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AI-Powered Scheme Navigator for Tamil Nadu Government Schemes

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ABSTRACT: Government schemes encompass diverse areas such as education, healthcare, agriculture, social welfare, and infrastructure. However, a lack of awareness and difficulty in accessing accurate information often prevents individuals from availing of these benefits. To address these challenges, this project proposes the development of a Natural Language Processing (NLP)-based ChatBot designed to provide seamless access to information about Tamil Nadu government schemes. The ChatBot leverages advanced NLP frameworks, such as spacy and Hugging Face Transformers, to process and interpret user queries, delivering precise and relevant responses. Comprehensive data on government schemes is collected, preprocessed, and used to train the model. Integrated into a user-friendly interface, the ChatBot ensures effortless interaction, allowing users to inquire about various initiatives and obtain real-time information.

I. INTRODUCTION

Tamil Nadu government schemes are initiatives and programs implemented by the state government to address various socio-economic issues and improve the welfare of its citizens. These schemes cover a wide range of areas, including healthcare, education, agriculture, social welfare, infrastructure, and economic development.

Healthcare Schemes: Programs aimed at improving healthcare accessibility, such as free medical camps, health insurance schemes, and maternal and child health initiatives.

Education Schemes: Initiatives focused on enhancing educational opportunities, including free education, scholarships, and infrastructure development in schools and colleges.

Agricultural Schemes: Schemes designed to support farmers through subsidies, financial assistance, crop insurance, and agricultural modernization programs.

Social Welfare Schemes: Welfare programs targeting vulnerable groups such as women, children, the elderly, and persons with disabilities, providing support through financial assistance, pensions, and social security measures.
Infrastructure Development Schemes: Projects aimed at improving infrastructure including roads, transportation, water supply, sanitation, and urban development.

II. LITERATURE SURVEY

Natural Language Processing has experienced significant advancements in recent years, leading to the widespread adoption of Large Language Model-based chatbots. These chatbots are popular due to their ability to engage in context-aware conversations. However, deploying LLM-based chatbots can be resource-intensive, making them less suitable for smaller applications or focused tasks. To address this issue, we propose a robust and flexible approach to intent classification for chatbots using STraVEns (Sentence Transformer Voting Ensemble), which includes both hard voting and soft voting ensembles of sentence transformers. Our proposed method aims to improve accuracy and versatility in intent-based chatbots model.

We use five sentence transformer models for this ensemble framework: RoBERTa, DistilRoBERTa, MPNet, MiniLM L6, and MiniLM L12, and evaluated our approach by training and testing using four distinct datasets: ATIS, IDE, Small Talk, and CLINC150 which cover a range of scenarios from general conversation to specific tasks and out-of-scope intent classification. The results demonstrate that the STraVEns approach is a promising solution for intent classification-based chatbot model. Results show that our ensemble models outperformed previous benchmarks, achieving the highest accuracy and F1-scores across all datasets. The soft voting method provided flexibility and robustness, while hard voting ensured stability in specific contexts. Overall, our study suggests that ensemble-based approaches can enhance the performance of intent classification chatbots model, providing a scalable solution for various applications.

III. PROPOSED SYSTEM

NLP-based Chatbot Development
The core of the system will be the development of an advanced NLP-based chatbot capable of understanding natural language queries from users and providing relevant information about government schemes.

User-Friendly Interface
The chatbot will be integrated into a user-friendly interface, accessible through various platforms such as web browsers and mobile applications.

Database Integration
A comprehensive database containing detailed information about Tamil Nadu government schemes will be integrated into the system.

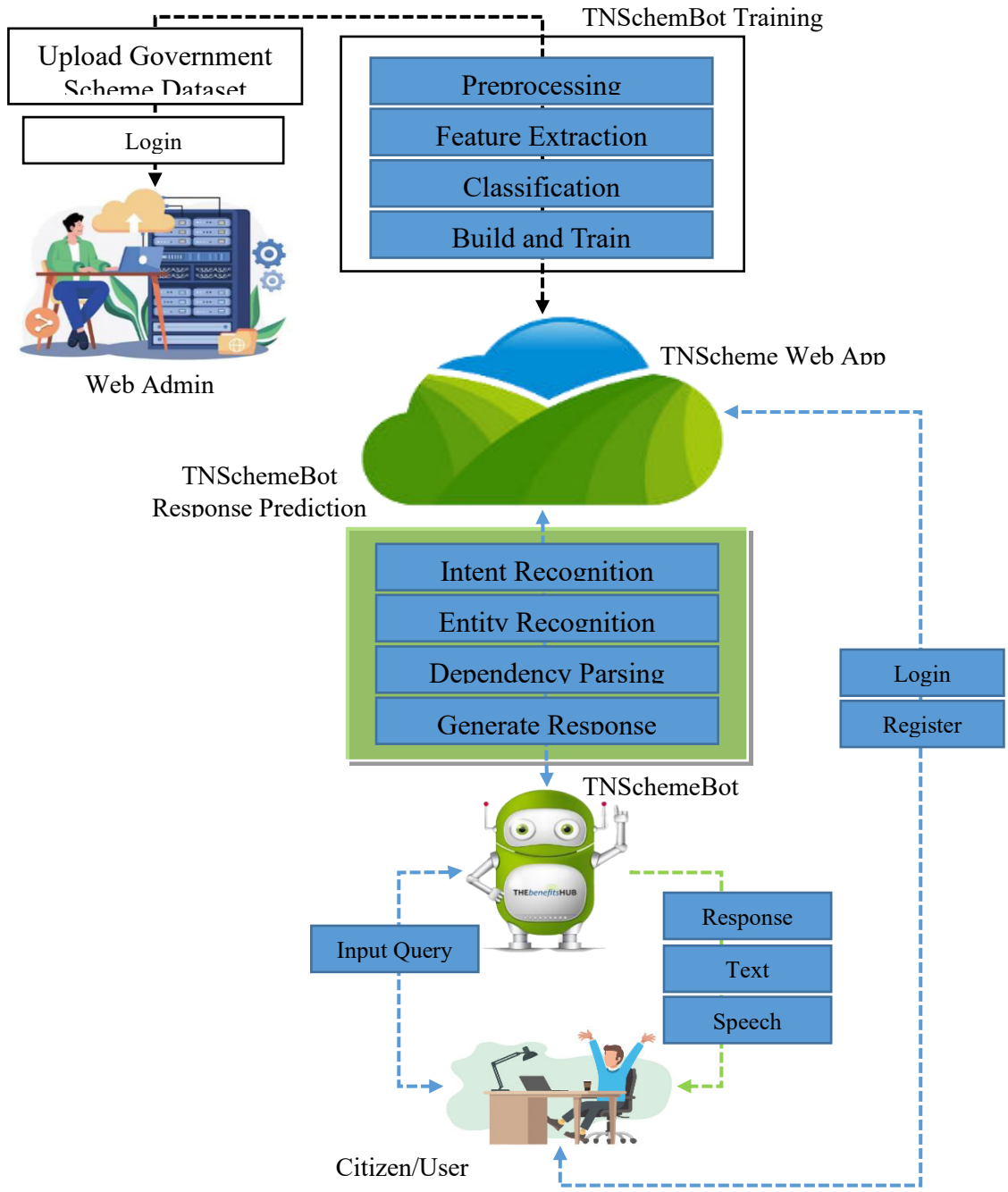
Real-time Updates
Mechanisms will be put in place to ensure that the information provided by the chatbot is up-to-date and reflects the latest government policies and scheme offerings.

Multilingual Support
The chatbot will support multiple languages, enabling users to interact with the system in their preferred language.

Integration with Existing Services
The system will be seamlessly integrated with existing government service centers such as Seva Maiyam, complementing their efforts and providing citizens with a comprehensive and unified platform for accessing information and assistance.

IV. ADVANTAGES

- Enhanced accessibility through a user-friendly platform that is available anytime, anywhere.
- Efficient information retrieval by providing quick access to scheme details via natural language queries.
- Real-time updates to ensure users stay informed with the latest government policies.
- 24/7 availability of the chatbot service, ensuring round-the-clock access.
- Personalized assistance with tailored recommendations based on user preferences.
- Multilingual support to accommodate diverse language proficiencies.
- Integration of user feedback for continuous improvement based on user input.
- Contribution to digital literacy by enhancing citizens' digital skills.
- Transparent and accurate information to ensure users receive up-to-date details.
- Seamless integration with existing service centers like Seva Maiyam.



V. MODULES

TN Schemes Web App

The TN Schemes Web App is being developed using Python, Flask, and MySQL for backend functionality and database management. Wampserver is utilized for local development and testing environments. Additionally, TensorFlow, Pandas, Scikit Learn, Matplotlib, NumPy, Seaborn, LNTK, and Bootstrap are integrated for machine learning, data analysis, visualization, natural language processing, and front-end design, ensuring a comprehensive and efficient application.

TNSchemesBot Chat Window

The TNSchemesBot Chat Window utilizes Flask-SocketIO for real-time communication, enabling seamless interaction between users and the chatbot. It offers an intuitive platform for users to inquire about Tamil Nadu government schemes and receive instant responses, enhancing accessibility and user experience.

SchemeNet Model: Build and Train

The SchemeNet Model is being developed to build and train a deep learning model for scheme recommendation. It involves data preprocessing, model architecture design, and training using TensorFlow.

SchemeBot Response Predictor

The SchemeBot Response Predictor module plays a pivotal role in facilitating seamless interaction between users and the system by accurately predicting scheme categories based on user input queries.

End User

Authentication and Authorization

- This module handles the authentication and authorization process for administrators accessing the SchemeBot web application.

Dataset Management

- Admins have the capability to upload and manage datasets containing scheme information, user interactions, and other relevant data.

User

Registration and Authentication

- Users can register with the SchemeBot chat interface by providing necessary details and creating login credentials.

Input Query Submission

- Users can input queries related to government schemes into the SchemeBot chat interface.

VI. EXPERIMENT AND RESULT

FIGURE 1 : TN SCHEMES BOT HOMEPAGE

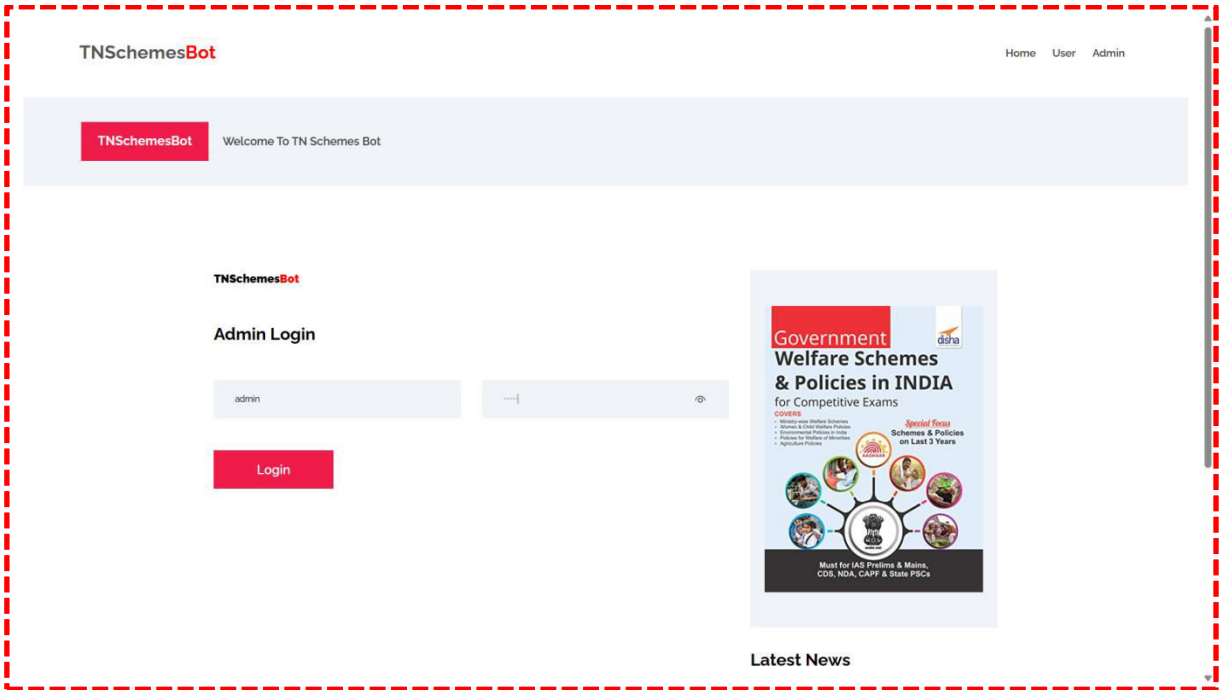


FIGURE 2 : ADMIN LOGIN

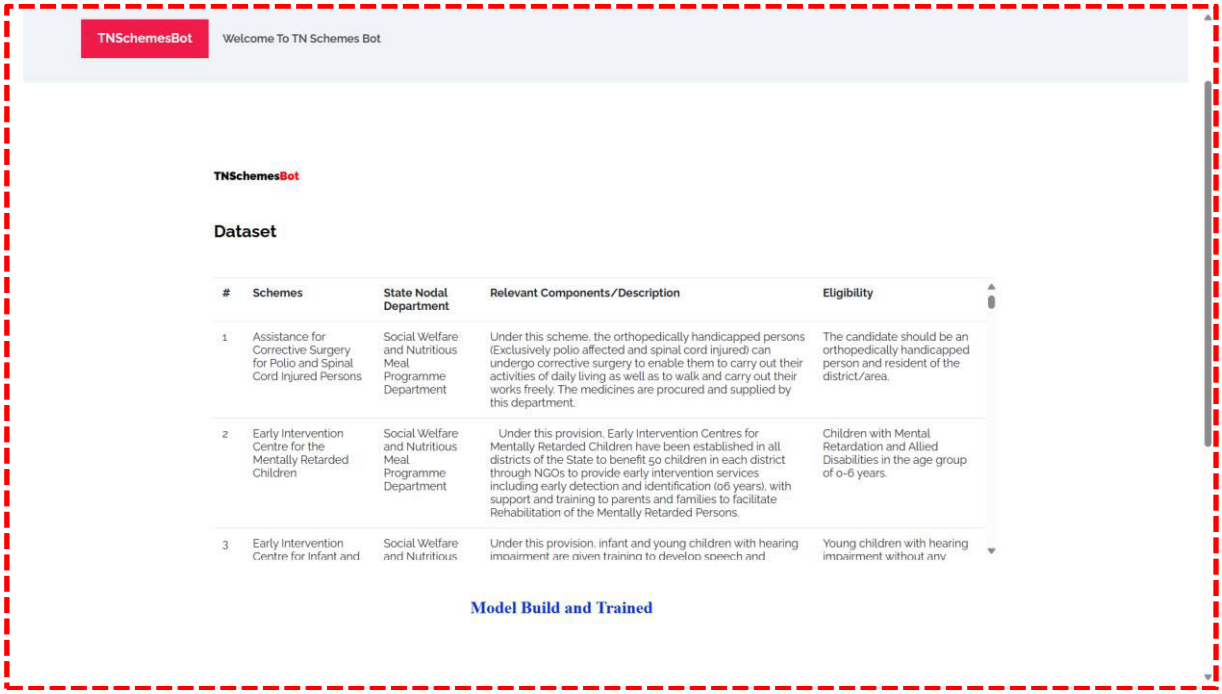


FIGURE 3 : DATABASE PAGE

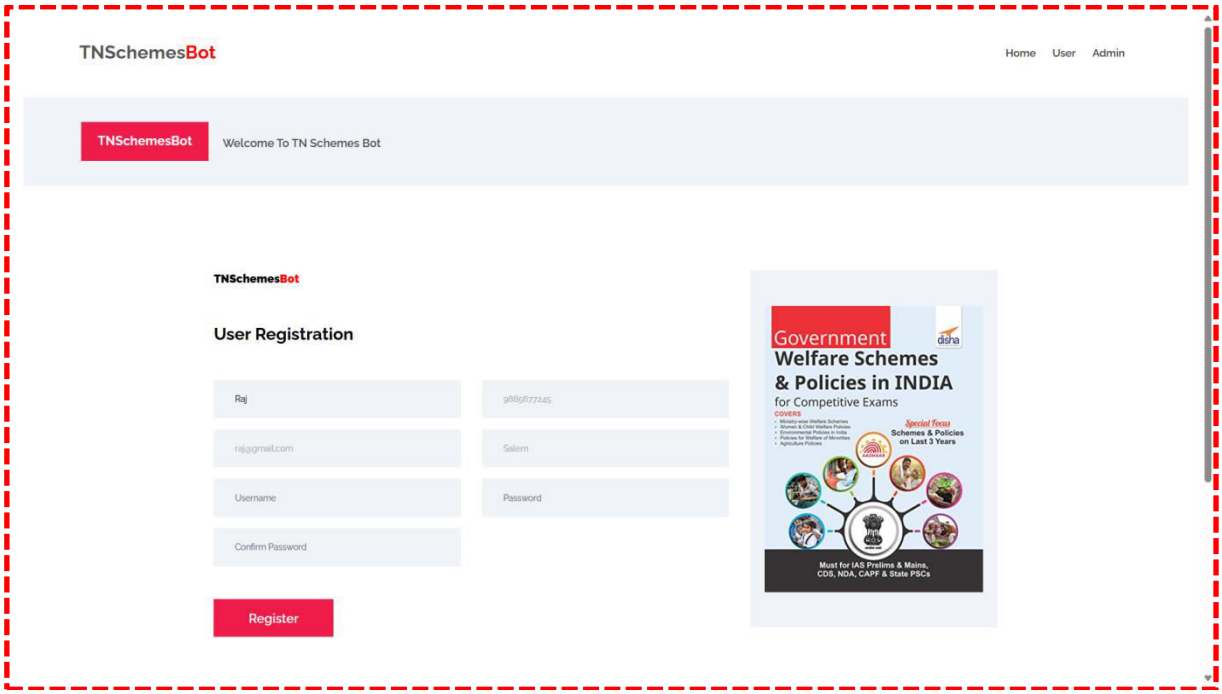


FIGURE 4 : USER REGISTRATION

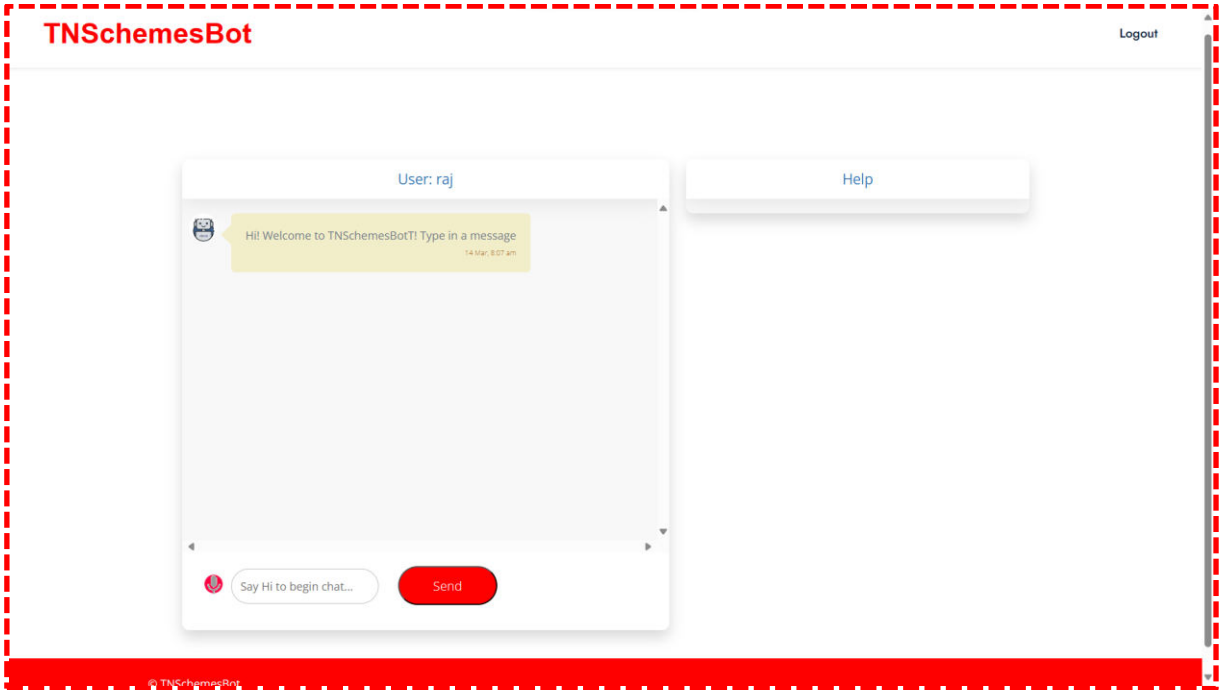


FIGURE 5 : TN SCHEMES NOTIFICATION

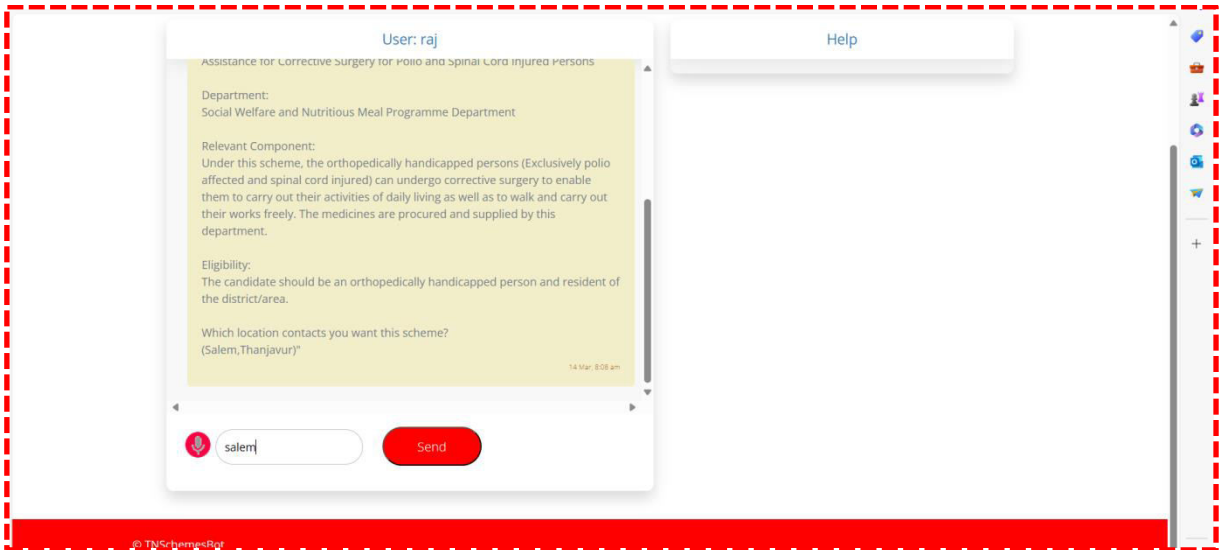


FIGURE 6 : DETIALS

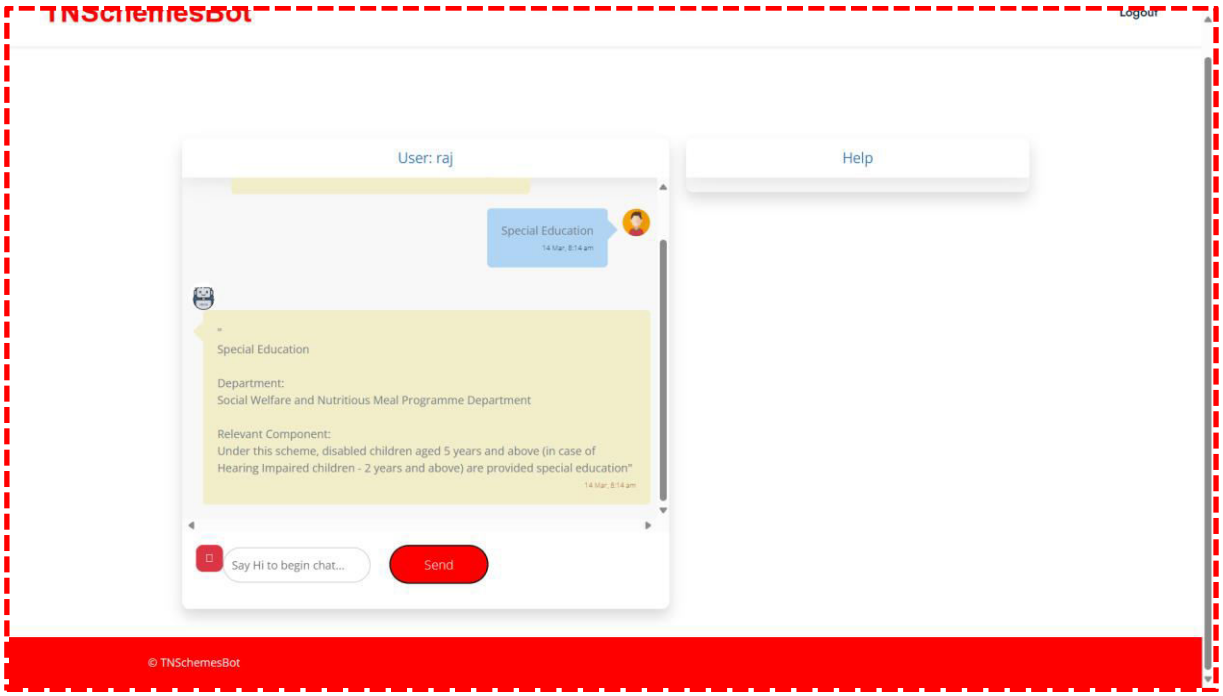


FIGURE 7 : VILLAGE SCHEMES

VII.CONCLUSION

In conclusion, the project has successfully developed a comprehensive platform for accessing Tamil Nadu government scheme information, catering to the needs of both administrators and users. By leveraging technologies such as Python, Flask, MySQL, TensorFlow, and Bootstrap, the system offers an intuitive and efficient interface for users to explore and benefit from various government initiatives. The TN Schemes Web App provides easy access to scheme details through a user-friendly interface, allowing users to search, filter, and understand schemes based on keywords or eligibility criteria. Secure authentication ensures personalized access, while feedback channels and notifications facilitate user engagement and keep users informed about updates.

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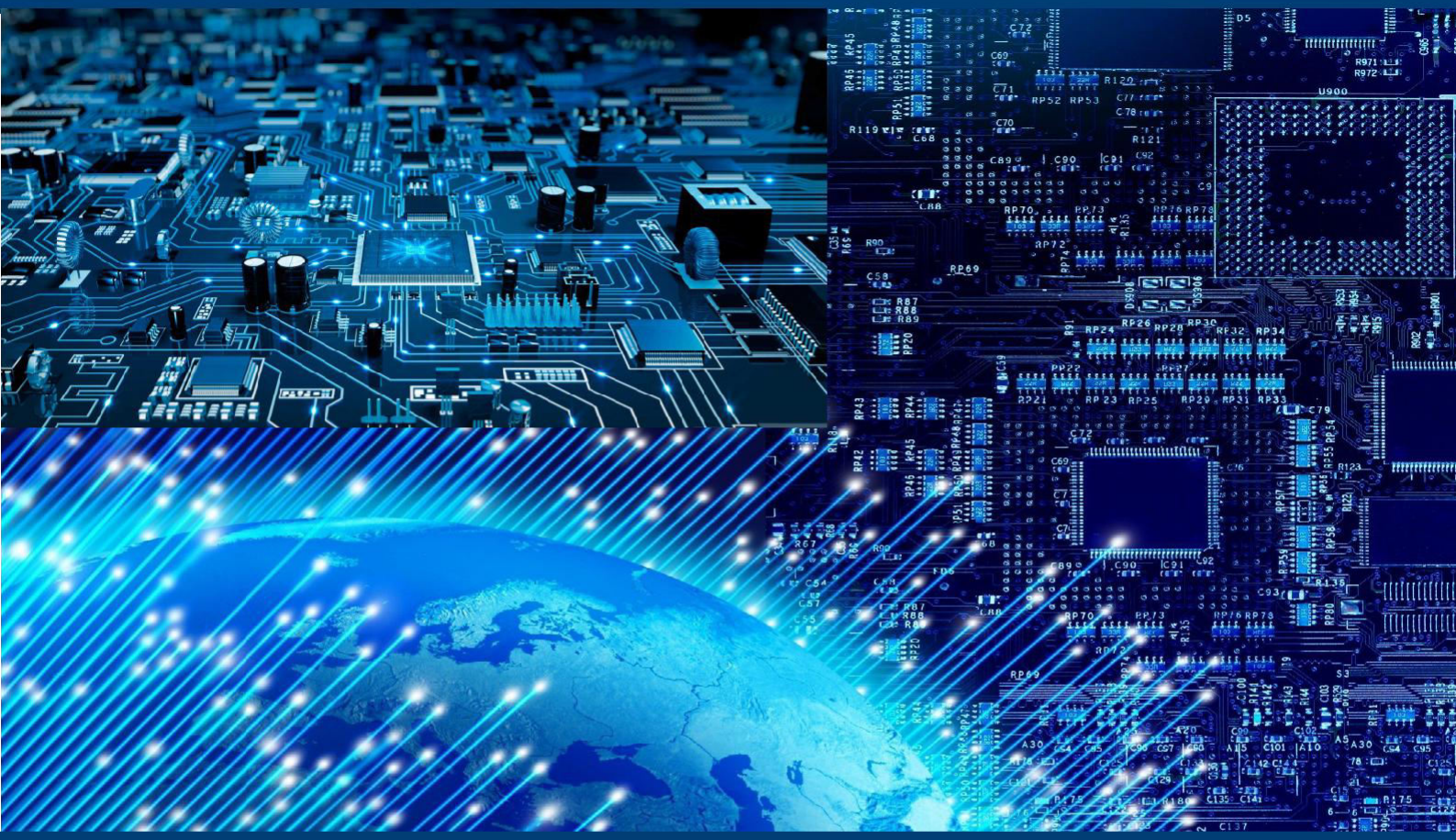

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