IELTS Band Assessment Tool

1 Problem Statement

With the high social development and increasing worldwide relationships, English has become the most widely used language. A large amount of global knowledge and scholarly content is written in English. Proficiency in English has now become an integral requirement for students who wish to pursue bachelor's, master's, or even PhD programs in European, British, Canadian, American, and even in Middle Eastern universities. Many institutes require the IELTS examination, which is widely acknowledged as a measure of English proficiency. Although the IELTS exam is becoming more and more important, many students remain unsuccessful in obtaining the required band score.

However, there are no free tools available that let students take a complete mock IELTS test and get their band assessment. This makes it difficult for them to know if they are really ready for the test. So, students do not know if they need to study more or which parts they need to improve. Many students find this upsetting, and it may cause them to postpone their intentions to study overseas. There are many AI tools out there, but none that help with IELTS band assessment. We want to use Generative AI and Natural Language Processing techniques to create a tool that helps students check their own skills and know where they stand.

2 Introduction

2.1 History

The IELTS test has its roots in the English Language Testing Service (ELTS), which was introduced in 1980 by the British Council and the University of Cambridge Local Examinations Syndicate (UCLES). ELTS was designed to assess the English proficiency of students receiving British Government awards for study or training in the UK, particularly focusing on the necessary English tuition. Influenced by the communicative approach to language teaching and English for Specific Purposes (ESP) courses of the 1970s, ELTS aimed to simulate real-life language use and address specific language needs based on academic disciplines. However, the complex structure of ELTS, including six academic modules and discipline-specific materials, posed challenges in terms of resource allocation, scoring reliability, and validation studies, leading to the realization that a more unified test might be more effective [1].

Over time, several key features of ELTS have persisted in the modern IELTS. For instance, IELTS is still administered through a global network of language centers, with

local staff conducting and marking the speaking and writing tests. The face-to-face speaking test remains a core component, reflecting the test's aim to simulate real-life language use. The test's high value on face validity ensures acceptability among stakeholders, including immigration and government agencies. Additionally, the nine-level band scale, initially an informal instrument, has been retained, reflecting users' intuitive understanding of the scoring system. The principles of communicative test design from the 1970s and 1980s continue to underpin the construct validity of IELTS [1].

Significant changes from ELTS to IELTS include the reduction of academic modules and the introduction of a General Training module. The four-part test (Listening, Reading, Writing, and Speaking) became independent measures of macroskills, allowing for better operational flexibility. The test name changed to the International English Language Testing System, recognizing Australian involvement and marking the collaboration among the British Council, Cambridge, and Australian partners. This partnership, along with an international approach to item writing and standard native-speaker varieties, has enabled IELTS to become a globally administered, high-stakes test that meets diverse English proficiency needs [1].

2.2 Motivation

We are motivated to create an IELTS Band Assessment Tool because English is highly used in education and jobs around the world. As the world transforms, the proficiency in English is important to explore future opportunities related to studies and jobs. Our tool will benefit in following ways:-

- **Self-Evaluation:** Students will be able to see their strengths and weaknesses clearly, which will help them focus on areas that need improvement.
- **Achieving Goals:** With better preparation, students can reach their academic and career goals, studying and working in English-speaking countries.

By using advanced AI technology, we want to provide a solution that does not exist yet. There are many AI tools, but none for the full IELTS band assessment. Our project will use natural language processing and generative AI to make a simple platform where students can take mock IELTS tests and get detailed feedback. This will help students understand their strengths and weaknesses, giving them a better chance to get the band scores they need and achieve their goals in education and their careers.

3 Related Work

3.1 Comparative Analysis of Related Work

3.2 Comparative Analysis of Related Tools

Title	Authors	Year	Objective	Limitation
Teaching English in the Age of AI: Embracing ChatGPT to Optimize EFL Materials and Assessment [2]	Koraishi	2023	To explore the use of ChatGPT in optimizing English as a Foreign Language (EFL) materials and assessment, improving teaching methods, and enhancing learner engagement.	It focuses on ESL (English as Foreign Language) by leveraging ChatGPT, rather than comprehensive ILETS preparation, which include reading, writing, listening and speaking.
The Potential Use of Generative AI in ESL Writing Assessment: A Case Study of IELTS Writing Tasks [3]	Sun, Tianhe	2023	It explores the possible application of generative AI in the assessment of ESL writing, specifically focusing on IELTS writing and feedback to improve the accuracy, coherence, and cohesion of student essays.	It's solely for writing assessment, where it involves lack of detailed description and unreliable references from AI tools.
Practicing IELTS Writing for L2 Writers with ChatGPT; An Exploratory Self-Study [4]	Dwi Budidarma Sutrisno	2023	To examine how ChatGPT generates responses for determining the IELTS Writing Task, assists L2 writers in practicing IELTS writing, and offer the researcher's insights on using ChatGPT for IELTS writing practice.	This study focuses on writing for IELTS, neglecting reading, listening, and speaking. We are developing an entire IELTS system.
Evaluation of students' IELTS writing ability based on machine learning and neural network algorithm [5]	Yiran Liu	2021	Evaluate students' IELTS writing abilities using machine learning and deep learning techniques. The study aims to assess three aspects of English writing ability: English thought and expression, language use, and language standard writing.	The study solely evaluates writing abilities for Chinese students who pass CET-4 and CET-6; we address all four components of IELTS.
Smart Personal Intelligent Assistant for Candidates [6]	Senevirathne	2020	To create an intelligent assistant that can offer candidates personalized assistance and feedback in a variety of areas, such as learning a language.	It may include a lack of comprehensive coverage of all IELTS sections (reading, writing, listening, speaking) and possibly outdated methodologies that do not leverage the latest advancements in AI for language assessment.

Table 1: Comparative Analysis of Related Work

Title	Developer	Objective	Limitation
Kandor IELTS Prep Tool [7]	Kandor	To evaluate and improve public speaking skills using AI, focusing on metrics like clarity, confidence, and engagement.	Primarily focuses on public speaking and does not cover a comprehensive set of language skills such as writing or listening comprehension, which are crucial for IELTS preparation, and it is a paid tool.
IDP Education [8]	IDP Education	To provide a standardized English language proficiency test (IELTS) that assesses listening, reading, writing, and speaking skills and provide counselling and Tuition.	It does not offer a free mock test for practice. It requires a fee for taking the official exam.
Duolingo English Test [9]	Duolingo	To offer a convenient and accessible English proficiency test that can be taken online, assessing reading, writing, listening, and speaking skills.	While convenient, it may lack the depth and rigor of traditional standardized tests like IELTS. It also requires a fee and lacks ongoing free practice opportunities.
Grammarly [10]	Grammarly Inc.	To enhance writing skills by providing AI-driven grammar, spelling, and style suggestions.	Focuses mainly on writing and does not provide comprehensive assessment or training for speaking, listening, or reading skills, which are essential for IELTS preparation.
IELTS Prep App [?]	British Council	To assist learners in preparing for the IELTS exam by offering practice tests, tips, and resources for all four sections: listening, reading, writing, and speaking.	The app may have limited free content and may require in-app purchases for full access to all resources and practice materials.

Table 2: Comparative Analysis of Related Tools

4 Methodology

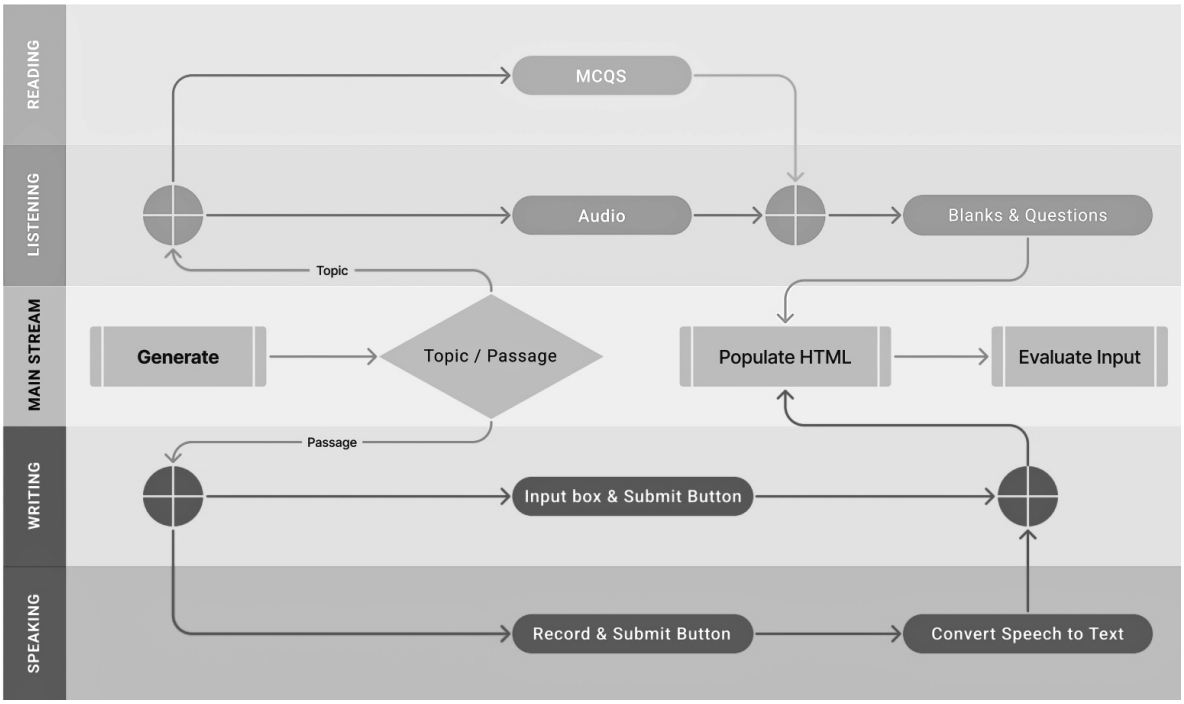

Figure 1: Swim Diagram

For each functionality we have created class where use advance technologies which includes Natural Language Processing (NLP), Generative Ai, Text-to-Speech, Accent Evaluation and other grammar checking APIs. Figure 1 demonstrate entire workflow with execution sequence.

4.1 Reading

The reading phase begins with the Generate passage class, which uses generative AI and natural language processing to produce a meaningful and contextually appropriate passage, and we then generate question which user will attempt and then evaluated The steps involved in this phase are:

Passage Generation: We have created a JSON file with 10 topics, each with 10 paragraphs. Our module system randomly picks a topic and selects any three paragraphs from it. Then, it sends this topic and its three paragraphs to the GPT-2 model, which will then generates a complete passage which will further used for examination. We have also add words limit in place to control the length of the passage.

MCQs Generation: Our MCQ generation module utilizes a combination of natural language processing techniques to create multiple-choice questions from a given passage. The system first selects random sentences from the passage and determine important words or phrases to mask. Then using the BERT pre-trained model, the module will predicts possible words for these masked words. The correct response for

the multiple-choice questions is then developed using these predictions. And by using WordNet we find synonyms and contextually similar words for options.

Blanks Generation: Creating fill-in-the-blank questions from generated passage is the main task of the blanks generation module. Key nouns, verbs, and adjectives are among the important words that the system recognizes and replaces with blanks. These words are chosen based on their importance to the overall meaning of the passage.

User Interaction: User will interact with the generated passage, MCQs, blanks, and questions at web page, where we populated it. After reading, the user will proceed to answer the multiple-choice questions (MCQs), fill in the blanks, and respond to the questions.

Evaluation: The user's selected answers and written answers will be matched with the actual answers stored in backend. This evaluation process calculates the user's score, which is used to calculate the band score for the reading phase. However, the band score will not be shown to the user immediately. Instead, a result page will be generated at the end, where the user can see their band score for each phase and the overall band score.

4.2 Listening

The listening phase is very similar to the reading phase in terms of passage generation, MCQs, blanks, and Q/A generation. However, they differ as they lies in how the user interacts with the content. Listening phase is designed to evaluate the user's listening ability.

Audio Conversion: We use the Text-to-Speech (TTS) module to adap the passage for listening. It converts the passage into a audio recording, with proper pronunciation. This audio conversion of the passage is crucial for testing the user's listening skills.

User Interaction: User will interact with the generated passage, MCQs, blanks, and questions at web page, where we populated it. User's can play the audio by clicking on the play button. After listening, the user will proceed to answer the multiple-choice questions (MCQs), fill in the blanks, and respond to the questions.

Evaluation: Evaluation is done in the same as way as done in reading phase, where answers will be matched with the actual answers stored in backend. This evaluation process calculates the user's score, which is used to calculate the band score for the listening phase. .

4.3 Writing

The writing phase is designed to assess the user's ability to write an essay on the given topic which is both coherent and contextually appropriate. This phase include generating topic, receiving user written essay as an input and its evaluation.

Topic Selection: We have already created a JSON file that contains a list of diverse topics. Our model will randomly selects a topic from JSON file, And user will write an essay on that topic.

User Interaction: The selected topic is populated in web page to present to the user. This user will then write an essay on the given topic, where user will express their ideas clearly and cohesively.

Evaluation: When user submit its essay, it is then sent to the hugging face transformers model, where we have used AutoModel and AutoTokenizer. The evaluation process includes analyzing various aspects of the essay, which includes cohesion, syntax, vocabulary, phraseology, grammar, and conventions. Each of these metrics is scored individually and this is according to ILETS band format. The scores is individual calculated for cohesion, syntax, vocabulary, phraseology, grammar, and conventions, then they are averaged to calculate the final score for the writing phase. This score is stored in global variable at backend and it will contribute to the overall band score at the end of the writing assessment.

4.4 Speaking

The speaking phase is to assesses the user's ability to articulate their thoughts verbally on a given topic. This phase include generating topic, receiving and processing speech using STT(Speech-to-text) module and evaluating the transcribed text.

Topic Selection: Similar to the writing phase, a random topic is selected from a predefined list of topics. This topic is presented to the user to ensure a broad evaluation of speaking abilities.

User Interaction: The selected topic is populated in web page to present to the user. The user will speak about the topic by clicking in start button, where user will express their ideas.

Speech-to-Text (STT) Conversion: The user's vocal response is recorded and converted into text using a Speech-to-Text (STT) module. This conversion ensures that text-based analysis techniques can be used to assess the spoken content.

Evaluation: The transcribed text is then sent to hugging face transformers model, where we have used AutoModel and AutoTokenizer for evaluation. The evaluation process includes analyzing various aspects of the transcribed text for cohesion, syntax,

vocabulary, phraseology, grammar, and conventions, which is similar to the writing phase. Each of these metrics is scored individually and this is according to ILETS band format.
The scores is individual calculated for cohesion, syntax, vocabulary, phraseology, grammar, and conventions, then they are averaged to calculate the final score for the writing phase. This score is stored in global variable at backend and it will contribute to the overall band score at the end of the writing assessment.

5 Conclusion

This project describes the development of an IELTS Band Assessment Tool which is designed to evaluate users' skills in reading, listening, writing, and speaking, So they can perfume good in actual examination. By using advanced AI models from Hugging Face library, the tool provides a detailed evaluation analysis of various language metrics, which ensuring a thorough assessment of English proficiency.

This Project effectively integrates several key features. where , it includes random topic selection from a JSON file, which ensuring a diverse range of prompts, along with user interaction which is facilitated through a web interface built in flask, where users can read passages, listen to audio, write essays, and speak on given topics. These tool also incorporates a STT (speech-to-text) conversion feature, which converts spoken vocal response into text for further evaluation analysis. The evaluation process uses AI models to score written and spoken responses based on cohesion, syntax, vocabulary, phraseology, grammar, and conventions.

These scores will help user to understand their strengths and weaknesses and area of improvement. By offering accurate and a detailed English language assessments, the IELTS Band Assessment Tool is an advanced, user-friendly solution that helps users in effectively preparing for their IELTS test.

References

[1] Wikipedia, the free encyclopedia. International english language testing system. `https://en.wikipedia.org/wiki/International_English_Language_Testing_System`, August 7 2020.

[2] Osama Koraishi. Teaching english in the age of ai: Embracing chatgpt to optimize efl materials and assessment. *Language Education and Technology*, 3(1), 2023.

[3] Tianhe Sun. The potential use of generative ai in esl writing assessment: A case study of ielts writing tasks. *Irish Journal of Technology Enhanced Learning*, 7(2).

[4] Dwi Budidarma Sutrisno. Practicing ielts writing for l2 writers with chatgpt; an exploratory self-study. *EDU Journal-English Department of UMMU Journal*, 3(2):41–55, 2023.

[5] Liu Yiran. Evaluation of students' ielts writing ability based on machine learning and neural network algorithm. *Journal of Intelligent & Fuzzy Systems*, 40(4):6743–6753, 2021.

[6] SS Senevirathne, GUD Fernando, JB White, STH Divyanjala, Udara Srimath S Samaratunge Arachchillage, and DPNP Dias. Smart personal intelligent assistant for candidates of ielts exams. In *2020 2nd International Conference on Advancements in Computing (ICAC)*, volume 1, pages 446–451. IEEE, 2020.

[7] Kandor. How it works - kandor's public speaking analysis tool. `https://trykandor.com/How_It_Works`. Accessed: 2024-06-08.

[8] IDP Education. Idp ielts. `https://ielts.idp.com/about`. Accessed: 2024-06-08.

[9] Duolingo. Duolingo english test. `https://englishtest.duolingo.com/`. Accessed: 2024-06-08.

[10] Grammarly Inc. Grammarly. `https://www.grammarly.com/`. Accessed: 2024-06-08.