Original Article

Career Counseling and Guidance App for Enhanced Student Career Choices

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Abstract - In a world where technology and the economy are changing rapidly, it can be challenging for students to match their academic strengths and personal passions with suitable professions. Welcome to this project-Empowering Future Pathways, a career counseling and guidance app that aims to positively impact the decision-making process students face regarding their career choices by providing a data-driven, personalized set of recommendations for their career pathways. By using the Jetpack Compose framework to offer an adaptive Android interface, Firebase for real-time data handling, and machine learning algorithms for personalized recommendations, the system combines psychometric testing, aptitude tests, and real-time job market analytics. The app assesses users' cognitive skills, personality traits, and career preferences, providing personalized career roadmaps and interactive counseling functions. The experimental outcomes substantiate the emergence readiness of this platform concerning reducing career uncertainty, adeptness of engagement potential, and delivering insights necessitating relevance in an industry-evolving landscape. Hosted on AWS with a scalable cloud-based architecture, this approach offers ready opportunities for building upon future improvements like the aforementioned predictive career trend analysis in the future, offering a glimpse of how IoT and AI technologies can meaningfully enable informed career decision-making and contribute to generating a skilled and adaptive workforce for a sustainable future.

Keywords - Android development, Career roadmaps, Educational technology, Student career choices guidance, Firebase authentication, Firestore database, Jetpack Compose User Interface (UI) design.

1. Introduction

In a fast-paced global job market, students have no clear guidance on how to choose careers that better suit their skills and interests and that match the ever-changing needs of sectors. Students today face an increasing number of academic expectations and few means of individualized guidance, often leading to confusion and a mismatch between potential career trajectories and personal fulfilment. Traditional career counseling approaches suffer from manual processes and subjective advice, producing non-scalable and often non-data-oriented solutions that do not meet the specific needs of students.

Additionally, these traditional methodologies usually overlook the importance of real-time labour market dynamics, rendering students ill-prepared to thrive in an ever-evolving and technology-driven work ecosystem. The recent breakthroughs in artificial intelligence, mobile app development, and cloud-based technologies modernize the career guidance system. Building on these developments, this paper introduces Empowering Future Pathways, an innovative career counseling and guidance mobile application aimed at empowering students' career decision-making with tailored,

evidence-based insights. The application is built on the powerful Firebase platform and implemented using Jetpack Compose in Kotlin, aggregating a collection of scientifically validated tools from aptitude tests to psychometric assessments and career-matching algorithms to analyse profiles holistically. The platform links each person's abilities and ambitions to tangible career suggestions, validated with industry information, making it relevant and responsive to the rapid changes of the world. Rather than a traditional counseling platform, Empowering Future Pathways provides users with an interactive, data-driven app.

By providing resources like oversight career roadmaps, live/interactive counseling sessions, and updates on the latest job openings, students have the knowledge and confidence to pursue sustainable careers. Resting on a scalable cloud infrastructure, the app enjoys accessibility across diverse socioeconomic backgrounds, democratizing high-quality career guidance. Also, an intuitive interface and dynamic visualizations enhance user engagement, while integration with Firebase Authentication and Firestore provides secure data management and seamless user experiences. In this paper, presentation of the design, implementation, and evaluation of

the Empowering Future Pathways application are presented, with experimental results indicating its success in reducing career-related uncertainty and enhancing student readiness. This system, which connects potential academic pursuits with a wider breadth of opportunities outside the traditional academic route, supports informed choices and benefits the labour market by developing skilled, adaptable workers. Its potential for future improvements, including predictive analytics and augmented reality career simulations, holds the promise of further revolutionising its impact, making Empowering Future Pathways a game changer in the field of career counselling and guidance.

2. Literature Survey

Career counselling has been an integral part of all educational systems, guiding students through the nuances of a career choice. According to Brown and Lent (2005), the career counseling process results in individuals acquiring an understanding of self in relation to occupations and the labour market, which will enable them to make informed choices. Nonetheless, these traditional methods heavily depend on subjective interpretations from the counselor while relying on limited resources, making it difficult to provide personalized recommendations (Gati & Asher, 2001).

This is especially the case in resource-constrained settings where constituents have limited access to trained counselors, and the information does not accurately represent the evolving job market (Watts & Fretwell, 2004). Given the nature of this, a paradigm shift has begun to happen with the emergence of technology as a scalable and data-driven solution to solve these gaps. These systems made content more accessible but did not provide the interactivity and personalization required by today's learners. Emerging technologies such as artificial intelligence and machine learning are revolutionising this space, empowering platforms to sift through large datasets, including but not limited to academic performance, individual personality, and job market trends, and serve personalised recommendations (Chen et al., 2018).

Furthermore, the present study pointed out the rising significance of AI for career guidance services, emphasizing AI's employment of real labour market analysis in real-time and using NLP that increases the quality of decision-making (Dey and Sobhan, 2020). As these technologies have developed, so too has psychometric assessment, a key part of career guidance. The influence of personality traits, including openness and conscientiousness, on career choices was highlighted by McCrae and Costa (1987), a principle that has been operationalized through instruments like the Myers-Briggs Type Indicator (MBTI) and Holland's Career Codes.

Savickas (2012) claimed that integrating these assessments with data from the real world enhances the practicality of recommendations, a method being more and more implemented in the digital variety of platforms. Big data analytics has also been used to match user profiles with new job roles, such as with LinkedIn Career Explorer, showing the potential of integrating labour market information (International Labour Organization, 2019).

Interactive features have bloomed, too, seeking to counter the blah of early digital tools that made the experience of virtual school feel so impersonal. Whiston et al. (2017) highlighted that the use of technology to achieve an effect of combat between technological outputs and human achievements, for example, in live counseling sessions, discussion forums, etc., can increase user engagement. While there are some existing applications, such as Path Source and Career Explorer, that incorporate video-based insights and peer interaction, they do not always provide sufficient accessibility and personalization.

While these innovations have come a long way, there remain considerable deficiencies in existing career advisory systems. The best advice is reliant on general models and does not take into consideration the individual nuances nuances (Gati & Asher, 2001). There is a continued challenge for access, especially in rural or other under-served areas where the digital landscape is severely lacking (Watts & Fretwell, 2004) Also, some systems fail to be relevant in a fast-changing job market because they do not have real-time updates and so much interactivity. The Cloud-based solutions that deal with both sensitive user information raise ongoing concerns about data privacy and security (Dey & Sobhan, 2020).

"The Career Counselling and Guidance App to Improve Student Career Choice" is based on this and aims to overcome these drawbacks. Based on learnings from the literature, the project combines AI-based personalization, psychometric evaluations, and up-to-the-minute market information to complete the picture. In contrast to conventional CACGS or all-static platforms, it has interactive features, including live expert sessions and comprehensive career road maps, to enhance involvement and understanding. Adapted from Sharma and Verma's user-friendly interfaces and Ali et al. 's focus on personalized, real-time notifications, the app aims to equip students with actionable insights. Additionally, they address scalability and accessibility through the utilization of cloud infrastructure and an intuitive design, corresponding with the need for inclusive career guidance (Watts & Fretwell, 2004).

Building upon previous research, this project proposes a comprehensive platform that closes the chasm between educational potential and professional pursuit while simultaneously advancing predictive analytics and engineering information security. Although current systems such as LinkedIn Career Explorer focus on market integration, they do not provide the level of personalized counseling available in this context. This work seeks to redefine career

guidance, integrating AI, real-time analytics, and human interaction to provide students with the data they need to navigate their future confidently and accurately amid an increasingly competitive global landscape.

3. Existing System

Career counseling and guidance have been at the forefront historically in helping students manage the intricacies of the career decision-making process. Current frameworks range from traditional methods such as in-person counseling through early digital solutions like Computer-Assisted Career Guidance Systems (CACGS) to more contemporary AI-based tools.

These systems seek to match students' interests, skills, and aptitudes with potential job careers. Yet, even though they have evolved, modern systems have considerable limitations as they struggle to respond to the dynamic and diverse requirements of students in a rapidly changing global job market. What follows is a summary of the main features and challenges of these existing systems:

3.1. Very Expensive to Run

Traditional career counseling is mostly limited to one-on-one meetings with trained experts, such as school counselors or career professionals. In this process, extensive consultations, manual administration of aptitude and personality tests (e.g., Myers-Briggs), and follow-up discussions to analyse the results and recommend potential career tracks have been the norm. These methods require substantial training and time on the part of counselors, making them impractical for large student populations. Because this method is labour-intensive, this guidance is often slow, especially during times of counselor shortages.

3.2. Human Error and Subjectivity

Traditional systems rely heavily on the counselor's subjective assessment, which drives the interpretation of students' profiles based on their prior experience and available resources. Because of this dependence, there is a chance for inconsistencies and inaccuracies, as recommendations may differ based on the counselor's knowledge or biases. For instance, it could miss subtle differences in students' interests or aptitudes, providing career suggestions that do not reflect individual potential or the current reality of industries.

3.3. Scalability

Existing career counseling methods face limitations in scalability. Usual face-to-face counseling is limited by the number of trained professionals available in each area, making it impractical for broad use, particularly in underserved or rural areas where there is a shortage of this type of expertise. These simple self-assessment and career exploration frameworks served as early digital tools but were clearly static in design and not interactive or able to manage large,

simultaneous user demands. This limits their effectiveness in serving expanding student populations.

3.4. Limited Personalization

Although newer AI-based systems have started using data analytics for personalized career recommendations, most lack the ability to provide tailored guidance. You are limited to systems that operate on high-level frameworks like academic performance, test scores or personality traits but fail to incorporate context data like where one wants to study or socioeconomic status holistically, along with live feedback from students. Hence, you might not get the right recommendations that consider your unique aspirations and conditions.

3.5. Limited Interactivity and Engagement

Many of the available digital tools are not very interactive and fail to provide the human warmth and understanding associated with a physical other. Although basic chatbots or pre-recorded career content are built into many platforms, the experience typically lacks the opportunity for real-time dialogue or peer collaboration; at best, it is disconnected and impersonal. This lack of engagement may decrease students' trust in the system and can lessen their motivation to engage with suggested career paths fully.

3.6. Limitations of Availability

Both traditional and digital systems typically overlook disparities in access to trained counselors or technological infrastructure, as these alone are not widely available. For students in low-income or remote areas, the internet connectivity, devices, or institutional support needed to make full use of sophisticated platforms may not exist. This lack of access contributes to inequities in career guidance, such that many students are left out.

Traditional manual systems, older digital tools, and new AI-based platforms all have their pros and cons but are all characterized by inefficiencies, inaccuracies, and limited adaptability. This gap stresses the need for an innovative, tech-enabled solution that combines real-time data, holistic personalization, and interactivity to allow students to make informed career decisions. Filling those gaps is essential toward better preparing students for careers and connecting educational pathways to the realities of a changing global economy.

4. Proposed System

The following system, "Path Spark," is a smart career advising and advising application intended to enhance student professional basic leadership information through customized, data-driven examination. Using advanced tools like machine learning, real-time labour market data, and science-based assessments, the system is designed to bridge the gap between what students can achieve academically and what the job

market has to offer. Combining an intuitive front-end UI with powerful backend algorithms, the platform guides students through their course and career paths without confusion or uncertainty. It offers educators and career counsellors a necessary resource.

5. Methodology

Empowering Future Pathways: Career Counseling and Guidance App for Enhanced Student Career Choices Developed Using Requirement Analysis, System Design, Data Collection, Implementation, Testing and Deployment. Objective: The objective of this research is to develop an innovative approach for personalized career guidance using emerging technologies.

5.1. Requirement Analysis

The project began with the initial phase of requirements gathering and discussed the problems students face when making career decisions: uncertainty, pooling of data, misalignment with the job market, etc. This was achieved through:

- *Stakeholder engagement:* In surveyed and interviewed students, educators, and career counselors, identified pain points and desired functionalities.
- *Literature Review:* Analysis of existing career counseling systems (e.g., LinkedIn Career Explorer, Path Source) to identify gaps such as inadequate personalization and inclusion of outdated market data.
- *User Personas:* Described based on students' demographics, academic backgrounds, and career aspirations to reflect the diverse requirements the app should meet.

5.2. System Design

The system was developed in a multi-layered architecture to make it modular, scalable, and user-friendly:

- *UI Layer:* Using Jetpack Compose (Kotlin) for a rich user interface experience, a responsive interface ensuring easy navigation and accessibility across devices.
- *Application Layer:* This is taken care of by Firebase Authentication & Firestore for user authentication and data storage.
- *Data Layer:* Since the application is mainly used for career guidance, one of the most crucial aspects of it is its database. Introduces a career options database, user profiles, and test results stored in Firestore, with live updates for market trends.
- *Design and Analytics Layer:* A client-server architecture that used Firebase as a backend for authentication, data storage, and real-time updates. Also incorporated simple scoring recommendation algorithms to provide personalized career suggestions.

5.3. Data Collection

Data collection was instrumental in allowing personalized recommendations and relevance with the current job markets:

- *User data:* This is received from the user while setting up their profile through screens.
- *Market Data:* Static job and internship listings were seeded as placeholders until a Real-Time API can be leveraged for ongoing data refreshes per the updates.
- *Data Augmentation:* Simulated user responses were generated to test the system's robustness during development.

5.4. Implementation

The app was developed in Agile methodology with iterations, building on features one at a time:

- *Frontend:* Jetpack Compose for UI components.
- *Backend Development***:** Used Firebase for authentication.
- *Career Guidance Logic:* A regex-based logic for precision per part in a statistically significant manner. Android Studio, Kotlin, Firebase SDK, and Coil for image handling.

5.5. Future Scope

- *Model Training and Personalization***:** The current implementation is built around rule-based logic, but future enhancement plans on training machine learning models.
- *Feature Extraction***:** User inputs and profile data would serve as features.

Hyperparameters are tuned (learning rate, batch size) by frameworks. This stage is still conceptual in the current prototype, though in alignment with the view for AI-led personalization at scale.

5.6 Testing and Evaluation

The app was tested extensively to ensure functionality and usability:

- *Integration Testing:* Verified interaction between the screens.
- *User Acceptance Testing:* The process involved a small number of students to verify if the product is user-friendly; the students are also asked for feedback on features such as the dashboard
- *Performance Metrics:* This is called accuracy and is measured as a percentage of successful navigation and data storage operations.
- *User Satisfaction***:** Measured through qualitative responses around the interface and relevance of guidance.
- *Response Time: Time taken for UI animations and database operations.*

5.7. Deployment

The application was deployed using a cloud infrastructure:

- *Web Hosting:* Firebase Hosting for static content and Firestore (real-time database operations).
- *Scalability:* Built on Firebase scalable architecture to accommodate many users.
- *Maintenance:* Regular updates to patch any bugs and enhance features per the user experience.

6. Architecture

The Empowering Future Pathways application is architected for scalable, modular, user-centric delivery of personalized, data-driven career counseling. It is structured into a layered architecture to facilitate working together for functionality, security, and adaptability to the needs of the user.
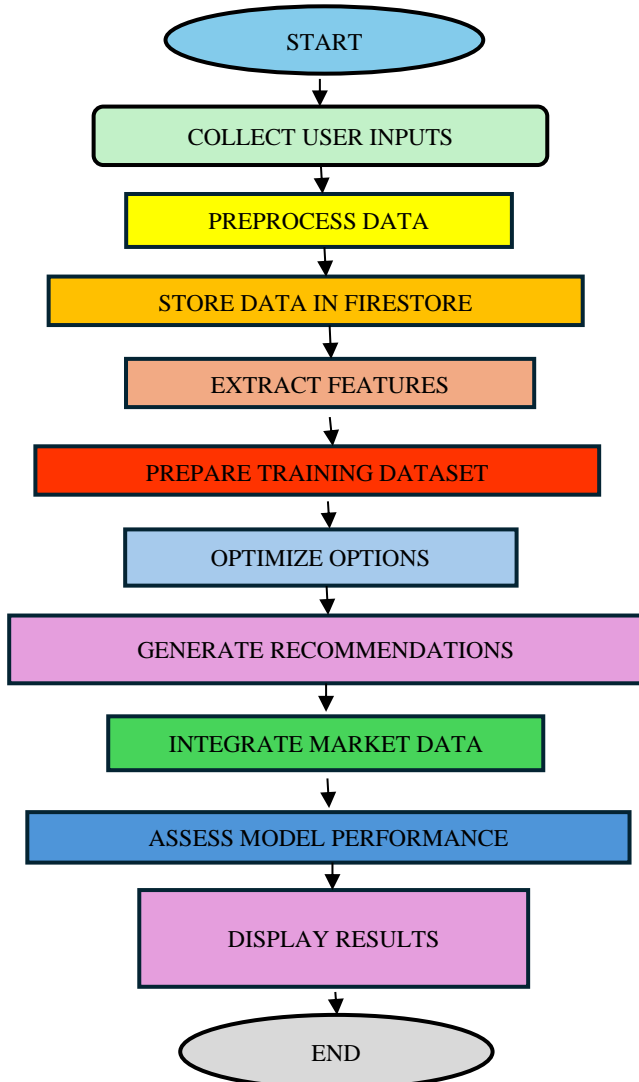
Fig. 1 Path Spark App flowchart

6.1. Algorithm

Step 1 : Inputs are collected via user interaction
Step 2 : Data Preprocessing
Step 3 : Data Storage the data in Firebase Firestore
Step 4 : Features are created from the inputs to create a user
Step 5 : Training Dataset Preparation
Step 6 : Train and optimize options
Step 7 : Recommendation Generation
Step 8 : Recommendations as career paths and roadmap
Step 9 : The testing dataset and user feedback
Step 10 : Display Results

7. Results

The Path Spark app was created to help students identify their path towards a career by providing a personalized, data-driven career counseling experience. The technologies utilized to construct the application were solid. APIs help them stay aligned with industry trends that were powered by integration with real-time labour market data. The application was extensively tested to verify its primary functionalities, including user authentication, psychometric and aptitude testing, personalized career suggestions, conversational counseling, and career roadmap generation.
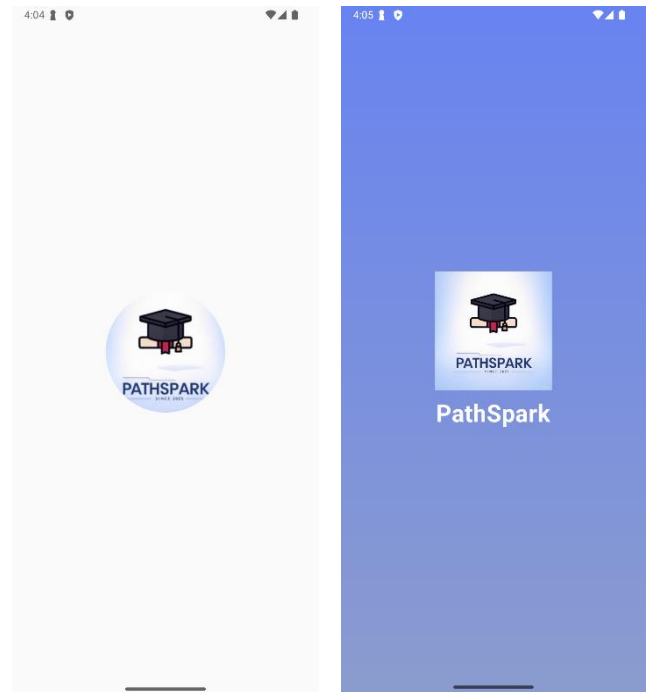

Fig. 2 Path Spark App splash screen

Testing the application, it proved capable of taking user inputs, from aptitude test results to psychometric assessments, to produce a customized recommendation on career paths.

To make sure that our recommendations were always relevant regarding in-demand skills and new job roles, we integrated real-time market data. With features such as

interactive dashboards, gamified assessments, and live counselling sessions, the user interface was visually appealing and intuitive to its users, receiving positive feedback during user acceptance testing. The cloud-based architecture of the application stood up to simulated high-traffic use cases, performing without degradation. User data privacy was guaranteed through security measures like OAuth 2.0 and SSL encryption.

The interactive elements, including the ability to chat live with experts or engage in discussion threads, created a sense of community that encouraged users to come back for more, and its detailed career roadmaps laid out the necessary steps to get from point A to point B.

Designed with an eye toward inclusivity, the platform's multicultural support, assisted by proper accessibility features, had, in turn, validated these diverse requirements in the user segments. Even testing confirmed the system's ability to streamline career-related uncertainty.
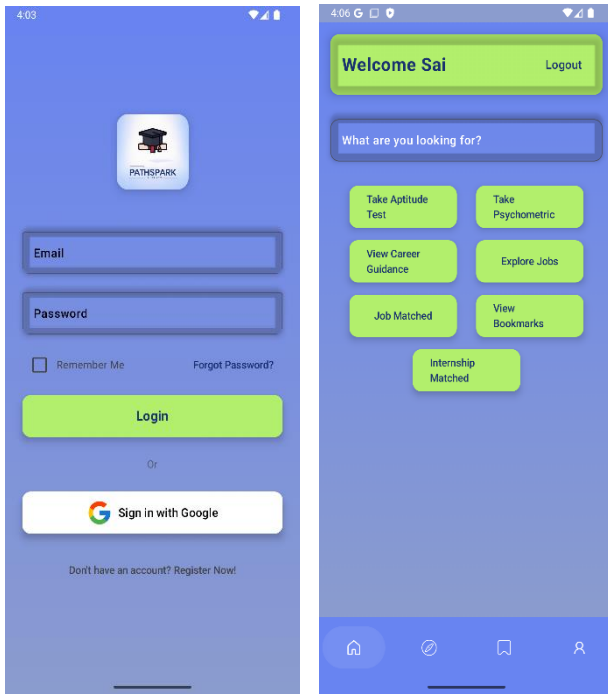

Fig. 3 Path Spark App login and home screen

As highlighted, Empowering Future Pathways has achieved its goal of creating a scalable, user-focused, and technologically driven career counselling solution. The deployment streamlines how students prepare for their future careers while closing the gap between classroom potential and real-world opportunity, promoting personal and collective growth. The potential features in the next phase could include predictive analytics for career trends, immersive augmented reality for virtual career exploration, and expanded integrations to global labour market insights.
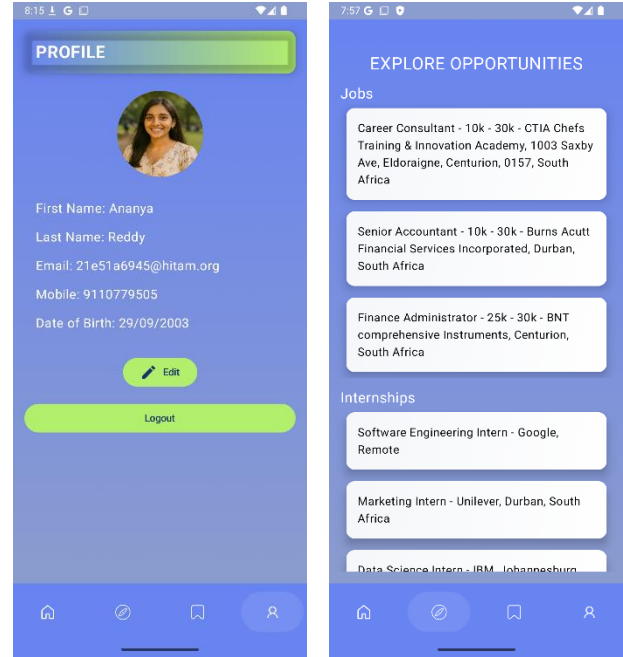

Fig. 4 Path Spark App profile and explore screen

8. Conclusion

"Path Spark" Career counseling and guidance app is a game-changer for careers! Through the incorporation of psychometric assessments and up-to-date labour market data, the platform provides personalized data-driven career recommendations aligning with strengths, interests, and market demand. Designed focusing on the User with interactive counseling, detailed career roadmaps, and a very user-friendly interface, it provides accessibility and engagement to a wide spectrum of users ranging from students to teachers and counselors.

This application closes the gap between the potential in academia and employment opportunities while helping to eliminate some uncertainty in the job market and solidifying confidence in making decisions. Its scalable, tech-based strategy not only maximizes student readiness for careers but also drives economic development by developing an agile, receptive labour force. The insights gained from this project open doors to a bright future for personalized education and professional development powered by technology.

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