Brain Boost : A PTE Examination Preparation Website

Akshara M S[*1],Dhaya Varghese[*2],Roshini Kuriakose[*3], Soorya Pradeep[*4],Krishnaveni V V[*5]
College of Engineering Kidangoor, Kerala, India
aksharams1111@gmail.com[*1] , dhayasusan2003@gmail.com[*2] , roshinik810@gmail.com[*3] ,
pradeepsoorya73@gmail.com[*4] , veni.anuraj@gmail.com[*5]

***Abstract*—Brain Boost is a website designed to help users prepare for the Pearson Test of English (PTE). The platform provides a structured approach to learning by incorporating exam-style practice questions which can be uploaded by admin, a detailed result with a section wise split up. This research paper explores the development and implementation of Brain Boost, covering its methodology, system architecture, and the impact on PTE aspirants. The results indicate that the application significantly enhances learning efficiency, user engagement, and performance tracking, making it an effective tool for language learning.**

***Index Terms*—Machine learning, Deep learning, Speech recognition**

I. INTRODUCTION

In today's interconnected world, English has solidified its position as the global language. Its importance extends far beyond academic settings. Some key areas where English proficiency is vital including the areas of education, career opportunities, career advancement, communication and collaboration- Global Networking, business and trade, technology, innovation and scientific research.

The Pearson Test of English (PTE) Academic is a computer-based English language test widely recognized by universities and institutions globally. Assesses a test taker's ability to communicate effectively in an academic setting. The PTE is designed to evaluate skills in speaking, listening, reading, and writing. One of the key advantages of the PTE is its computer-adaptive format, which ensures a fair and objective assessment of language abilities. This means that the difficulty level of the questions is adjusted based on the candidates performance, providing a more accurate evaluation.Another benefit of the PTE is the quick turnaround time for the results. Test-takers typically receive their scores within a few business days, allowing them to make timely decisions about their academic or professional plans. Its acceptance by a diverse range of institutions makes it a popular choice for individuals seeking to study or work abroad. To prepare for the PTE, a variety of resources and tools are available. These include practice tests, simulated exam conditions, and instant feedback to help test-takers identify their strengths and weaknesses. By utilizing these resources and practicing regularly, individuals can significantly improve their PTE scores and enhance their chances of achieving their academic and career goals. PTE Academic is a valuable tool for assessing English language proficiency. Its computer-adaptive format, quick results, and wide acceptance make it a reliable choice for people seeking to pursue higher education or career opportunities in English-speaking countries. By understanding the test format, practicing regularly, and utilizing available resources, test-takers can increase their confidence and achieve their desired PTE scores.

Emerging web platforms for PTE preparation integrate several advanced technologies to create an immersive and personalized learning experience. Artificial Intelligence (AI) plays a major role, enabling personalized feedback and adaptive learning, where exercises adjust based on user performance. Machine Learning (ML) algorithms further analyze user data, identifying patterns in strengths and weaknesses to create a customized study path. Natural Language Processing (NLP) is essential for automated scoring in the speaking and writing sections, allowing instant, detailed feedback on language accuracy, fluency, and coherence. Additionally, cloud computing supports these platforms, ensuring scalability, real-time access, and high-speed data processing, while data analytics provides insights into learner progress and potential areas of improvement. Furthermore, voice recognition technology offers advanced speaking practice by analyzing pronunciation and accent, helping candidates prepare for real-world speaking tasks.

II. LITERATURE SURVEY

The literature survey explores the development and effectiveness of various online platforms designed to prepare candidates for the Pearson Test of English (PTE). With the increasing reliance on digital learning tools, these platforms have revolutionized the way test-takers approach PTE preparation. Studies indicate that structured practice plans, AI-driven assessments, and expert guidance play a crucial role in maximizing test performance.

A. Evolution of Virtual Personal Assistants

The development of VPAs started with simple rule-based systems that could execute predefined commands. Over time, advancements in NLP and AI have enabled VPAs to process natural language more effectively, making interactions more intuitive and seamless. Today, AI-based voice assistants such as Google Assistant, Siri, Alexa, and Cortana utilize deep learning and NLP techniques to understand user queries, perform tasks, and provide personalized responses.

B. Voice Assistants and Human-Computer Interaction

Voice-controlled AI assistants have significantly enhanced the way users interact with technology. Research in human-computer interaction has shown that voice assistants improve accessibility and efficiency by enabling hands-free operation. Studies have explored the integration of NLP and speech-to-text conversion, which allows these assistants to interpret spoken commands and execute tasks accurately.

C. AI and NLP in Virtual Assistants

Modern virtual assistants employ AI and NLP for speech recognition and response generation. Google Duplex, for instance, leverages deep learning to conduct human-like conversations. Similarly, IoT-based VPAs integrate Raspberry Pi and NLP technologies to facilitate automation and smart home control. The continuous evolution of NLP models enables these assistants to understand complex commands, extract user intent, and generate appropriate responses.

D. Personalization and Adaptive AI in VPAs

A major focus of recent research has been on personalizing VPAs to cater to individual user needs. AI-driven assistants use machine learning algorithms to analyze user preferences, learn from interactions, and provide tailored recommendations. For example, modern VPAs can suggest movies, music, and news based on past behavior, enhancing user engagement. Additionally, integration with APIs such as OpenWeatherMap and Hugging Face allows VPAs to fetch real-time information and respond contextually.

E. Advancements in VPA Technology

The ongoing advancements in AI and NLP have led to more sophisticated VPAs with capabilities such as:

Context Awareness: AI models can maintain context over multiple interactions, improving the coherence of conversations.

Multimodal Inputs: Modern VPAs support both text and voice commands, providing users with flexible interaction methods.

Secure and Efficient Data Management: AI-driven assistants incorporate encryption and authentication mechanisms to ensure data privacy.

III. METHODOLOGY

The methodology implemented in this study follows a structured approach, integrating advanced technology-driven solutions to create an interactive and efficient PTE preparation platform. The system incorporates evaluation, chatbot support, secure authentication, and performance tracking to deliver a seamless learning experience.

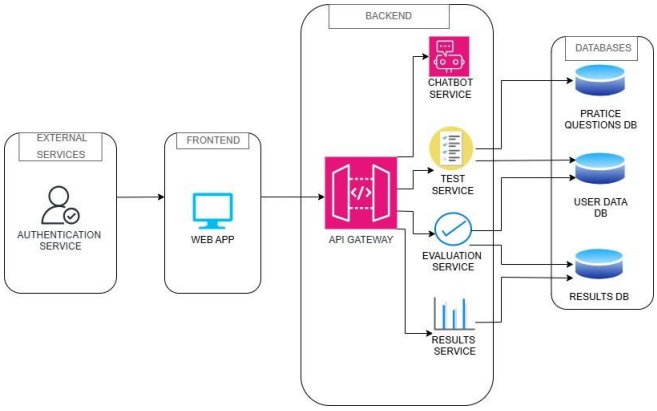

Fig. 1. *System Architecture*

A. User Module

This module acts as a bridge between the user and Brain Boost. Brain Boost has two main users, namely admin and aspirant. An account can be created as an administrator or an aspirant. Admin has the provision to add questions and view the registered user and their results. The candidate can attempt the exams and view the result, the previous result can also be viewed.

The user interface is build using the HTML for structure, CSS for styling and JavaScript for interactivity. They were used in combination to make a user-friendly interface. Bootstrap was also employed to make it more dynamic.

B. Authentication Module

Only registered users can use the services. While registered as aspirant the image of face is taken and stored into the database, sixty image is taken to ensure the accuracy. When a user tries to log in the system will capture a new image and will compare it with stored image in the database. If the face matches a stored profile, the user is granted access. Otherwise, authentication fails.

Haar cascade algorithm is used for face detection. The system capture the image using the webcam and will be saved to the database and when tried to log in the system captures a new image and compares it with stored images. If the face matches a stored profile, the user is granted access. Otherwise, authentication fails.

C. Test Module

The Test Module in Brain Boost is responsible for conducting different sections of the Pearson Test of English (PTE). It includes four main sections: Reading, Writing, Listening and speaking. Each section follows a structured flow where questions are retrieved from the database, user responses are recorded, and automated evaluation is performed. The user selects a section and the questions will be fetched from the database. User submits the responses either by typing or speaking. In reading section we use WebSpeech API to convert the speech into text and this text will be compared with the text. For other parts we will compare it with the answer given by the aspirant to the one stored in the database.

D. Evaluation

After completing a test, the PTE preparation web application employs an automated evaluation system to assess users performance based on predefined scoring criteria. The evaluation process covers all four sections—Speaking, Writing, Reading, and Listening—ensuring a comprehensive analysis of aspirants skills

E. Result

A detailed score report, providing section-wise scores and an overall performance.The system maintains a record of past attempts, allowing users to track improvements over time. A graphical representation of progress is displayed on the dashboard, helping aspirants identify strengths and weaknesses.

F. Chatbot

The chatbot module in the PTE preparation web application is designed as an interactive vocabulary-building tool. It helps users expand their English vocabulary by providing word meanings, phonetic transcriptions, and synonyms. By offering instant responses, the chatbot enables users to learn new words effortlessly, improving their comprehension and communication skills. Users can input any English word, and the chatbot retrieves Phonetics (Correct pronunciation using phonetic transcription),Meaning (A concise definition of the word), Synonyms (Alternative words with similar meanings to enhance vocabulary). The chatbot is available as a widget on the aspirant dashboard, allowing easy access without disrupting the test-taking experience. The chatbot is integrated with the Dictionary API, which provides a database of word definitions, phonetics, and synonyms. The implementation process includes:

User Input Handling: The chatbot accepts a word input from the user. API Request: It sends a request to the Dictionary API to fetch word-related data. Response Processing: The retrieved data is formatted and displayed to the user in a structured manner. User-Friendly Interface: The chatbot appears as a small pop-up widget for seamless interaction.

IV. RESULT AND DISCUSSION

The implementation of the Brain Boost web app has successfully provided PTE aspirants with a structured and interactive platform for exam preparation. The key outcomes of the project are summarized below:

A. Enhanced Learning Experience

The platform's structured approach to PTE preparation has resulted in a more engaging and interactive learning experience. Each test section provides users with an opportunity to develop skills specific to the PTE exam. The incorporation of AI-driven speech and text analysis ensures a comprehensive understanding of language proficiency.

B. AI Vocabulary Chatbot Integration

The AI chatbot has significantly improved users' vocabulary-building experience. With features such as real-time definitions, phonetic analysis, and contextual sentence suggestions, learners have been able to expand their vocabulary more effectively. The chatbot also adapts to the user's proficiency level, suggesting words that match their learning stage.

C. Performance Tracking and Feedback System

Aspirants have benefited from detailed performance insights, allowing them to monitor progress across multiple test attempts. The result tracking feature provides users with personalized recommendations to focus on weaker areas. Additionally, graphical progress visualization aids in identifying trends over time.

D. User Engagement and Accessibility

The intuitive interface and structured practice activities have contributed to improved user engagement. Timed practice sessions simulate real exam conditions, promoting better time management and confidence-building. The platform's accessibility across different devices ensures that users can practice at their convenience, further enhancing their learning experience.

E. Future Enhancements and Scope

While the platform has demonstrated significant success, future enhancements may include:

AI-Powered Speech Scoring: Refining pronunciation analysis using deep learning models.

Adaptive Learning Modules: Implementing AI-driven adaptive testing that modifies question difficulty in real time.

Mobile Application Integration: Expanding accessibility through mobile app development.

By integrating these improvements, the platform can further enhance personalized learning experiences and optimize test-taker performance.

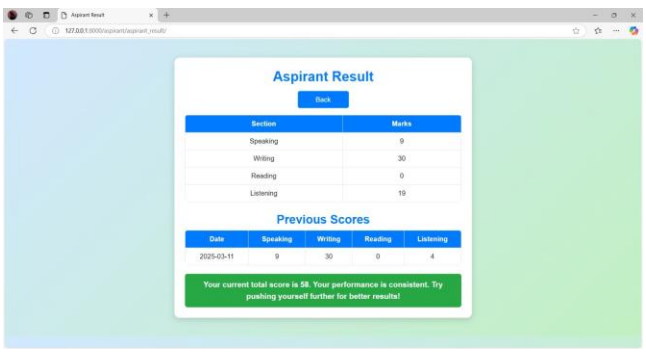

Fig. 2. *Aspirant Result*

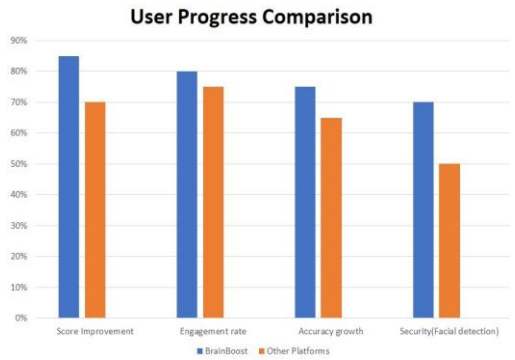

Fig. 3. *Aspirant Result*

The comparison graph shows that our PTE preparation website outperforms other platforms in key aspects such as score improvement, engagement rate, accuracy growth, and security. By using our website, users can achieve a higher score improvement (85%), as structured practice sessions help them achieve better results. The platform also increases engagement (80%) by providing regular question sets and a user-friendly interface that encourages consistent practice. Additionally, it ensures better accuracy growth (75%), as the systematic learning process helps users refine their skills over time. Lastly, the website offers superior security (70%) through facial detection, enhancing authentication and making the platform more reliable.

Overall our website provides a more effective and secure learning experience compared to other PTE preparation platforms. It has the potential to attract more users and help them achieve better PTE scores.

Technology	User Module	Authentication Module	Test Module	Evaluation	Chatbot	Result Tracking
HTML/CSS/JavaScript	✓		✓			✓
Bootstrap	✓		✓			✓
Haar Cascade Algorithm		✓				
WebSpeech API			✓			
Machine Learning (ML)			✓	✓	✓	✓
Natural Language Processing (NLP)			✓	✓	✓	
Dictionary API					✓	
Data Analytics						✓

Fig. 4. *Technologies used*

The table depicts that this paper leverages modern web technologies and AI-driven tools to deliver an effective PTE exam preparation platform. The frontend is built with HTML, CSS, JavaScript, and Bootstrap for a responsive and interactive user interface. Secure authentication is implemented using the Haar Cascade algorithm for face recognition. The test module integrates the WebSpeech API for speech-to-text conversion in speaking tasks, while Machine Learning (ML) and Natural Language Processing (NLP) enable automated scoring for writing and speaking responses. A vocabulary-building definitions, phonetics, and synonyms. Performance tracking utilizes data analytics to generate detailed progress reports, and cloud computing ensures scalability, real-time access, and secure data management. Together, these technologies create a personalized, adaptive, and user-friendly learning experience for PTE aspirants.

chatbot, powered by a Dictionary API, provides instant wordCONCLUSION

In summary, the Pearson Test of English (PTE) has become a vital tool for assessing English proficiency among non-native speakers. The paper explores the strengths of PTE preparation tools, particularly mobile applications that provide accessible, flexible, and targeted practice. Although these tools support candidates in improving their performance, there is potential for future platforms to incorporate advanced technologies such as artificial intelligence and adaptive learning. These technologies can improve personalization,enabling a tailored learning path that meets individual needs and challenges. As demand for PTE and other English proficiency tests grows, the evolution of these digital resources promises an integrated ecosystem that combines convenience with robust, real-time support for test-takers. This convergence of technology and education could set new standards for language learning, helping more candidates reach their desired proficiency levels effectively and confidently.

REFERENCES

[1] Hamide Kubra Altun and Jeongmin Lee. Immersive learning technologies in english language teaching: A systematic review. *Educational Technology International*, 21(2):155–191, 2020.

[2] Pallavi Asthana, Sumita Mishra, Nishu Gupta, Mohammad Derawi, and Anil Kumar. Prediction of student's performance with learning coefficients using regression based machine learning models. *IEEE Access*, 2023.

[3] Hareesh Buddha, Liyana Shuib, Norisma Idris, and Christopher Ifeanyi Eke. Technology-assisted language learning systems: A systematic literature review. *IEEE Access*, 2024.

[4] Sathena Chan and Lyn May. Towards more valid scoring criteria for integrated reading-writing and listening-writing summary tasks. *Language Testing*, 40(2):410–439, 2023.

[5] Yuya Chiba and Ryuichiro Higashinaka. Dialogue situation recognition in everyday conversation from audio, visual, and linguistic information. *IEEE Access*, 2023.

[6] Rose Clesham, Sarah Hughes, and Lauren Miller. Examining the domain relevance of pte academic for australian professional bodies. 2023.

[7] Eduard Frankford, Clemens Sauerwein, Patrick Bassner, Stephan Krusche, and Ruth Breu. Ai-tutoring in software engineering education. In *Proceedings of the 46th International Conference on Software Engineering: Software Engineering Education and Training*, pages 309–319, 2024.

[8] Hamed Ghaemi and Zahra Khorsand. A comparative study of writing scores in ielts and pte: An investigation into the factors leading to disparity in scores. *African Educational Research Journal*, 12(1):6–20, 2024.

[9] Shanshan He, Anne-Marie Se´ne´cal, Laura Stansfield, and Ruslan Suvorov. A scoping review of research on second language test preparation. *Language Testing*, page 02655322241249754, 2024.

[10] Rastislav Metruk. Mobile-assisted language learning and pronunciation instruction: A systematic literature review. *Education and Information Technologies*, pages 1–28, 2024.