Quizify: Intelligent Quiz Generator Powered by AI

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Abstract— **The increasing integration of Artificial Intelligence (AI) in the field of education has paved the way for innovative solutions that enhance automation, personalization, and efficiency in teaching and learning. This research presents the design and development of Quizify, an AI-powered quiz generator and assessment platform built as an Android application. The primary goal of Quizify is to simplify the process of test creation for educators by enabling them to generate multiple-choice question (MCQ) test papers based on a provided topic and desired number of questions. Leveraging Google Gemini's generative AI capabilities, the app intelligently generates well-structured and topic-relevant quizzes, reducing the time and effort teachers typically invest in manual test preparation. Teachers also have the flexibility to review and edit the generated questions before assigning them to students, ensuring accuracy and alignment with their curriculum.**

The app is developed using Kotlin, Jetpack Compose, and Firebase, and follows the Model-View-ViewModel (MVVM) architecture to promote modularity, scalability, and maintainability of the codebase. Students can access these quizzes through a unique join code, participate in the assessments, and submit their answers through an intuitive user interface. The platform also allows teachers to review student submissions, monitor progress, and analyze performance through a real-time backend system. This paper outlines the core methodologies used in building Quizify, highlights the challenges encountered during development, and explores the app's potential impact on modern digital learning environments.

I. INTRODUCTION

With the rapid growth of online education and remote learning platforms, the need for automation in academic tasks has become increasingly important. One of the most time-consuming responsibilities for educators is the creation of quiz and test papers, which often requires careful planning to ensure question quality and balance. Traditional methods of manually preparing assessments can be inefficient and repetitive, especially when catering to large numbers of students or covering multiple topics.

Artificial Intelligence (AI) offers automated systems that can analyze input topics, understand context, and generate diverse and meaningful quiz content. AI-powered quiz generation not only speeds up the preparation process but also enhances assessment techniques by introducing variety and adaptability. It helps maintain consistency in difficulty levels and encourages more frequent evaluations to support student learning and retention. Moreover, AI enables the personalization of assessments based on individual learning needs and academic goals.

Quizify is designed to address these needs by offering an intuitive, AI-assisted platform that enables teachers to generate quizzes quickly and effectively. Teachers simply input a topic and the number of questions, and the AI engine generates a structured multiple-choice questionnaire. The app also allows teachers to review, edit, or replace any question, ensuring accuracy and relevance. This blend of automation and flexibility helps keep the assessments personalized and curriculum-aligned.

By integrating advanced AI capabilities, Quizify reduces the manual workload of educators while improving the learning experience for students. It supports a smarter approach to continuous evaluation and helps make digital education more scalable and effective.

II. RELATED WORKS AND PREVIOUS RESEARCH

As education moves toward digital platforms, the need for smarter assessment tools has grown. Many researchers have explored how artificial intelligence

(AI) can help with quiz generation, performance tracking, and personalized learning. Quizify is built on these ideas, offering an AI-powered solution to improve the quiz-making and assessment process.

A. AI-Based Quiz Generation

Studies show that large language models (LLMs) can create topic-based multiple-choice questions with just a small amount of input. These AI tools help teachers save time while keeping quiz content accurate and varied.

B. Collaboration Between AI and Teachers

Research highlights that while AI can assist in generating questions, teachers are still essential. They check for accuracy, adjust question difficulty, and ensure the content fits the learning goals.

C. Student Engagement Through Digital Assessments

Platforms that offer easy access to quizzes and instant feedback have been shown to boost student participation. A user-friendly and game-like experience makes learning more fun and continuous.

D. Scalable and Flexible Assessment Systems

AI-powered tools can handle a high number of quizzes and users at the same time. This scalability makes it easier for schools and colleges to conduct regular tests and track progress efficiently.

By following these trends, Quizify supports modern education and solves real problems that teachers face in the digital learning space.

III. METHODOLOGY

Quizify was developed using modern tools and architectural patterns to ensure an intelligent, responsive, and user-friendly quiz application. The following technologies and frameworks were used:

A. Kotlin for Programming

Kotlin was chosen for its concise syntax, safety features, and support for coroutines, enabling smooth asynchronous operations within the app. Its modern language design helped reduce boilerplate code and allowed faster development cycles.

B. Jetpack Compose for UI

The user interface of Quizify is built using Jetpack Compose, a modern toolkit that follows a declarative approach. It enables the development of responsive, animated interfaces while simplifying state management. This approach improves performance and reduces UI-related bugs, resulting in a smooth user experience.

C. Firebase Realtime Database

Firebase plays a critical role in data storage and synchronization. It ensures real-time syncing of quiz data and user responses across devices. With offline persistence, users can continue their quizzes even without an active internet connection. Firebase also provides secure authentication and multi-user access, ensuring seamless interactions in various network conditions.

D. MVVM Architecture

To maintain a clean and modular codebase, the Model-View-ViewModel (MVVM) architecture was adopted. The Model layer handles data-related tasks, including fetching and storing quiz content. The ViewModel serves as a communication bridge between the UI and the data layer, processing information and exposing it to the View. The View, built with Jetpack Compose, dynamically responds to data changes. This structure improves the maintainability, scalability, and testability of the app.

E. Google Gemini API (Flash 1.5) for AI

The integration of Google's Gemini API significantly enhances the intelligence and adaptability of the Quizify application. The AI model is capable of generating dynamic quiz questions based on the user-provided topic. This reduces the manual workload for educators while maintaining relevance and quality in the generated content.

In addition to question generation, the AI analyzes user responses in real time. It provides instant feedback that helps students understand their mistakes and learn more effectively, fostering a more interactive learning experience.

The system also adapts the difficulty level of the quiz based on the learner's performance. If a user performs well, the system gradually increases the complexity of questions, whereas struggling users receive simpler ones to support their understanding.

Lastly, an AI-powered chatbot is integrated within the app to assist users during quiz sessions. This virtual

assistant helps clarify doubts, guide users through the interface, and offer relevant suggestions — making the learning journey more supportive and user-friendly.

IV. WORKING PRINCIPLE

The core functionality of Quizify relies on the seamless interaction between the user prompt, the Gemini AI model, and the Firebase-powered backend to generate and deliver personalized quizzes.

When a user inputs a topic or prompt, it is passed to the Gemini model, which initiates a function call. This function is responsible for preparing the necessary API parameters such as topic, difficulty level, and number of questions. These parameters are sent to a designated API endpoint using a secured connection.

The API processes the request and returns an API response in structured JSON format, which includes multiple-choice questions, correct answers, and optional explanations. This response is handled by the function response block, which is returned to Gemini. Finally, the model response is passed back to the app interface, displaying the quiz in a clean, user-friendly format using Jetpack Compose UI.

The entire flow ensures real-time, dynamic, and intelligent quiz generation tailored to the user's input and preferences. This system also enables adaptive feedback and difficulty adjustment using Gemini's contextual capabilities.
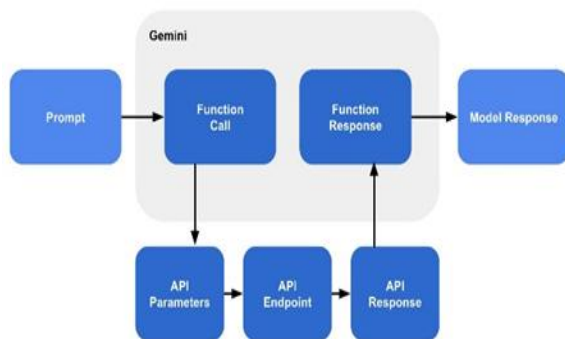

Figure 1. Working Flow of the Quizify Application

V. USER INTERFACE OVERVIEW

Quizify features a clean, intuitive, and responsive user interface designed to enhance user engagement and learning experience. The interface is built using Jetpack Compose, enabling smooth animations and a dynamic layout that reacts to user interactions. Key UI components include topic input fields, dynamically generated quizzes, progress indicators, and an integrated AI chatbot interface.
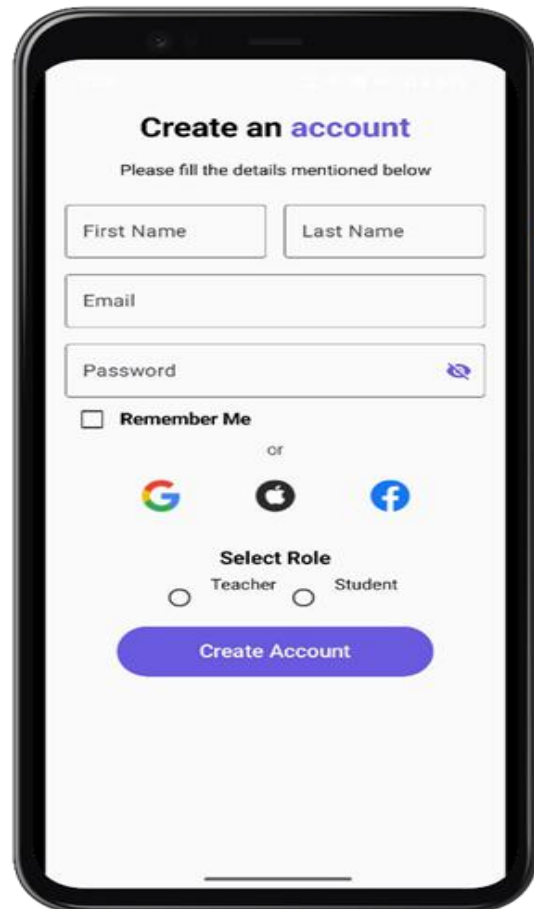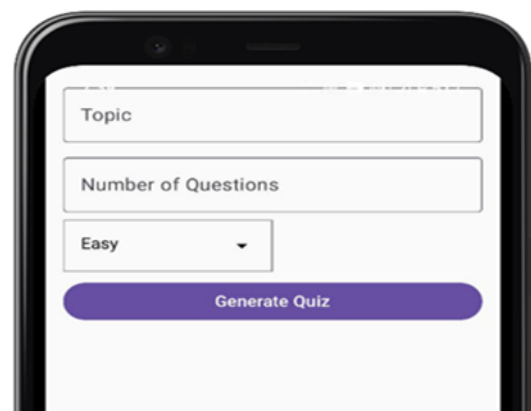

Figure 2. SignUp Page

Figure 2. Teacher Interface for Quiz Creation

Figure 3. Student Interface for Taking Quizzes

VI. RESULT AND DISCUSSION

Quizify demonstrated a significant boost in efficiency by reducing quiz creation time by approximately 70% when compared to manual methods. This improvement is mainly due to the integration of the Google Gemini API, which generates high-quality, structured questions instantly. Despite relying on AI, the app maintains flexibility by allowing educators to review and adjust the content, ensuring that quizzes meet specific academic standards. This human-AI collaboration balances automation with control, making the system both time-saving and adaptable to different teaching needs.

In terms of user experience, Jetpack Compose offers a visually engaging and responsive interface, enhancing student interaction with the app. Real-time feedback, smooth navigation, and dynamic animations contribute to a more enjoyable and intuitive assessment process. Additionally, Firebase Realtime Database ensures reliability by supporting real-time

quiz distribution, multi-user access, and offline capabilities. These technical strengths enable a seamless experience for both teachers and students, making Quizify a reliable and scalable platform for digital learning environments.

VII. CONCLUSION

Quizify demonstrates how AI can be practically applied to solve real-world educational challenges. By automating the quiz creation process using the Google Gemini API, the application saves valuable time for educators while maintaining quality through customizable outputs. The app's ability to adapt quiz difficulty based on student performance not only personalizes learning but also encourages continuous improvement. Furthermore, the AI chatbot offers an interactive layer of support, enhancing student engagement and reducing dependency on teacher intervention for basic queries.

The use of modern technologies such as Kotlin, Jetpack Compose, Firebase Realtime Database, and MVVM architecture ensures that the application is not only functional but also scalable, responsive, and maintainable. Its user-centric design makes it accessible for both teachers and students, regardless of their technical background. Overall, Quizify presents a balanced blend of automation, user control, and real-time interaction—proving that AI can be a powerful assistant in reshaping the education landscape, making assessments smarter, faster, and more student-friendly.

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