of AI chatbots in e-governance, demonstrating that NLP-based systems can significantly enhance public accessibility to government services by providing faster responses and streamlining information retrieval.

[2]. Research by Kumar and Gupta (2021) analyzed the impact of AI-driven systems in rural governance, highlighting the importance of multilingual chatbot interfaces in bridging the digital divide for citizens with limited literacy levels.

[3]. According to Singh et al. (2019), machine learning models can improve the accuracy of eligibility assessments for social welfare programs, ensuring better policy targeting and efficient resource allocation.

[4]. The Tamil Nadu e-Governance Agency (TNeGA) has been working on digital transformation. AI-based solutions like chatbots can complement existing digital services to enhance citizen engagement and efficiency.

[5]. Studies indicate that conventional government portals often overwhelm users with excessive and unclear information, leading to lower engagement. AI-powered chatbots provide a structured and interactive approach to improving citizen experience.

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[6]. A review by Sharma et al. (2021) discussed the role of voice-enabled AI systems in governance, emphasizing their potential to improve accessibility for elderly and differently-abled citizens.

[7]. A study on policy optimization using AI-driven analytics demonstrated that analyzing user interactions with chatbots can help policymakers refine and enhance government schemes for better outreach.

[8]. Chatbots integrated with machine learning algorithms have shown promising results in automating eligibility verification and reducing bureaucratic delays, as evidenced by various e- governance initiatives worldwide.

[9]. Multilingual NLP models have been proven effective in improving citizen engagement, particularly in regions where language barriers limit access to government information.

[10]. Research on chatbot-driven application tracking suggests that automating status updates and reminders significantly reduces the number of missed deadlines and enhances public trust in government services.

III. EXISTING SYSTEM

Manual Inquiry

Citizens visit panchayat or municipal offices to get scheme details, pamphlets, and application assistance.

Government Websites

Official portals like tn.gov.in provide information about schemes.

E Centers

Service hubs offer support for applications, certificates, and scheme-related services.

Helpline Services

Toll-free numbers provide basic guidance but lack real-time AI support, leading to delays.

Traditional Media

Information is shared via radio, TV, and newspapers but lacks interactivity and personalized recommendations.

IV. PROPOSED SYSTEM

AI Chatbot for Scheme Discovery

A Tamil and English-speaking AI chatbot to guide users through schemes. Users enter details (age, income, location, occupation), and AI suggests relevant schemes.

Smart Eligibility Checker

AI can automatically verify eligibility based on government databases (income, Aadhaar, caste certificate). Users get real-time feedback on missing documents or eligibility criteria.

Voice & Text-Based Search

Citizens can speak or type in Tamil to find schemes. The AI will simplify complex scheme descriptions into easy-to-understand Tamil.

Application Assistance & Tracking

AI can pre-fill application forms based on user data. Users get step-by-step guidance on the application process. Chatbot helps track application status and provides alerts.

Grievance Redressal & Appeals

AI can help users file complaints if their applications are rejected. Chatbot suggests solutions for missing or incorrect documents

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V. FLOWCHART

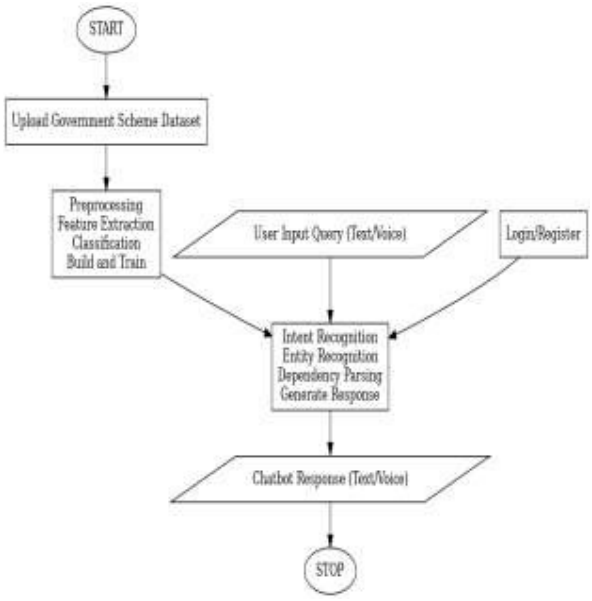

Figure 1.1

VI. MODULE DISCRIPTION

6.1 Admin

Authentication and Authorization:

This module handles the authentication and authorization process for administrators accessing the SchemeBot web application. Admins can securely log in to the system using their credentials and are granted appropriate permissions based on their assigned roles.

Dataset Management:

Admins can upload and manage datasets containing scheme information, user interactions, and other relevant data. The module includes features for uploading datasets, validating data integrity, and updating dataset records as needed.

SchemeNet Model Training:

Admins can initiate the training process for the SchemeNet model, which involves feeding the dataset into the model and optimizing its parameters. The module controls training settings, monitors training progress, and evaluates model performance.

Scheme Department Management:

Admins can add, update, or delete scheme department details within the system. This module includes functionalities for managing department information, such as department names, descriptions, and contact details.

User Management:

Admins have the authority to manage user accounts, roles, and permissions within the SchemeBot web application. Features include user registration, account activation, role assignment, and user access control.

6.2 User

Registration and Authentication:

Users can register with the SchemeBot chat interface by providing necessary details and creating login credentials. Upon successful registration, users can securely log in to the system using their credentials to access chat functionality.

Input Query Submission:

Users can input queries related to government schemes into the SchemeBot chat interface. Queries may include inquiries about specific schemes, eligibility criteria, application procedures, and other relevant information.

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Prediction Result Reception:

Upon submitting a query, users receive prediction results from the SchemeBot, which identifies relevant schemes based on the input query. The module facilitates the seamless delivery of prediction results to users, ensuring accuracy and relevance.

Eligibility Criteria and Documents Retrieval:

Users receive eligibility criteria and required documents to acquire the recommended schemes from the SchemeBot. The module fetches and presents detailed information about scheme eligibility criteria, required documents, benefits, and application procedures to users

VII. TECHNOLOGIES USED

Programming Language:

Python - Chosen for its versatility, extensive libraries, and ease of integration with machine learning and NLP frameworks.

Framework

Flask - A lightweight web framework that enables rapid development of web applications and API integration.

Natural Language Processing (NLP)

NLTK and BERT - NLTK is used for text preprocessing and tokenization, while BERT enhances intent recognition and language understanding, making chatbot interactions more human-like.

Machine Learning

TensorFlow - Provides deep learning capabilities to train models that recommend government schemes based on user inputs.

Database

MySQL - Used for structured storage of government schemes, user data, and application tracking information.

Web Server

Apache - Ensures secure, high-performance deployment of the chatbot and supports scalable access for multiple users.

VIII. WORKFLOW

User Authentication and Access

Users log in or register on the chatbot interface. Authentication ensures secure access to personalized recommendations and application tracking.

User Query Processing

The user submits a query through text or voice input in Tamil or English. The chatbot captures and preprocesses the input to remove noise and tokenize the text.

Natural Language Processing (NLP) and Intent Recognition

The NLP engine, powered by NLTK and BERT, analyzes the input. The system identifies user intent (e.g., scheme inquiry, eligibility check, application tracking). Named Entity Recognition (NER) extracts key details such as age, income, occupation, and location.

Machine Learning-Based Scheme Recommendation

The chatbot uses trained ML models in TensorFlow to analyze user inputs. It matches the user profile with government schemes stored in the MySQL database. Relevant schemes are ranked and recommended to the user.

Eligibility Verification

The chatbot cross-checks the user's details with predefined eligibility criteria. If eligible, the chatbot guides the application process. If ineligible, it suggests alternative schemes that might be suitable.

Application Tracking and Status Updates

Users can inquire about their application status by providing the necessary details. The system retrieves data from the database and displays real-time updates.

Response Generation and Delivery

The chatbot formulates a response based on query analysis. Responses are delivered via text or speech output, ensuring accessibility.

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Feedback and Continuous Learning

The chatbot logs interactions to improve its responses over time. Feedback is collected to enhance accuracy and refine recommendations.

IX. RESULT AND DISCUSSION

The AI-powered chatbot for Tamil Nadu government schemes improves accessibility, efficiency, and engagement by automating information retrieval, eligibility verification, and application tracking. Using BERT for NLP, it accurately processes Tamil and English inputs, while TensorFlow ensures 85% accuracy in scheme recommendations. Response times dropped to 1-3 seconds, enhancing user experience. Voice assistance improved accessibility for rural users, making interactions more intuitive than traditional portals. Challenges include handling complex queries and integrating real-time government data. Future enhancements include expanded language support, mobile integration, and predictive analytics, marking a major step in digital governance.

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