



# KALPAVRIKSHA: AI-Powered Personalized Government & Private Schemes Recommender System

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## ABSTRACT

*India offers a wide range of welfare schemes through various government ministries and private organizations to support citizens such as farmers, students, women, senior citizens, entrepreneurs, and economically weaker sections. Despite the availability of these programs, a significant portion of the population remains unaware of the benefits they are eligible to receive. The primary reasons include scattered information across multiple government portals, complex eligibility requirements, and language barriers that limit accessibility for rural populations.*

*This research proposes KALPAVRIKSHA, an artificial intelligence-based personalized recommendation system designed to assist citizens in discovering relevant government and private schemes according to their eligibility. The proposed system uses a Knowledge Graph Enhanced Graph Neural Network (KEGNN) model to analyze relationships between user profiles and scheme eligibility criteria. The system integrates multilingual support, an AI chatbot assistant, voice interaction, and automated document validation to simplify the process of identifying suitable schemes. The proposed platform aims to improve welfare scheme awareness, increase accessibility, and enhance the efficiency of digital governance systems by providing intelligent recommendations to users. By connecting citizens with appropriate welfare programs, the system can significantly improve the utilization of government initiatives.*

**Keywords:** Artificial Intelligence, Recommender Systems, Knowledge Graph, KEGNN, Government Schemes, Digital Governance.



## I. INTRODUCTION

Government and private welfare schemes play a crucial role in improving the social and economic conditions of citizens. These programs provide financial assistance, healthcare support, education subsidies, employment opportunities, and social welfare benefits to different sections of society. In India, hundreds of schemes are introduced by the central government, state governments, and private organizations every year.

However, despite the availability of these initiatives, many citizens fail to benefit from them. One of the major reasons is the lack of awareness about available schemes and their eligibility criteria. Information regarding welfare schemes is often distributed across multiple government websites and portals, making it difficult for users to identify relevant programs. In addition, many schemes contain complex eligibility conditions that require users to manually analyze various requirements such as income level, age group, occupation, and category.

Another major challenge is the language barrier. Most government portals provide information only in English or Hindi, which creates difficulties for users who prefer regional languages. Rural populations and individuals with limited digital literacy often struggle to navigate these portals.

To address these issues, there is a need for an intelligent system that can automatically analyze user information and recommend suitable schemes. The proposed system, **KALPAVRIKSHA**, aims to serve as a digital welfare assistant that simplifies scheme discovery using artificial intelligence techniques.

## II. PROBLEM STATEMENT

Although a large number of welfare schemes are introduced by government departments and private organizations every year, many eligible citizens fail to benefit from them. The gap between the availability of welfare schemes and their actual utilization remains a significant issue in developing countries like India. Several factors contribute to this problem, including lack of awareness, complex eligibility conditions, fragmented information sources, and language barriers.

One of the major challenges is the **lack of awareness among citizens regarding available welfare programs**. Many schemes are introduced by different ministries such as agriculture, education, social welfare, and rural development. However, information about these programs is often scattered across multiple official portals and government websites. As a result, users must manually search through various platforms to find schemes relevant to their needs. This process can be time-consuming and confusing, especially for individuals who are not familiar with digital systems.

Another critical issue is the **complexity of eligibility criteria** associated with welfare schemes. Most schemes define eligibility conditions based on multiple parameters such as age, gender, income level, educational qualification, geographic location, occupation, and social category. Citizens must carefully analyze each requirement to determine whether they qualify for a specific program. This process becomes even more complicated when multiple schemes need to be evaluated simultaneously.

Language barriers also play an important role in limiting accessibility to welfare programs. Many government portals primarily provide information in English or Hindi, which may not be easily understood by citizens who speak regional languages. This issue is particularly prominent in rural areas where digital literacy is limited and access to information is restricted.

In addition, **manual verification of documents** is another challenge that citizens often face. Individuals are required to verify whether their documents, such as income certificates, caste certificates, or identification cards, satisfy the requirements of specific schemes. Without proper guidance, this process can be difficult and may discourage citizens from applying for available benefits.



These challenges indicate the need for an intelligent system that can automatically analyze user information and recommend relevant welfare schemes. Such a system should simplify the process of discovering suitable schemes, reduce the complexity of eligibility verification, and improve accessibility through multilingual support and automated assistance.

### III. PROPOSED SYSTEM

To address the challenges associated with welfare scheme discovery, this research proposes an intelligent platform called **KALPAVRIKSHA**, which is designed to provide personalized recommendations of government and private schemes to citizens. The system leverages artificial intelligence and knowledge graph technologies to analyze relationships between user profiles and scheme eligibility criteria.

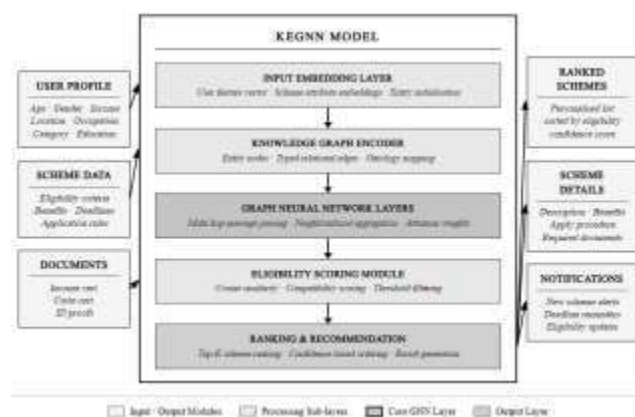
The primary objective of the proposed system is to simplify the process of identifying welfare schemes by automatically matching user attributes with scheme requirements. Instead of manually searching through multiple portals, users can simply enter their personal information into the platform, and the system will generate a list of schemes that match their eligibility.

The proposed platform follows a structured workflow. Initially, the user provides essential information such as age, gender, occupation, income range, educational background, and geographic location. This information is then processed by the system to create a digital user profile. The system compares this profile with scheme data stored in the database.

To improve recommendation accuracy, the system uses a **Knowledge Graph Enhanced Graph Neural Network (KEGNN)** model. Knowledge graphs represent relationships between different entities such as schemes, eligibility conditions, benefits, and user attributes. By analyzing these relationships, the model can identify patterns that help generate more accurate recommendations.

Once the analysis is completed, the system generates a list of recommended schemes tailored to the user’s profile. Each recommendation includes important details such as scheme description, eligibility requirements, benefits, and application procedures. This allows users to quickly understand the schemes they are eligible for.

In addition to recommendation functionality, the system also provides several supportive features. These include an AI-powered chatbot that answers user queries related to schemes, multilingual support to improve accessibility for regional users, and voice interaction capabilities that allow users to communicate with the system through speech.



**Fig. 1. KEGNN-Based Scheme Recommendation Model**

Overall, the proposed system aims to act as a **digital welfare assistant**, guiding citizens toward schemes that can improve their financial stability, educational opportunities, and overall quality of life.

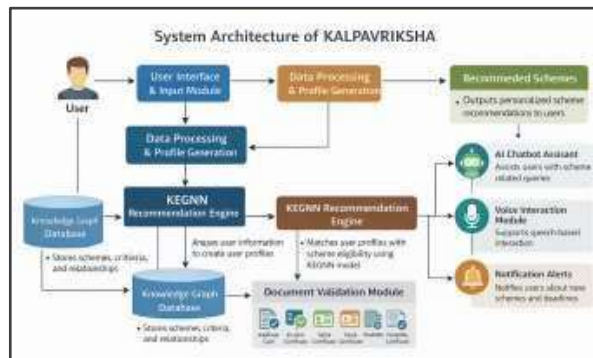


#### IV. SYSTEM ARCHITECTURE

The architecture of the proposed system is designed to efficiently process user information, analyze scheme data, and generate personalized recommendations. The system consists of several interconnected modules that work together to deliver accurate and relevant results.

The first component of the system is the **User Interface Module**, which serves as the primary interaction point between users and the platform. The interface is designed to be simple and user-friendly so that individuals with limited technical knowledge can easily navigate the system. Users can enter their personal details, explore recommended schemes, and interact with the chatbot through this interface.

**Fig. 2. System Architecture of KALPAVRIKSHA Recommendation System**



**Fig. 2. System Architecture of KALPAVRIKSHA Recommendation System**

The second component is the **Data Collection Module**, which is responsible for gathering scheme information from multiple sources. These sources include government portals, ministry websites, and private welfare organizations. The collected data includes scheme names, eligibility criteria, benefits, application procedures, and relevant deadlines.

The third component is the **Knowledge Graph Database**, which stores information about schemes and their relationships with different eligibility attributes. Knowledge graphs represent complex data relationships in a structured format, making it easier for artificial intelligence models to analyze patterns and dependencies between different entities.

The core component of the system is the **KEGNN Recommendation Engine**. This module processes data from the knowledge graph and user profiles to generate personalized recommendations. Graph neural networks are particularly effective in analyzing relationships within graph-structured data, which improves the accuracy of scheme matching. Another important component is the **Document**

**Validation Module**. This module allows users to upload essential documents such as identification cards, income certificates, or disability certificates. The system analyzes these documents and verifies whether they meet the requirements of specific schemes.

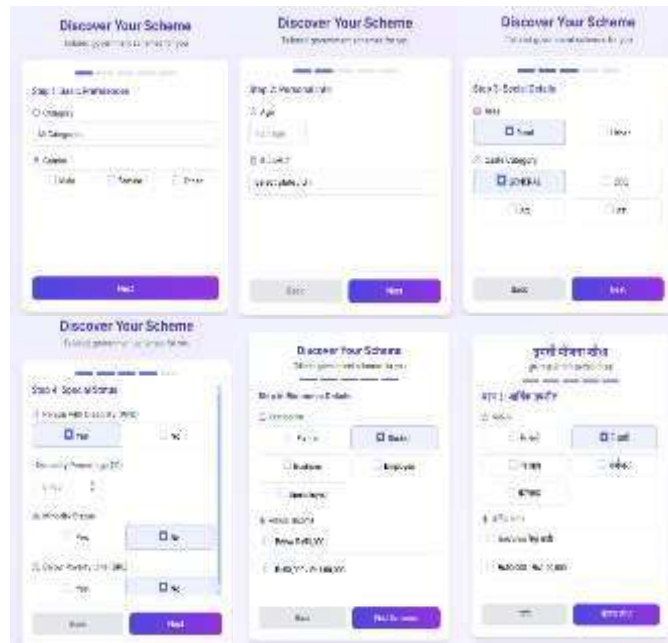
Finally, the **Notification Module** informs users about new schemes, upcoming application deadlines, and updates related to their recommended programs. Notifications can be delivered through email, mobile alerts, or application messages.

Together, these components create an integrated system capable of simplifying the discovery and accessibility of welfare schemes.





After accessing the platform, users are required to provide personal details through a **user profile input form**. The form collects important information such as age, gender, occupation, income range, educational background, and geographic location. This information is used to create a digital user profile that represents the eligibility attributes of the user.



**Fig. 6. User Profile Input Interface**

Once the user profile is created, the system processes the data using the **KEGNN-based recommendation engine**. The system analyzes relationships between user attributes and scheme eligibility criteria stored in the knowledge graph database. Based on this analysis, the platform generates a list of schemes that match the user's eligibility.



**Fig. 7. Personalized Scheme Recommendation Results**

To further assist users, the platform also provides an **AI chatbot interface** that helps answer questions related to welfare schemes and eligibility conditions. This feature improves user interaction and guides individuals in understanding available benefits.



## VII. IMPACT OF THE PROPOSED SYSTEM

The implementation of the KALPAVRIKSHA platform can significantly improve the accessibility and effectiveness of welfare programs. By providing personalized recommendations and automated assistance, the system reduces the effort required to discover relevant schemes.

For citizens, the system offers several benefits. It simplifies the process of identifying schemes that match their eligibility and reduces the time spent searching through multiple government portals. Multilingual support and voice interaction features further enhance accessibility for rural and semi-urban populations.

For government agencies, the system helps improve the reach and utilization of welfare programs. Many schemes fail to achieve their intended impact because eligible beneficiaries are unaware of them. By connecting citizens with relevant programs, the platform can increase participation and ensure better distribution of benefits.

The system also contributes to **digital governance initiatives** by promoting transparency and accessibility in public services. With the help of intelligent recommendation systems, governments can analyze usage patterns and gain insights into how welfare programs are being accessed by different groups of citizens.

From a societal perspective, the platform supports inclusive development by ensuring that welfare benefits reach the individuals who need them most. Improved accessibility to schemes can lead to better educational opportunities, financial stability, and social welfare for disadvantaged communities.

## VIII. FUTURE SCOPE

Although the proposed system provides an effective solution for welfare scheme discovery, there are several opportunities for further improvement and expansion.

One potential enhancement is the integration of the platform with **government application portals**, allowing users to apply for schemes directly through the system. This would eliminate the need for users to visit multiple websites to complete application processes.

Another improvement involves the development of a **mobile application** for smartphones. Since many rural users primarily access the internet through mobile devices, a dedicated mobile platform could significantly increase the reach of the system.

The system can also incorporate **predictive analytics** to anticipate which schemes a user may become eligible for in the future. By analyzing user data trends, the platform could notify individuals when they are likely to qualify for upcoming schemes.

Integration with **DigiLocker services** could simplify the document verification process by allowing users to securely access and share digital copies of their documents. This would reduce the need for manual uploads and verification.

Furthermore, emerging technologies such as **blockchain** could be used to enhance data security and ensure the authenticity of document verification processes.

These future improvements could transform the platform into a comprehensive digital welfare ecosystem capable of supporting millions of users.



## IX. CONCLUSION

The increasing number of welfare schemes introduced by governments and private organizations highlights the need for efficient systems that can help citizens discover and access these programs. However, the current process of identifying suitable schemes is often complicated due to fragmented information sources, complex eligibility requirements, and limited accessibility.

The proposed **KALPAVRIKSHA** platform addresses these challenges by using artificial intelligence and knowledge graph technologies to generate personalized recommendations for users. By analyzing relationships between user profiles and scheme eligibility criteria, the system simplifies the process of identifying relevant welfare programs.

The platform also incorporates additional features such as multilingual support, AI chatbot assistance, voice interaction, document validation, and automated scheme discovery. These capabilities enhance the accessibility and usability of the system for a wide range of users.

Overall, the proposed solution serves as a digital bridge between citizens and welfare programs. By improving awareness and accessibility, the system can help ensure that welfare benefits reach the individuals who need them most. With further development and integration, KALPAVRIKSHA has the potential to become a powerful tool for promoting inclusive digital governance and socio-economic development.

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