

AI-Based Government Scheme Recommender System using Artificial Intelligence for Personalized Welfare Assistance

Mrs. Priyadarshini A S Assistant Professor

Lipika B V Student

Manmohan A L Student

Mohit K K Student

Pallavi N Student

Computer Science and Engineering (Data Science)
P.E.S College of Engineering, Mandya

Abstract - Government welfare schemes play a crucial role in providing financial assistance, healthcare, education, employment, and social security benefits to eligible citizens. However, many individuals remain unaware of suitable schemes due to scattered information, complex eligibility criteria, and the lack of personalized guidance. This paper presents an AI-Based Government Scheme Recommender System for Personalized Welfare Assistance, a web-based platform that recommends relevant government schemes based on user profile attributes. The system evaluates demographic and socioeconomic information, including age, gender, occupation, annual income, education level, state, category, marital status, disability status, and family information, to determine eligibility and recommend suitable welfare schemes. The application is developed using React.js, Django REST Framework, PostgreSQL, and JWT authentication. It provides personalized recommendations, detailed scheme information, application links, bookmarking, feedback collection, and analytical dashboards. The proposed system simplifies scheme discovery, improves accessibility to welfare programs, and enhances the user experience through an intelligent and secure recommendation platform.

Keywords - Government Welfare Schemes, Artificial Intelligence, Recommendation System, Personalized Welfare Assistance, User Profile Attributes, Django REST Framework, React.js, PostgreSQL, Eligibility Prediction.

1. INTRODUCTION

Government welfare schemes are essential instruments for promoting social and economic development by providing financial assistance, healthcare, education, employment opportunities, housing support, and other public services to eligible citizens. The Government of India has introduced numerous welfare schemes to improve the quality of life of various sections of society, including students, farmers, senior citizens, women, economically weaker sections, and differently-abled individuals. However, despite the availability of these schemes, a significant number of beneficiaries remain unaware of the programs for which they are eligible. This lack of awareness often results in underutilization of government resources and prevents deserving citizens from accessing the benefits intended for them.

One of the major challenges faced by citizens is the complexity of identifying suitable schemes from the large number of welfare programs available through different government departments and portals. Existing government

websites primarily provide static information, requiring users to manually search through multiple pages and compare eligibility criteria. This process is often time-consuming, confusing, and difficult for users with limited technical knowledge. Furthermore, the absence of personalized recommendations makes it challenging for citizens to determine which schemes best match their individual profile and requirements.

To address these challenges, this paper proposes an AI-Based Government Scheme Recommender System for Personalized Welfare Assistance, a web-based platform that intelligently recommends government welfare schemes based on user profile attributes. The system analyses demographic and socioeconomic information such as age, gender, occupation, annual income, education level, state, category, marital status, disability status, and family information to evaluate eligibility and recommend the most relevant schemes. By automating the eligibility evaluation process, the platform simplifies scheme discovery and reduces the effort required to identify suitable welfare programs.

The proposed system is developed using React.js for the frontend, Django REST Framework for the backend, PostgreSQL for database management, and JWT-based authentication to ensure secure access. In addition to providing personalized recommendations, the platform offers detailed scheme information, bookmarking functionality, application links, feedback collection, and analytical dashboards for monitoring recommendation trends and user interactions. These features contribute to a secure, scalable, and user-friendly solution for improving access to government welfare services.

The proposed system aims to enhance transparency, improve awareness of welfare programs, and simplify the process of identifying eligible government schemes. By providing personalized recommendations through an intelligent recommendation engine, the platform supports citizens in accessing appropriate welfare benefits while reducing the complexity associated with manual scheme discovery. The solution has the potential to improve user engagement, increase the utilization of government welfare initiatives, and contribute to more efficient delivery of public services.

2. LITERATURE SURVEY

The rapid advancement of digital technologies has significantly improved the delivery of government services through various e-governance platforms. Several online portals have been developed to provide information about government welfare schemes, enabling citizens to access details regarding eligibility criteria, required documents, benefits, and application procedures. Although these portals have improved information accessibility, they primarily function as information repositories, requiring users to manually search and verify their eligibility for each scheme. This manual approach is often time-consuming and confusing, particularly for users with limited technical knowledge.

Recent research has explored the use of recommendation systems to personalize digital services based on user preferences and characteristics. Recommendation techniques such as content-based filtering, collaborative filtering, and hybrid approaches have been successfully applied in domains including e-commerce, healthcare, education, and tourism. These systems analyse user information to recommend relevant products or services. However, their application in government welfare services remains limited due to the complexity of eligibility criteria and the diversity of government schemes.

Artificial Intelligence has further enhanced recommendation systems by enabling intelligent analysis of user data and automated decision-making. AI-based systems can evaluate multiple user attributes simultaneously and provide

personalized recommendations with improved accuracy. Several studies have proposed intelligent decision support systems for public service delivery; however, many existing solutions lack comprehensive eligibility evaluation, secure authentication, transparency in recommendations, and analytical monitoring capabilities.

Despite these advancements, several challenges remain unresolved. Most existing government portals do not provide personalized recommendations based on user profile attributes and require citizens to manually compare eligibility criteria across multiple schemes. In addition, limited support for bookmarking, feedback collection, and analytical dashboards reduces user engagement and overall system effectiveness.

The proposed AI-Based Government Scheme Recommender System for Personalized Welfare Assistance addresses these limitations by integrating user profile analysis, intelligent eligibility evaluation, personalized scheme recommendations, secure authentication, bookmarking functionality, user feedback, and analytics into a single web-based platform. This approach improves accessibility, simplifies scheme discovery, and enables citizens to identify suitable government welfare schemes efficiently.

3. PROPOSED METHODOLOGY

The proposed AI-Based Government Scheme Recommender System is designed using a modular architecture to provide personalized recommendations of government welfare schemes based on user profile attributes. The system integrates React.js, Django REST Framework, PostgreSQL, and JWT authentication to ensure secure and efficient service delivery. The overall methodology consists of the following modules.

A. User Module

The User Module enables citizens to register, log in, and manage their personal profiles securely. Users provide demographic and socioeconomic information such as age, gender, occupation, annual income, education level, state, category, marital status, disability status, and family details. These profile attributes form the basis for eligibility evaluation and personalized recommendations.

B. Authentication Module

The Authentication Module provides secure user registration and login using JWT-based authentication. It validates user credentials, protects profile information, and ensures that only authorized users can access personalized recommendations and saved schemes.

C. Recommendation Engine

The Recommendation Engine is the core component of the proposed system. It compares user profile attributes with the eligibility criteria of government welfare schemes stored in the database. Based on the evaluation, the engine identifies eligible schemes and generates personalized recommendations. Each recommendation includes scheme details, eligibility information, required documents, benefits, and application links.

D. Scheme Management Module

The Scheme Management Module maintains comprehensive information about government welfare schemes, including eligibility conditions, benefits, application procedures, required documents, and official application links. This module ensures that users receive accurate and up-to-date information regarding available schemes.

E. Analytics Module

The Analytics Module provides statistical insights into user registrations, recommendation trends, frequently recommended schemes, and overall system usage. These analytical reports assist administrators in evaluating system performance and improving service delivery.

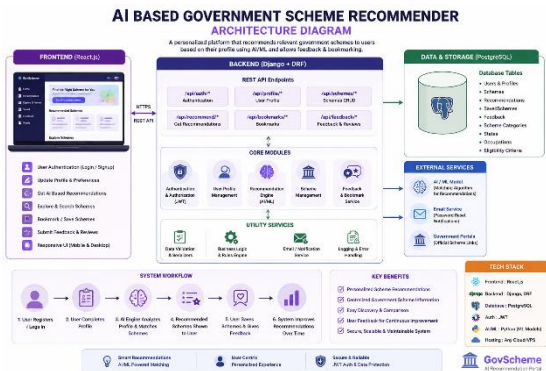


Figure 1. Architecture of the Proposed AI-Based Government Scheme Recommender System

Figure 1 illustrates the overall architecture of the proposed system. The React.js frontend communicates with the Django REST Framework backend through REST APIs. User profile information and government scheme data are stored in the PostgreSQL database. The recommendation engine evaluates profile attributes against scheme eligibility criteria to generate personalized recommendations, while the analytics module monitors overall system performance.

4. IMPLEMENTATION

The proposed AI-Based Government Scheme Recommender System is implemented using modern web technologies to provide a secure, scalable, and user-friendly platform for

personalized government welfare scheme recommendations. The implementation consists of frontend, backend, database, authentication, and recommendation modules that work together to deliver personalized services to users.

A. Frontend Technologies

- React.js
- HTML5
- CSS3
- JavaScript

The frontend provides an interactive user interface that enables users to register, log in, manage profiles, browse schemes, and receive personalized recommendations. Responsive design principles ensure compatibility across different devices and screen sizes.

B. Backend Technologies

- Django REST Framework
- Python
- REST APIs

The backend processes user requests, validates profile information, performs eligibility evaluation, and communicates with the PostgreSQL database. REST APIs facilitate seamless communication between the frontend and backend components.

C. Database

- PostgreSQL

PostgreSQL is used to store user profiles, government scheme details, recommendation records, bookmarked schemes, and user feedback. The database ensures secure and efficient data management while supporting future scalability.

D. Authentication

- JWT Authentication

JWT-based authentication provides secure user registration and login by generating authentication tokens for authorized users. This mechanism protects sensitive user information and ensures secure access to personalized recommendations.

E. Recommendation Engine

The recommendation engine evaluates user profile attributes against predefined eligibility criteria of government welfare schemes. Based on the evaluation results, the system recommends eligible schemes and displays detailed information, including benefits, required documents, eligibility conditions, and application links.

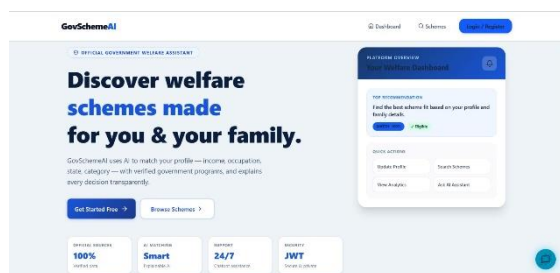


Figure 2. Home Page of the Proposed System

The home page provides an overview of the platform and allows users to access registration, login, and scheme recommendation features.

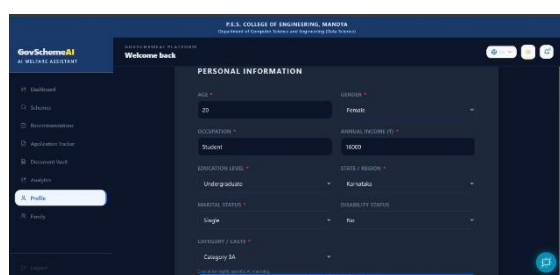


Figure 3. User Profile Module

The user profile module collects demographic and socioeconomic attributes required for eligibility evaluation and personalized recommendations.

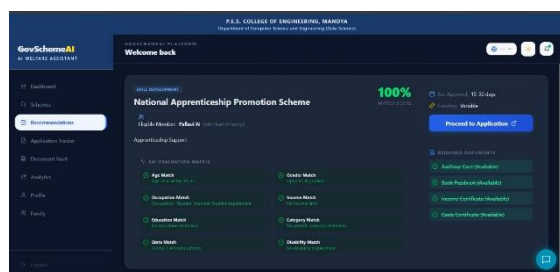


Figure 4. Personalized Recommendation Module

The recommendation module displays eligible government schemes based on user profile attributes along with detailed scheme information and eligibility status.

5. SYSTEM WORKFLOW

The proposed system follows a structured workflow to generate personalized government scheme recommendations.

- User registers and logs into the system.
- User completes the profile by entering demographic and socioeconomic information.

- Profile attributes are securely stored in the PostgreSQL database.
- The recommendation engine evaluates the user profile against scheme eligibility criteria.
- Personalized government schemes are recommended to the user.
- Users can bookmark schemes, provide feedback, and access detailed scheme information.
- Administrators monitor recommendation statistics and user activities through the analytics dashboard

6. RESULTS AND DISCUSSION

The AI-Based Government Scheme Recommender System was successfully developed and tested using multiple user profiles with different demographic and socioeconomic characteristics. The system accurately evaluated user profile attributes and recommended government welfare schemes based on predefined eligibility criteria. Users were able to access detailed scheme information, bookmark eligible schemes, and navigate to official application links through an intuitive web interface.

The recommendation module generated personalized scheme suggestions by comparing user profile attributes with the eligibility conditions stored in the database. The dashboard provided users with an overview of recommended schemes, application readiness, and profile completion status. The analytics module generated visual reports showing user registrations, recommendation trends, and frequently recommended government schemes. These insights assist administrators in monitoring system performance and user engagement.

The implementation achieved the following outcomes:

- Successful user registration and secure authentication.
- Accurate profile-based eligibility evaluation.
- Personalized government scheme recommendations.
- Secure management of user and scheme data.
- Interactive dashboard for users.
- Analytical reports for monitoring recommendation trends.
- Improved accessibility to government welfare schemes through an intelligent recommendation process.

Overall, the proposed system provides a practical, secure, and scalable solution for simplifying the discovery of government welfare schemes. The integration of profile-based eligibility

evaluation and personalized recommendations improves user experience and helps citizens identify suitable welfare programs efficiently.

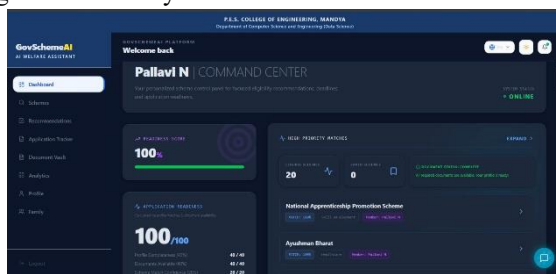


Figure 5. Personalized Dashboard

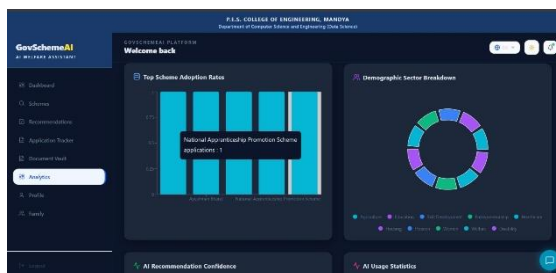


Figure 6. Analytics Dashboard

7. FUTURE ENHANCEMENTS

The proposed system can be enhanced by incorporating the following features:

- Integration with official government APIs for real-time scheme updates.
- AI-powered chatbot for citizen assistance.
- OCR-based document verification.
- Multilingual support for regional languages.
- Android and iOS mobile applications.
- Push notifications for newly launched schemes.
- Voice-assisted interaction for improved accessibility.
- Predictive analytics for identifying suitable future welfare schemes.
- Integration with Digi Locker for secure document access.
- Enhanced explainable AI techniques for recommendation transparency.

8. CONCLUSION

The AI-Based Government Scheme Recommender System provides an intelligent and user-centric platform for recommending government welfare schemes based on user profile attributes. By automating eligibility evaluation and

generating personalized recommendations, the system simplifies scheme discovery and reduces the effort required to identify suitable welfare programs. The integration of React.js, Django REST Framework, PostgreSQL, and JWT authentication ensures a secure, scalable, and efficient solution. The proposed platform enhances accessibility to government welfare services, improves user awareness, and supports citizens in identifying schemes that best match their individual requirements. Future enhancements involving government API integration, multilingual support, and advanced AI capabilities can further improve the effectiveness and scalability of the system.

REFERENCES

- [1] X. Guo and J. Lu, "Intelligent e-government services with personalized recommendation techniques," *International Journal of Intelligent Systems*, vol. 22, no. 4, pp. 401–417, 2007.
- [2] M. E. Cortés-Cediel, I. Cantador, and O. Gil, "Recommender Systems for e-Governance in Smart Cities: State of the Art and Research Opportunities," in *Proceedings of the ACM Workshop on Recommender Systems for Citizens*, 2017.
- [3] F. Ricci, L. Rokach, and B. Shapira, *Recommender Systems Handbook*, 2nd ed. Springer, 2015.
- [4] P. Resnick and H. R. Varian, "Recommender Systems," *Communications of the ACM*, vol. 40, no. 3, pp. 56–58, Mar. 1997.
- [5] Government of India, *MyScheme – Government Schemes Made Easy*. Available: <https://www.myscheme.gov.in>
- [6] Government of India, *National Portal of India*. Available: <https://www.india.gov.in>
- [7] React Team, *React Documentation*. Available: <https://react.dev>
- [8] Django Software Foundation, *Django Documentation*. Available: <https://docs.djangoproject.com>
- [9] Django REST Framework, *Official Documentation*. Available: <https://www.django-rest-framework.org>
- [10] PostgreSQL Global Development Group, *PostgreSQL Documentation*. Available: <https://www.postgresql.org/docs>
- [11] Auth0, *JSON Web Token (JWT) Introduction*. Available: <https://jwt.io/introduction>
- [12] United Nations, *Sustainable Development Goals (SDGs)*. Available: <https://sdgs.un.org/goals>