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Research Article

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DishaDoot: Career navigation platform

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ABSTRACT

DishaDoot: Career navigation platform is an innovative software solution designed to guide students from varied social and economic backgrounds in making informed career decisions, moving beyond the traditional and often restrictive approach of following popular career trends or succumbing to societal pressures. The platform aims to address the high unemployment rate in India by encouraging diversification of talent and knowledge, ultimately helping students identify career paths that align with their individual strengths, academic achievements, and personal interests. DishaDoot integrates a multi-faceted recommendation system that considers a variety of factors to provide customized career guidance. This includes user-profile test generation to assess personality traits and skills, career recommendations based on academic performance (such as 10th and 12th grade percentages), aptitude test scores, hobbies, and other personal interests. Additionally, DishaDoot introduces a scholarship recommendation module that suggests financial aid options based on the selected course, aiding students in navigating their educational pursuits more affordably. The career recommendation system's training dataset was curated by scraping data from various sources, focusing specifically on undergraduate courses offered by the University of Mumbai to streamline the scope of the project. By providing accurate and diverse course recommendations. DishaDoot is more than just a career recommendation system; it's a mission-driven platform aligned with the United Nations sustainable development goal 4, which advocates for inclusive, equitable, and quality education for all. Rooted in this global vision, DishaDoot aims to bridge the gap between students' potential and the opportunities available to them. In today's competitive world, students often face confusion, lack of guidance, and limited access to resources when it comes to planning their careers. DishaDoot steps in as a reliable companion on their journey, offering more than just course suggestions. One of the platform's standout features is its newly integrated scholarship recommendation engine, which helps students discover financial aid opportunities tailored to their academic background and interests, something that can make a real difference for those from underprivileged backgrounds. To further support students, DishaDoot also includes a smart support bot that provides real-time assistance, answers common queries, and ensures a smoother, more personalized user experience. These thoughtful additions address the practical challenges students face, from exploring career paths to securing resources for their education. What sets DishaDoot apart is its holistic approach. It not only suggests career paths based on the students' interests, academic performance, and aptitude, but also guides them with tools and insights that make the process more informed and empowering. It's designed with the Indian education ecosystem in mind, helping students especially those from rural or less-connected regions make confident, well-rounded career choices. DishaDoot isn't just a platform; it's a step towards transforming how young minds in India navigate their futures. By combining technology with empathy and purpose, DishaDoot aspires to create a meaningful impact on the lives of students, opening doors to opportunities and helping them turn aspirations into achievements.

Keywords: neural collaborative filtering, large language model, retrieval augmented graph, natural language processing

INTRODUCTION

Today's students are faced with an overwhelming number of career choices, yet many still struggle to make informed decisions about their future paths. In India, this challenge is especially pronounced. Societal pressure and a strong focus on a few traditional career paths often lead students to pursue fields that may not align with their true interests or skills. As a result, many find themselves in careers that don't allow them to reach their full potential, contributing to widespread job dissatisfaction and a high rate of unemployment. With a mismatch between the skills students develop and the skills the job market needs, it's clear that students need support to

make more informed career decisions that go beyond following the crowd.

That's where our idea, ***DishaDoot: Career navigation platform***, comes in. We have designed DishaDoot to help underprivileged students make wiser, more thoughtful career choices that reflect their individual strengths, achievements, and interests rather than following the well-worn paths that society promotes. By encouraging students to explore a wider range of career options, DishaDoot aims to support a more balanced spread of talent across different fields, which can help address some of the root causes of India's unemployment and underemployment issues. DishaDoot uses a recommendation system built around each student's unique profile. It considers multiple factors–including academic achievements (like 10^{th} and 12^{th} grade scores), test results, personal interests, and hobbies–to suggest potential career paths that suit them best. The platform even includes a scholarship recommendation system that helps students find financial aid options for their chosen courses, making it easier to pursue their dreams without financial strain. To ensure relevant recommendations, we focused on undergraduate courses offered by the University of Mumbai, scraping data from various sites to build our training dataset.

Beyond helping individual students, DishaDoot aligns with the United Nations' sustainable development goal 4 (SDG 4), which promotes "education for All." We believe every student should have access to high-quality career advice and opportunities, regardless of their background or financial situation. That's why we added a scholarship recommendation feature to assist students in finding financial support. Additionally, we included a support bot to help users navigate the platform and understand their options. These new features make DishaDoot more helpful and accessible, addressing some of the common barriers students face when planning their futures.The need for a career recommendation platform like DishaDoot is clear. In India, career decisions are often driven by societal expectations or stories of success in a few popular fields. This "herd mentality" doesn't just limit students' potential–it also oversaturates certain fields while others remain in desperate need of talent. Many students simply don't know about the wide variety of career options available to them. DishaDoot helps bridge that gap by giving students a holistic, personalized approach to career planning, empowering them to explore paths that truly match their unique profiles instead of following trends. With DishaDoot, we envision a future where students feel confident in choosing careers that reflect their strengths and aspirations. By making career exploration more thoughtful and data-driven, DishaDoot supports students' personal success and contributes to a more dynamic, skilled.

LITERATURE REVIEW

The study explored the adoption of Westman et al. (2021) to support higher education and lifelong learning. Key research topics included guidance agency and student support functions. The first practical trial involved an AI application recommending courses and employment opportunities based on students' study records and enrollment data. Among 63 students surveyed, 56% found the AI-recommended courses relevant to their needs. The findings highlight the value, functions, drivers, and barriers in implementing AI for career guidance in education.

An innovative career advising method was developed combining machine learning for job prediction in Shilaskar et al. (2024) with the RASA NLU framework for a chatbot. The k-nearest neighbors (KNN) algorithm achieved 97% accuracy, outperforming random forest and decision tree models. The system provides predictions and recommendations based on user responses, integrating KNN for job prediction and RASA's NLU for conversational AI in career counseling.

Skill set assessment module in Ajay et al. (2022) conducts assessments with psychological and core skill questions. Developed using HTML5, CSS3, and JavaScript for both front-end and back-end. Prediction module employs machine learning algorithms, including KNN for classification and k-means clustering for department grouping. Implemented with Python and Flask API result analysis evaluates performance using a confusion matrix, measuring precision, recall, accuracy, F-measure, and error rate to assess the classification model's effectiveness.

Qualification forecasting assigns thresholds in Sayyed et al. (2020) to subjects to determine student eligibility based on GPA. Evaluates the impact of each subject on career classification, issuing advisory reports if thresholds are not met. Personality forecasting matches students with careers based on personality analysis and academic performance for personalized advice. Methodology collects and preprocess data uses artificial neural networks for modeling and integrates feature extraction and neural network processing. Data analysis applies clustering techniques and association rules to improve prediction accuracy. Prediction model uses a weighted formula combining past data and expert knowledge to provide career recommendations.

NLP techniques uses Word2Vec, NER, and POS tagging to understand text in Kumar et al. (2024). Machine learning applies RNNs, transformer models, and learning algorithms for intent classification. Dialogue management employs FSMs and RL to manage conversations. Response generation uses templates and advanced models like GANs for replies. NLP module interprets queries. User profiling manages profiles. Knowledge base stores information. Decision support provides recommendations. Feedback collects feedback for improvement.

Purpose in Shah et al. (2024) reviews AI-based career recommendation systems, emphasizing data mining, machine learning, and fuzzy logic techniques. Challenges sddress issues like information overload, lack of personalization, and biases in recommendations. Approaches discuss methods such as supervised learning, collaborative filtering, and reinforcement learning for career prediction. References include numerous citations from previous research on AI-based career guidance systems.

Chatbot Platforms for Human Interaction

Mhatre et al. (2024) explored a platform for human-chatbot interaction using Python, highlighting the challenges in

building data-driven systems due to the vast amounts of data required.

Guidance and Counseling Support Systems

A 2022 paper discussed a guidance and counseling support system designed to aid university counseling offices in decision-making, aligning with current laws and regulations.

Online Career Guidance Systems

Crystal D'Mello's research emphasized the lifelong process of career development, influenced by various personal factors. The study focused on how career guidance systems can help individuals understand themselves and the job market to make informed career decisions.

Reviews chatbots as AI-driven online applications in Khandagale et al. (2022) for user interaction, with early examples like "Eliza" and "Cleverbot" that paved the way for modern chatbots.

NLP in chatbots highlights NLP as essential for understanding user input, with Python's NLTK library used for tasks like tokenization, stemming, lemmatization, and named entity recognition. Pattern matching algorithm describes its use in matching user queries with predefined patterns to retrieve responses, noting its simplicity and limitations in self-learning. Naive Bayes algorithm discusses its application in chatbots for associating training questions with labels, praised for handling large datasets effectively due to its simplicity.

Dataset training utilizes a knowledge-based system to create training datasets for the chatbot at Shantipriya et al. (2024). Assessment session evaluates users' educational backgrounds with a set of questions. Query generation manages user queries related to career guidance. NLP pre-processing applies tokenization, stemming, lemmatization, and punctuation removal to prepare text. Query classification and answer generation uses decision tree algorithms to classify queries and generate responses. Voice answer converts text responses into speech using hidden Markov models to improve interaction.

The development of an intelligent career counseling chatbot leverages AI and NLP to provide specialized career guidance in Parab et al. (2017). While existing chatbots often focus on general purposes like customer service, this chatbot uses NLP to understand and respond to user queries in natural language. This capability allows the chatbot to effectively guide users in selecting suitable careers based on their interests and qualifications.

Effectiveness of CACG Tools

These tools confirmed that career advice and counseling guidance (CACG) tools of Herath et al. (2024) are effective in offering personalized career guidance and aiding informed decision-making for students. Technological advancements highlighted the role of AI, data analytics, and user profiling in enhancing the functionality and personalization of modern CACG tools. Variability across educational stages Found that CACG tool usage varies by educational level, suggesting a need for tailored approaches for different student stages.

Research gaps identified a lack of empirical research on the long-term effectiveness of CACG tools and their application in diverse educational contexts.

Future Research Directions

Recommended exploring CACG tools in vocational education, integrating emerging technologies for improved personalization and effectiveness.

Used literature review and documentation methods for data collection and content analysis in Yola et al. (2024).

Findings

85.2% of students know about AI; 25.9% use it frequently for assignments. AI tools, like virtual tutoring, help in learning but effectiveness varies.AI can boost confidence and reduce learning anxiety but may affect critical thinking and privacy.

Conclusion

AI offers significant benefits in education but should be used cautiously to avoid over-dependency and ensure data privacy.

The study developed in Kingchang et al. (2024) an AI chatbot platform to assist in higher education decisions based on user aptitudes. It used a simple random forest algorithm for educational recommendations and designed the workflow, structure, and user interface for the Botnoi platform. A survey was conducted involving six experts through purposive sampling and 65 students at the Railway Technical School via voluntary selection to gather insights and validate the platform.

PROJECT DESCRIPTION

Problem Statement

Develop an AI-powered career guidance platform that assists students in exploring potential career paths, Provide education to all ,understanding their interests and aptitudes, and providing information about available educational and vocational policies initiated by the government as well as private agencies tailored to their individual socio-economic profiles. The major objective is to design a comprehensive career counseling system that empowers students with personalized career guidance and support and provide sustainable career growth. This system should employ machine learning models and decision-making algorithms to analyze individual profiles and offer optimized career recommendations based on their strengths, interests, and aspirations. It should also provide real-time information on government scholarships, educational schemes, and financial assistance programs that align with students' socio-economic backgrounds. The goal is to create a supportive platform that equips students with knowledge about relevant opportunities, enabling them to make informed and accessible educational and career choices.

Module Details

The project include 5 distinct modules namely, frontend, backend, data storage, machine learning modules, and external API.

Frontend module

This module includes the UI interface for user-profile filling, test interface, recommendation of courses and scholarship interface, and chatbot interaction.

Backend module

The backend module includes profile collection and storage logic, large language models (LLM) API for test generation logic, and scholarship recommendation engine.

The machine learning models

The machine learning models include neural collaborative filtering (NCF) algorithm modeling and RAG based support chatbot build using Lang chain or external software.

Data storage module

The data storage is used to store datasets and databases like user-profile data storage, courses and scholarships datasets, and test result storage.

External API

External API includes LLM API for dynamic test generation based on user profile and API for support chatbot using RAG architecture.

Methodology

DishaDoot is a career guidance platform developed for students to make good and informed choices of their career trajectory by using AI and machine learning models. Based on the literature review we performed we concluded implementing a career guidance platform that includes existing features as well as some additional features. The features that existing system includes are as follows: generating user test and using ML model for recommendation. The additional features included in our system include creating dynamic tests based on user profile with the help of Gemini API, Course recommendation using refined NCF as well as scholarship recommendation based on user socio-economic background. The scholarships are divided into 3 sections: need based assistance, inclusion assistance, and merit based assistance. The methodology to implement the above plan is as follows. Procure datasets for courses and scholarships, which is a painful task as the datasets are not readily available so we need to web scrape the sites available online. Develop and design frontend and data storage to collect user information and store them. Dynamic test generation includes generating Gemini API and connecting it for test generation and rendering. Also the generated result needs to be stored and mapped to profile. The implementation of NCF for recommendation. Finally, the development of API chatbot using RAG for support and additional information. DishaDoot is an advanced career guidance platform developed to empower students in making informed decisions about their career paths by integrating cutting-edge AI and machine learning techniques. Built on the foundation of an extensive literature review, DishaDoot was designed to go beyond existing systems by offering not only foundational features but also several impactful enhancements. These include personalized dynamic tests, course recommendations tailored through refined NCF, and scholarship suggestions based on socio-economic profiling, making DishaDoot a comprehensive and adaptive solution for career planning. One of DishaDoot's key innovations is its dynamic, profile-based test generation. Using the Gemini API, the platform creates adaptive tests that align with each user's unique profile, considering cognitive and verbal abilities, logical reasoning, mathematical aptitude, and emotional intelligence. This dynamic approach ensures that tests are relevant to individual strengths and weaknesses, yielding insights that are specifically tailored to help guide students in selecting suitable career paths. Gemini's integration also enables continuous test refinement, allowing DishaDoot to maintain a seamless and personalized user experience.

In addition, DishaDoot features a course recommendation system powered by refined NCF. Unlike traditional methods, NCF leverages both implicit and explicit feedback to analyze user preferences and behaviors, identifying courses that align with a user's career and academic interests. This deep-learning approach captures complex user-item interactions, allowing for highly accurate, personalized recommendations. By understanding individual goals and learning styles, DishaDoot provides course suggestions that are both practical and aligned with long-term ambitions. Another critical feature is scholarship recommendation based on socio-economic profiling. DishaDoot categorizes scholarships into three sections: need-based assistance, inclusion-based assistance, and merit-based scholarships. This targeted approach ensures that each user receives scholarship guidance that reflects their financial and academic context, making the recommendations more effective and accessible. By incorporating both socio-economic and academic data, the system helps students identify scholarships they are most likely to qualify for, offering support that has real potential to impact their educational journey.

Data collection is a key component in building DishaDoot. Since reliable datasets for courses and scholarships are not readily available, DishaDoot utilizes advanced web scraping techniques to gather data from publicly accessible sources. Custom scripts built with libraries like BeautifulSoup and Selenium allow the platform to extract structured data, while rigorous data cleaning processes ensure that the information is uniform and trustworthy, providing a solid foundation for analysis and recommendation. Frontend and backend design for data management is equally important. DishaDoot's user-friendly frontend interface collects key profile details from users, including cognitive and socio-economic information. The backend, built with a PostgreSQL database, securely stores this information, supporting the recommendation and dynamic test generation pipeline. The backend, powered by a Flask API, processes requests, manages user data, and renders test results in real time, facilitating a smooth and secure data flow. The platform's dynamic test generation and result mapping is powered by Gemini API integration. This API enables DishaDoot to generate customized tests based on user profiles, with the results being systematically stored and mapped to each user's profile. The result data is essential not only for providing immediate feedback but also for creating a longitudinal record of the user's progress and aptitudes, which enhances the quality and precision of future recommendations. DishaDoot's course recommendation

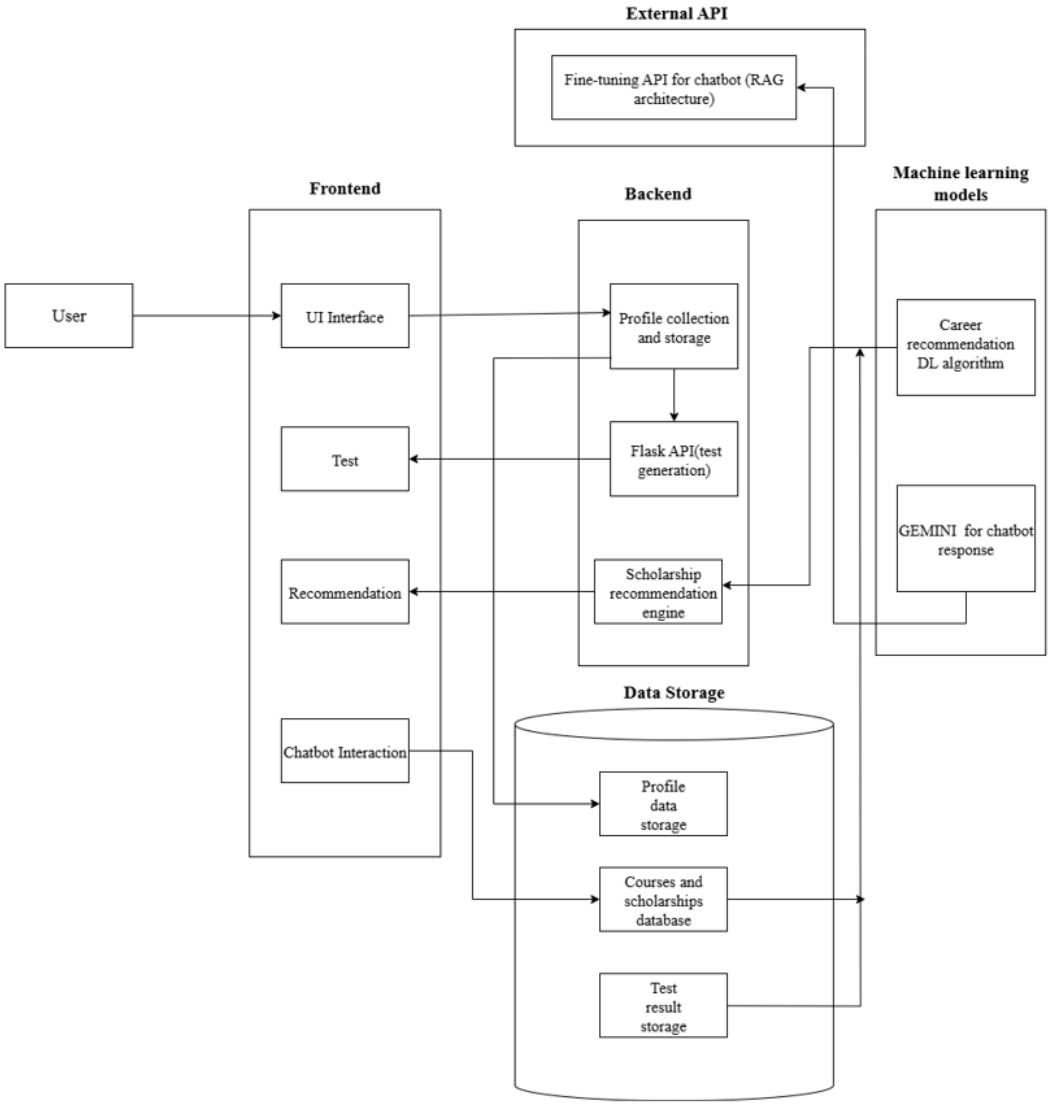


Figure 1. Data flow diagram (Source: Authors' own elaboration)

model is enhanced by NCF, which identifies patterns in user feedback to provide personalized suggestions. The refined NCF model is pre-trained on large datasets and uses neural networks to capture user-item interactions, learning preferences that go beyond simple user-item matching. By fine-tuning with real-time user feedback, the model becomes more accurate and adaptable to evolving user preferences, offering an intelligent and proactive recommendation engine. Finally, DishaDoot includes a chatbot developed using retrieval-augmented generation (RAG). This intelligent chatbot is designed to assist students by providing real-time, context-sensitive responses to queries about courses, scholarships, and more. RAG combines information retrieval with natural language generation to deliver detailed, accurate answers, making the chatbot an invaluable support tool that enhances user experience with DishaDoot's resources.

Data Flow Diagram

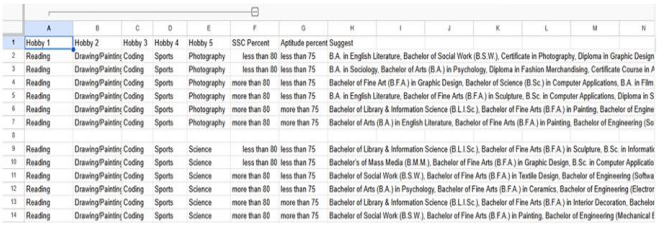
Figure 1 shows the data flow diagram how the data flows in our project. Starting with user details, how we utilize the student marks, hobbies, and aptitude score to feed in our dl model to generate recommendation for the user. We also listed the external API where we use Gemini as our chatbot to answer the user query which is trained on our database.

IMPLEMENTATION

Dataset Curation

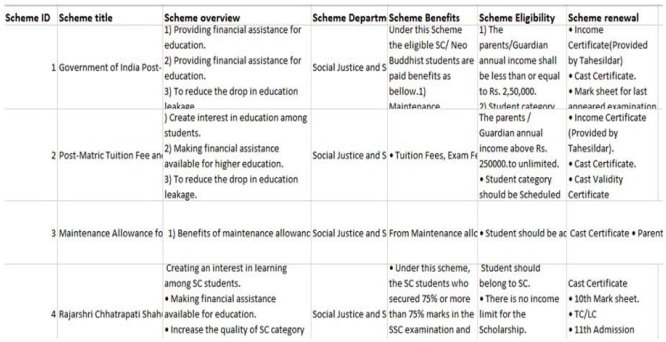
Courses and hobbies dataset

For limiting the scope of our project prototype we have created the courses dataset from the courses offered by University of Mumbai and mapped each course with multiple hobbies which are most common in order to implement our NCF model. The structure of the dataset is shown in **Figure 2**.



	A	B	C	D	E	F	G	H
1	Hobby 1	Hobby 2	Hobby 3	Hobby 4	Hobby 5	SSC Percent	Aptitude percent	Suggest
2	Reading	Drawing/Paintin	Coding	Sports	Photography	less than 80	less than 75	B.A. in English Literature, Bachelor of Social Work (B.S.W.), Certificate in Photography, Diploma in Graphic Design
3	Reading	Drawing/Paintin	Coding	Sports	Photography	less than 80	less than 75	B.A. in Sociology, Bachelor of Arts (B.A.) in Psychology, Diploma in Fashion Merchandising, Certificate Course in A
4	Reading	Drawing/Paintin	Coding	Sports	Photography	more than 80	less than 75	Bachelor of Fine Art (B.F.A.) in Graphic Design, Bachelor of Science (B.Sc.) in Computer Applications, B.A. in Film
5	Reading	Drawing/Paintin	Coding	Sports	Photography	more than 80	less than 75	B.A. in English Literature, Bachelor of Fine Arts (B.F.A.) in Sculpture, B.Sc. in Computer Applications, Diploma in S
6	Reading	Drawing/Paintin	Coding	Sports	Photography	more than 80	more than 75	Bachelor of Library & Information Science (B.L.I.Sc.), Bachelor of Fine Arts (B.F.A.) in Painting, Bachelor of Engine
7	Reading	Drawing/Paintin	Coding	Sports	Photography	more than 80	more than 75	Bachelor of Arts (B.A.) in English Literature, Bachelor of Fine Arts (B.F.A.) in Painting, Bachelor of Engineering (So
8								
9	Reading	Drawing/Paintin	Coding	Sports	Science	less than 80	less than 75	Bachelor of Library & Information Science (B.L.I.Sc.), Bachelor of Fine Arts (B.F.A.) in Sculpture, B.Sc. in Informatic
10	Reading	Drawing/Paintin	Coding	Sports	Science	less than 80	less than 75	Bachelor's of Mass Media (B.M.M.), Bachelor of Fine Arts (B.F.A.) in Graphic Design, B.Sc. in Computer Applicatio
11	Reading	Drawing/Paintin	Coding	Sports	Science	more than 80	less than 75	Bachelor of Social Work (B.S.W.), Bachelor of Fine Arts (B.F.A.) in Textile Design, Bachelor of Engineering (Softwa
12	Reading	Drawing/Paintin	Coding	Sports	Science	more than 80	less than 75	Bachelor of Arts (B.A.) in Psychology, Bachelor of Fine Arts (B.F.A.) in Ceramics, Bachelor of Engineering (Electror
13	Reading	Drawing/Paintin	Coding	Sports	Science	more than 80	more than 75	Bachelor of Library & Information Science (B.L.I.Sc.), Bachelor of Fine Arts (B.F.A.) in Interior Decoration, Bachelor
14	Reading	Drawing/Paintin	Coding	Sports	Science	more than 80	more than 75	Bachelor of Social Work (B.S.W.), Bachelor of Fine Arts (B.F.A.) in Painting, Bachelor of Engineering (Mechanical E

Figure 2. Courses and hobbies dataset (Source: Authors' own elaboration)



Scheme ID	Scheme title	Scheme overview	Scheme Departm	Scheme Benefits	Scheme Eligibility	Scheme renewal
1	Government of India Post-	1) Providing financial assistance for education. 2) Providing financial assistance for education. 3) To reduce the drop in education leakage	Social Justice and S	Under this Scheme the eligible SC/ Neo Buddhist students are paid benefits as bellow.1) Maintenance	1) The parents/Guardian annual income shall be less than or equal to Rs. 2,50,000. 2) Student category	• Income Certificate(Provided by Tahesildar) • Cast Certificate. • Mark sheet for last appeared examination
2	Post-Matric Tuition Fee an	) Create interest in education among students. 2) Making financial assistance available for higher education. 3) To reduce the drop in education leakage.	Social Justice and S	• Tuition Fees, Exam Fe	The parents / Guardian annual income above Rs. 250000.to unlimited. • Student category should be Scheduled	• Income Certificate (Provided by Tahesildar). • Cast Certificate. • Cast Validity Certificate
3	Maintenance Allowance fo	1) Benefits of maintenance allowanc	Social Justice and S	From Maintenance allc	• Student should be ac	Cast Certificate • Parent
4	Rajarshri Chhatrapati Shahi	Creating an interest in learning among SC students. • Making financial assistance available for education. • Increase the quality of SC category	Social Justice and S	• Under this scheme, the SC students who secured 75% or more than 75% marks in the SSC examination and	Student should belong to SC. • There is no income limit for the Scholarship.	Cast Certificate • 10th Mark sheet. • TC/LC • 11th Admission

Figure 3. Scholarship dataset (Source: Authors' own elaboration)

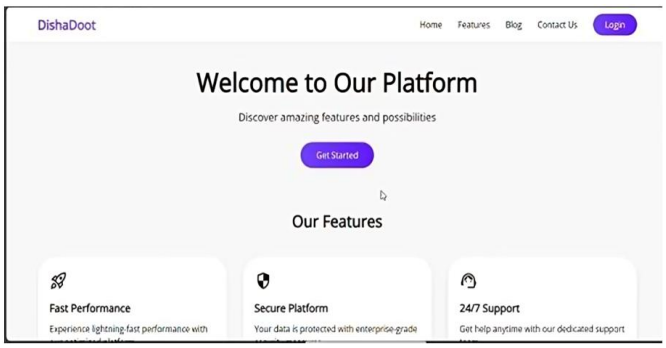


Figure 4. Landing page (Source: Authors' own elaboration)

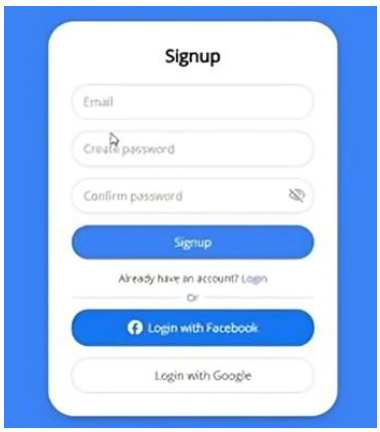


Figure 5. User login page (Source: Authors' own elaboration)

Scholarship dataset

The scholarship dataset was created by using http://aaplesarkar.mah.gov.com/. It includes various scholarships offered by the state government of Maharashtra for students from varied domains. It also includes various private scholarships (**Figure 3**).

Frontend

The front end of the project includes the login page, landing page, and profile information page which takes in personal, social, economic and academic information for the backend model. The frontend is developed using React.js, Tailwind CSS and flask framework of python.

The examples of frontend visuals are shown in **Figure 4**, **Figure 5**, **Figure 6**, **Figure 7**, **Figure 8**, and **Figure 9**.

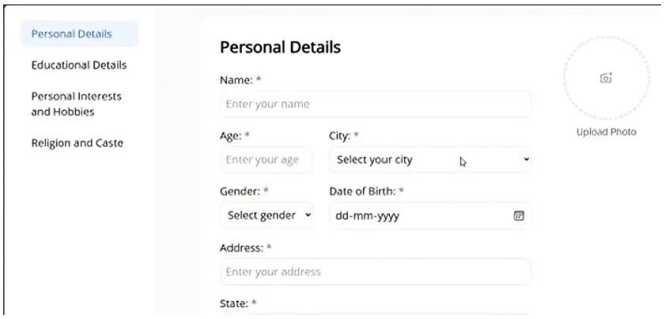


Figure 6. Personal details form (Source: Authors' own elaboration)

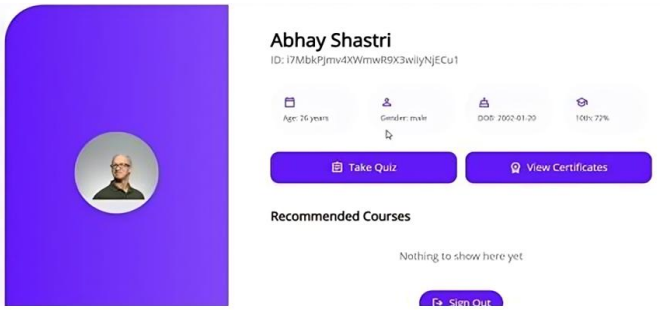


Figure 7. Profile form (Source: Authors' own elaboration)

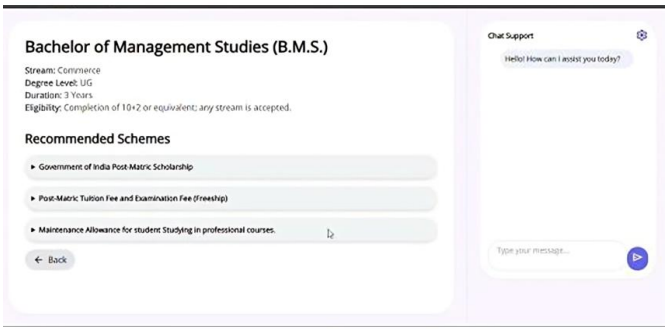


Figure 8. Course recommendation (Source: Authors' own elaboration)

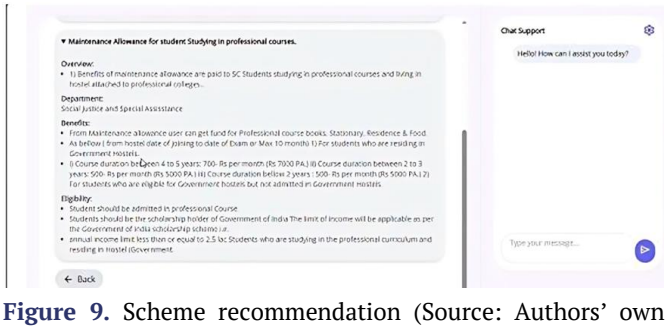


Figure 9. Scheme recommendation (Source: Authors' own elaboration)

Backend

The backend is built using a firebase database, NCF, and BERT model. The BERT model is used to recommend courses based on using profiles. The user test is generated using Gemini API. It also provides 24/7 support both for any query regarding course or scholarship recommended.

Table 1. Comparison between different models

	Loss function	ROC AUC curve	F1-score
NCF	1,042,184.1188	0.521	0.0055
Hybrid	0.184	0.8371	0.1589
BERT	4.2845	0.4773	0.001501

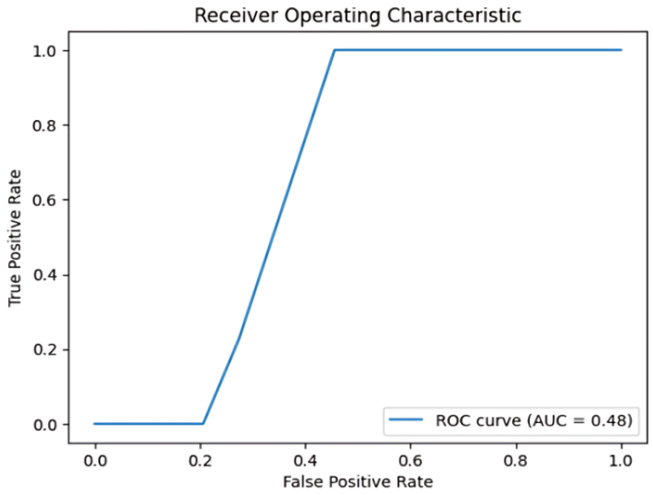


Figure 10. BERT ROC AUC curve (Source: Authors' own elaboration)

RESULTS

The performance metrics of the implemented backend model were calculated based on the deep learning performance metrics. The models taken for this consideration are NCF Model, BERT model, and hybrid model.

The comparison was drawn on 4 basis ROC AUC Curve, Loss function and F1-score (**Table 1**).

The implications of **Figure 10**, **Figure 11**, and **Figure 12** shows that the BERT model has the lowest loss function value (4.2845), indicating that it has the best optimization and generalization compared to NCF (1,042,184.1188) and hybrid (0.184) models.

ROC AUC score: The hybrid model has the highest ROC AUC score (0.8371), suggesting that it performs the best in distinguishing between classes. The NCF model has a moderate ROC AUC score (0.521). The BERT model has the lowest ROC AUC score (0.4773), indicating that it struggles with distinguishing between classes.

F1-score: The hybrid model has the highest F1-score (0.1589), which suggests a better balance between precision and recall. The NCF model has an F1-score of 0.0055, showing poor classification performance. The BERT model has the lowest F1-score (0.001501), meaning it struggles significantly with classification accuracy.

The evaluation of the three models BERT, NCF, and hybrid shows that while BERT has the lowest loss function value (4.2845), this does not necessarily translate into better predictive performance. Despite having the lowest loss, BERT performs poorly in terms of the ROC AUC score (0.4773) and F1-score (0.001501), suggesting that it struggles with making reliable predictions. The NCF model, on the other hand, has an extremely high loss function value (1,042,184.1188),

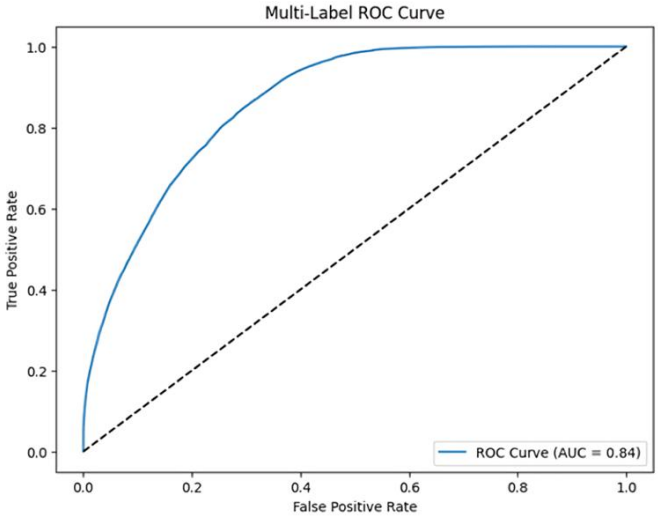


Figure 11. NCF ROC AUC curve (Source: Authors' own elaboration)

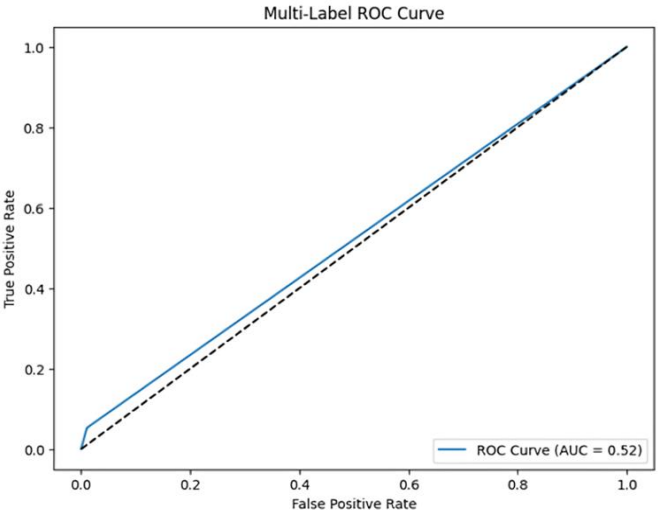


Figure 12. Hybrid ROC AUC curve (Source: Authors' own elaboration)

indicating significant optimization issues. Its ROC AUC score (0.521) is slightly better than BERT's but still remains low, meaning it has limited ability to differentiate between different outputs.

Additionally, its F1-score (0.0055) is very low, highlighting poor predictive performance. In contrast, the hybrid model outperforms both BERT and NCF across key evaluation metrics. It achieves the highest ROC AUC score (0.8371), meaning it is the most effective in distinguishing between relevant and irrelevant outputs. Additionally, it has the highest F1-score (0.1589), signifying a better balance between precision and recall. While its loss function value (0.184) is higher than BERT's, this does not negatively impact on its predictive ability, as loss alone is not a definitive indicator of overall performance. Overall, the Hybrid model proves to be the most reliable choice for this task. Its superior ROC AUC and F1-score demonstrate that it provides more accurate and meaningful predictions.

CONCLUSION AND FUTURE SCOPE

The DishaDoot: Career navigation platform was developed to bridge the gap between students' aspirations and informed career decisions using AI-powered recommendations. This research highlights the need for a personalized, data-driven approach to career guidance, moving beyond traditional societal norms that often restrict students' choices. By integrating NCF, a RAG chatbot, and a dynamic test generation system powered by Gemini API, DishaDoot offers an advanced, interactive, and insightful career counseling experience. The performance evaluation of different models (BERT, NCF, and hybrid models) demonstrated that while BERT had the lowest loss function value (4.2845), it performed poorly in classification accuracy. The NCF model, despite its moderate ROC AUC score (0.521), had significant optimization issues. In contrast, the hybrid model emerged as the most effective, achieved the lowest AUC score (0.8371) and F1-score (0.1589), making it the best choice for reliable career predictions. Beyond technical advancements, DishaDoot aligns with the United Nations' SDG 4, ensuring inclusive and equitable education. The platform's scholarship recommendation system, which categorizes scholarships into need-based, inclusion-based, and merit-based assistance, further enhances accessibility for students from diverse socio-economic backgrounds. While this study successfully presents a comprehensive AI-powered career navigation system, future improvements can include expanding the dataset to a national level, refining the recommendation models with real-time student feedback, and enhancing the chatbot's conversational intelligence for better user engagement. By continuously evolving, DishaDoot has the potential to revolutionize career counseling in India, empowering students with the knowledge and tools needed to make confident, well-informed career choices that align with their true potential and aspirations.

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