

# **Smart Quizzer AI - Adaptive AI-Based Quiz Generator**

**An intelligent platform for personalized learning through AI-powered quizzes**

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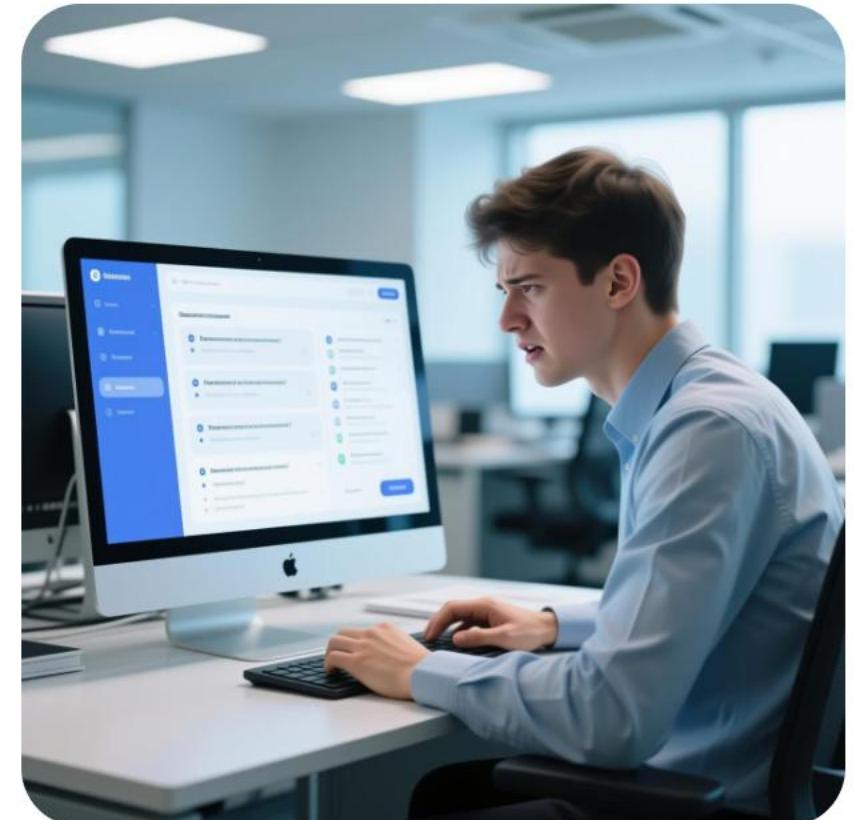
# Introduction

Smart Quizzer AI is an **AI-powered, adaptive** quiz generation system designed to revolutionize learning. It dynamically creates questions directly from educational content, ensuring relevance and depth. The system features **real-time** difficulty adjustment, tailoring challenges to individual performance. Users benefit from immediate feedback and comprehensive progress tracking, making it an ideal tool for students, teachers, and self-learners seeking personalized and effective study methods.



# Problem Statement

- Traditional quiz tools are static and non-personalized.
- Everyone faces the same difficulty regardless of skill.
- Manual quiz creation is time-consuming.
- No real-time analytics or adaptive behavior.
- Limited feedback and engagement.



# Objectives



Develop AI-driven question generation system



Implement adaptive learning and quiz engine



Provide real-time feedback and analytics



Support topic-based and personalized quiz creation



Create engaging and dynamic user interface

# Modules Overview



User & Profile Management



Content Ingestion & Parsing



AI Question Generation



Difficulty Classification



Adaptive Quiz Engine



Answer Evaluation & Feedback

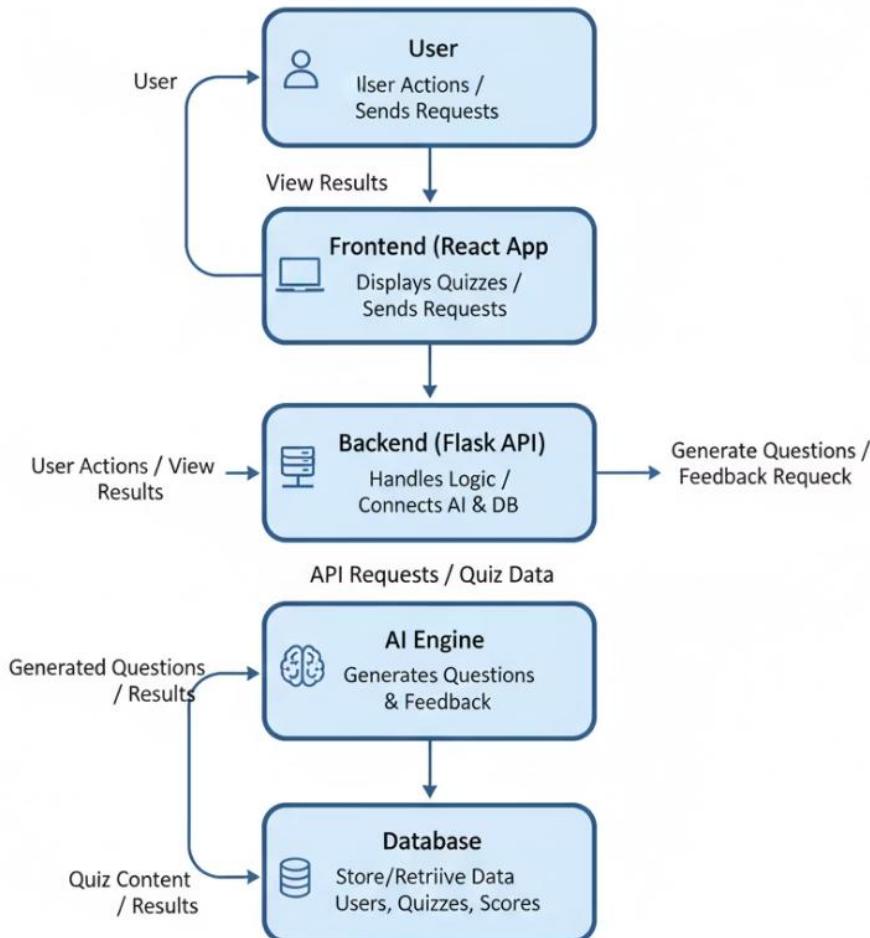


Leaderboard & Analytics

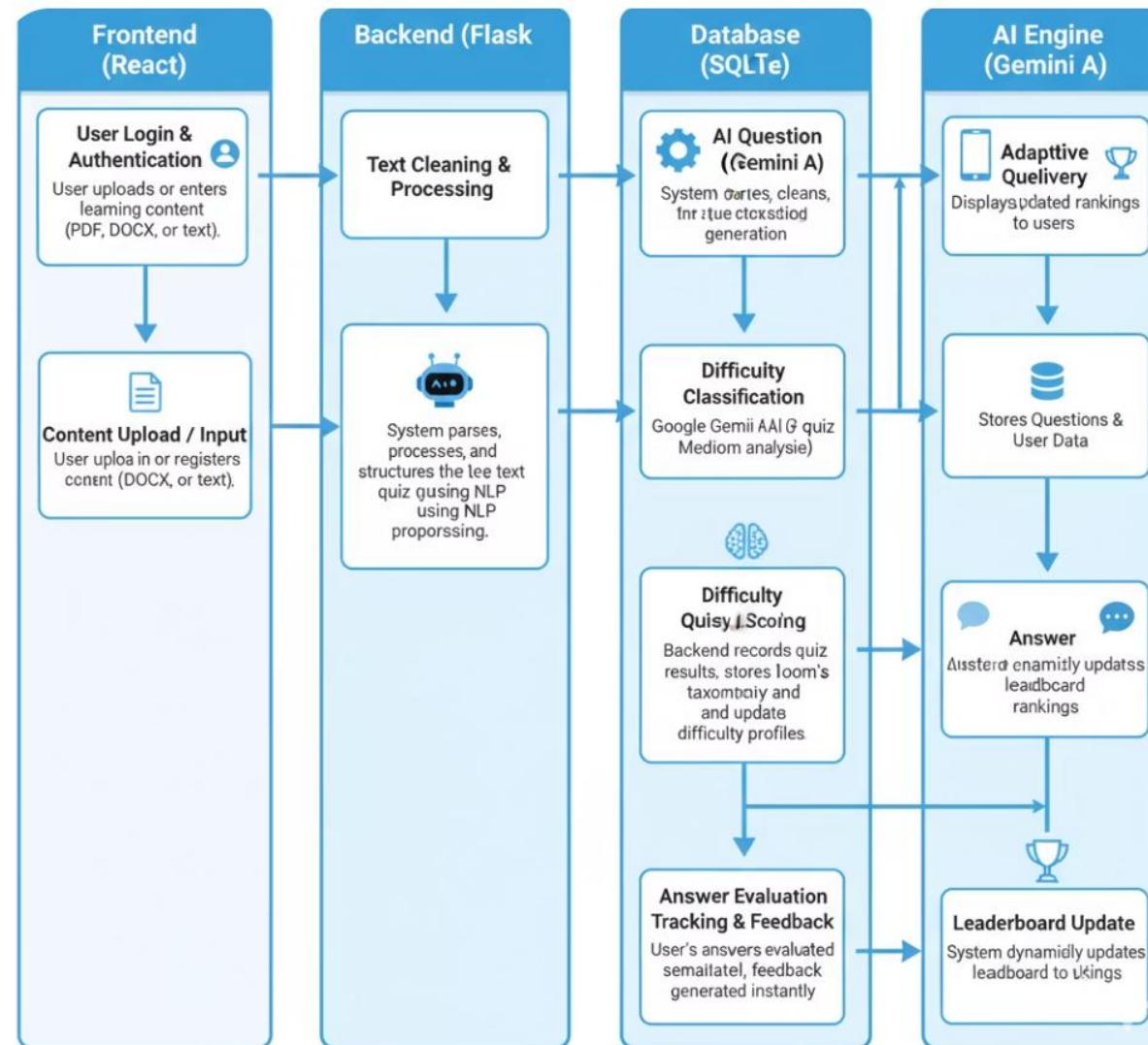


Admin Dashboard

# Architecture Diagram



# Workflow / Data Flow



# Adaptive Quiz Engine

Real-time difficulty adjustment based on user accuracy, correct answers lead to harder questions, wrong answers lead to easier questions, uses Bloom's taxonomy and semantic complexity analysis, learner performance history affects future quizzes

**What is  $15 + 7 - 3$  equal to?**

- A) 19
- B) 25
- C) 15
- D) 22

  **Excellent!**

 Explanation: First, add  $15 + 7 = 22$ . Then, subtract 3 from 22, which equals 19.

|                 |                |                   |
|-----------------|----------------|-------------------|
| 1/3<br>Progress | 33.3%<br>Score | 12s<br>Time Taken |
|-----------------|----------------|-------------------|

 **Adaptive Learning Insights**

Next Difficulty: **EASY** Streak:  1 correct

Confidence: 50%

Reason: maintaining level

 Back to Dashboard →  Flag Question  Feedback  Next Question →

# Answer Evaluation & Feedback

## Example Question & Answer

**Question:** How does Smart Quizzer AI check for answer correctness?

**Your Answer:** It uses natural language processing, specifically sentence transformers, to determine how close my answer is to the expected one.

Checks correctness using NLP (Sentence Transformers).

Accepts near-correct answers (semantic similarity  $\geq 80\%$ ).

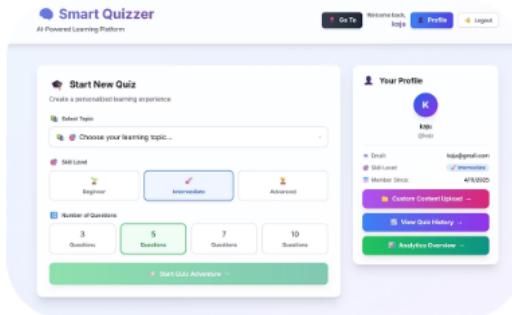
## System Feedback

**Feedback:** Excellent! Your answer demonstrates a strong understanding of the underlying technology. The semantic similarity to the ideal answer is 95%.

Provides instant feedback and explanation.

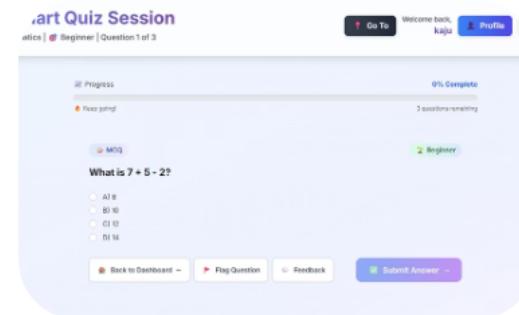
Updates user progress record dynamically.

# User Interface (Frontend Features)



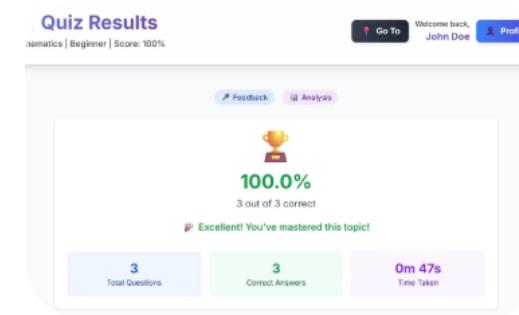
## Dashboard

Tracks performance and badges



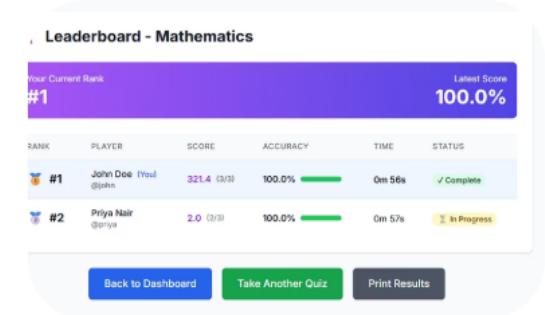
## Quiz Page

Adaptive questions, timer, hints



## Results Page

Detailed feedback



## Leaderboard

Real-time ranking

# Admin Dashboard



## Manage Users & Roles

Oversee user accounts and assign administrative or learner roles.



## Review Flagged Questions

Address user-reported issues and maintain question quality.



## Access Feedback & Statistics

Gain insights from user feedback and system performance data.



## Monitor Leaderboard & Activity

Track global user rankings and system engagement metrics.



## Admin Dashboard

Manage users, moderate content, and monitor platform health

Logged in as  
**System Administrator**  
Administrator

Logout

Overview

Users

Leaderboard

Moderation

Feedback

Auto-refresh On

Total Users



12

4 active today

Total Quizzes



423

Avg Score: 69.8%

Questions Generated



4250

# Leaderboard & Gamification

Real-time leaderboard updates after every quiz, rankings based on correct answers and time, achievements and badges encourage competition, performance-based scoring

 Admin Dashboard

Manage users, moderate content, and monitor platform health

Logged in as  
System Administrator  
Administrator

 Logout

Auto-refresh  On

 Overview  Users  Leaderboard  Moderation  Feedback

 Global Leaderboard  Live Updates ON Last updated: 8:49:57 pm  Refresh

 Search by username or email...  Filter by topic...  Search

 Recent Activity  User Statistics

 Performance Leaderboard (12 users ranked)

Showing each user's most recent quiz attempt, ranked by: 1) Correct Answers (higher is better), 2) Time Taken (faster is better)

| RANK | USER                           | TOPIC            | CORRECT ANSWERS | ACCURACY | TIME TAKEN | SUBMITTED AT             |
|------|--------------------------------|------------------|-----------------|----------|------------|--------------------------|
| #1   | meera<br>Meera Joshi           | Mathematics      | 12/15           | 80%      | 11m 0s     | 3/11/2025<br>10:12:31 am |
| #2   | deepak<br>Deepak Gupta         | Computer Science | 10/15           | 66.7%    | 13m 0s     | 3/11/2025<br>8:34:42 am  |
| #3   | sneha<br>Sneha Reddy           | Geography        | 9/13            | 69.2%    | 19m 0s     | 2/11/2025<br>9:31:41 pm  |
| #4   | ravi<br>Ravi Kumar             | Mathematics      | 9/13            | 69.2%    | 19m 0s     | 3/10/2025<br>4:51:11 am  |
| #5   | admin1<br>System Administrator | Computer Science | 8/13            | 61.5%    | 25m 0s     | 3/11/2025<br>11:35:41 am |
| #6   | arjun<br>Arjun Mehta           | Chemistry        | 7/9             | 77.8%    | 20m 0s     | 2/11/2025<br>11:11:41 am |

## Achievements & Badges



### Perfect Score

Achieved 100% accuracy on a quiz.



### Fast Thinker

Completed a quiz quickly and accurately.



### Streak Master

Answered multiple questions correctly in a row.



### Quiz Master

Completed a significant number of quizzes.

Back Go To Welcome back, John Doe Profile Logout

Overview Badges AI Insights

#### Your Badges

**Badge Collection**

|               |              |            |
|---------------|--------------|------------|
| Badges Earned | Total Points | Completion |
| 5             | 255          | 24%        |

All Badges Milestones Perfect Scores Speed Streaks Accuracy Topic Masters Special

|   |  |  |  |  |
|---|--|--|--|--|
| First Quiz<br>Complete your first quiz<br><small>10 points common 4/11/2025</small> | Quiz Master<br>Complete 10 quizzes<br><small>25 points common 4/11/2025</small>  | Quiz Legend<br>Complete 50 quizzes<br><small>Not earned yet rare</small>                     | Quiz Titan<br>Complete 100 quizzes<br><small>Not earned yet epic</small>                                 | Perfect Score<br>Get 100% on any quiz<br><small>20 points common 4/11/2025</small> |
| Perfectionist<br>Get 100% on 5 quizzes<br><small>Not earned yet rare</small>        | Flawless Victory<br>Get 100% on 10 quizzes<br><small>Not earned yet epic</small> | Speed Demon<br>Complete a quiz in under 2 minutes<br><small>50 points rare 4/11/2025</small> | Lightning Fast<br>Complete 5 quizzes in under 2 minutes each<br><small>150 points epic 4/11/2025</small> | On Fire<br>Get 5 correct answers in a row<br><small>Not earned yet common</small>  |

# Technology Stack



## Frontend

- React 18
- TypeScript
- Tailwind CSS
- React Router
- Axios



## Backend

- Flask
- SQLAlchemy
- Flask-JWT
- Gemini AI
- Sentence Transformers



## Database

- SQLite (development)
- PostgreSQL (optional)

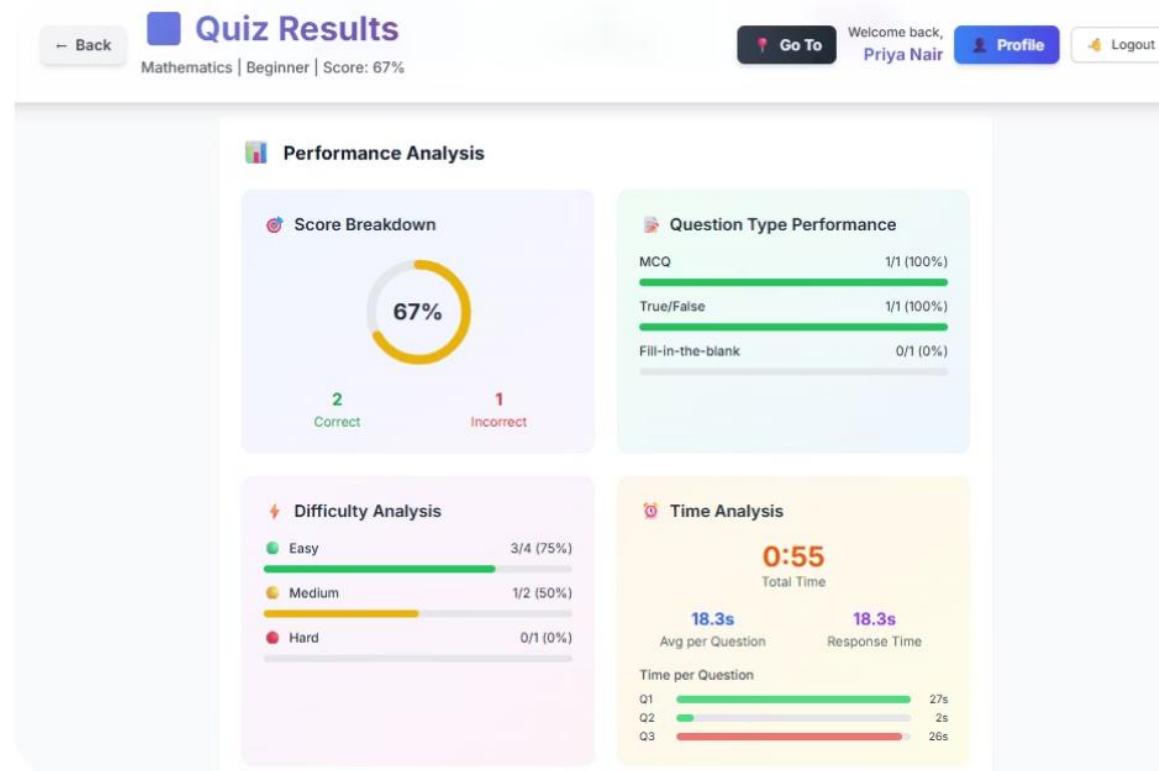


## Tools

- Docker
- pdfplumber
- python-docx
- BeautifulSoup4
- NLTK

# Analytics & Results

Smart Quizzer AI provides comprehensive visual analytics to track user progress and accuracy. Our intuitive dashboard displays graphs, charts, and trends showing a user's improvement over time, their difficulty progression, and learning curve. This data-driven approach allows for personalized recommendations for weak areas, ensuring an optimized learning path.



# Future Enhancements

## Voice-Based Quizzes

Integrate advanced speech recognition for interactive verbal responses.



## Mobile App Version

Develop a dedicated mobile application for on-the-go learning.



## Multilingual Generation

Expand question generation to support multiple languages for global reach.

## Live Multiplayer Quizzes

Enable real-time competitive quizzes among users to enhance engagement.

## AI Study Recommendations

Offer personalized study paths and content based on performance data.



# Conclusion

Smart Quizzer AI provides personalized, adaptive, and efficient learning. It intelligently bridges AI with education. Real-time analytics, adaptive quizzes, and engaging UI ensure effective learning. Ready for academic and enterprise use.

**Adaptive Learning  
Made Smarter with AI**

# Thank You

Empowering Learners with AI

GitHub: [github.com/BatchuMamatha/Smart-Quizzer-AI](https://github.com/BatchuMamatha/Smart-Quizzer-AI)