**AI-Powered Language Learning Chatbot - Documentation**

**Introduction**

The **AI-Powered Language Learning Chatbot** is an interactive web application designed to enhance language learning through **real-time AI conversations, translations, pronunciation feedback, and mistake tracking**. Built using **Streamlit**, it leverages **Groq LLaMA**, **Google Translate**, **gTTS**, and **SQLite** to provide an engaging and effective learning experience.

**System Architecture**

The chatbot follows a **modular architecture** with the following key components:

**1. User Input**

* Users can enter text directly or use speech recognition for voice input.
* If speech input is selected, **SpeechRecognition** converts it into text for processing.

**2. AI Processing**

* The input is processed by **LangChain** with **Groq LLaMA**, generating adaptive AI-driven responses based on the user's proficiency level and target language.

**3. Translation Layer**

* The AI-generated response is translated into the user’s native language using **Google Translate via Deep Translator**.

**4. Text-to-Speech Output**

* The translated response is converted into speech using **gTTS** for pronunciation practice.

**5. Mistake Logging & Correction**

* Any mistakes in grammar, vocabulary, or pronunciation are logged in an **SQLite** database along with AI-corrected responses.
* Users can review their mistakes later to reinforce learning.

**System Architecture Diagram**

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| User Input |-->| Speech-to-Text (STT)|-->| AI Processing |

| (Text or Speech) | | (if applicable) | | (Groq LLaMA) |

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| Translation |-->| Text-to-Speech (TTS)|-->| Output (Text/Audio) |

| (Google Translate) | | (gTTS) | | and Mistake Logging |

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(*This diagram provides a high-level overview of the chatbot’s architecture.*)

**Technologies Used**

| **Component** | **Technology** |
| --- | --- |
| **Frontend** | Streamlit |
| **AI Model** | Groq LLaMA (via LangChain) |
| **Translation** | Google Translate via Deep Translator |
| **Speech-to-Text** | SpeechRecognition |
| **Text-to-Speech** | gTTS |
| **Database** | SQLite |

**Key Features**

✅ **AI-Powered Conversations** – Adaptive responses based on user proficiency.  
✅ **Real-Time Translation** – Converts responses into the user’s native language.  
✅ **Speech Recognition** – Converts user speech into text for analysis.  
✅ **Text-to-Speech** – Reads translations aloud for pronunciation practice.  
✅ **Mistake Tracking** – Logs user errors in a database for targeted improvements.

**Future Enhancements**

* **Pronunciation Scoring** using phoneme comparison.
* **Conversation Memory** to track user progress.
* **Multimodal Inputs** (images + text + voice for contextual learning).