HackToFuture 3.0

Tech Tantras

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Voice to Visualization

Project Code: T2PS3

In the production industry, higher management and small business owners rely heavily on reports to make critical business decisions. However, these reports are often generated from outdated or static data, leading to inaccurate insights.

Accessing real-time data requires technical expertise in writing SQL queries, which many decision-makers lack. Even when data is retrieved, interpreting raw datasets without proper visualization makes it challenging to identify trends and actionable insights.

This gap between data accessibility and decision-making results in **delayed responses to market changes, missed opportunities, and inefficient operations**. Businesses need a solution that enables **seamless data retrieval and visualization** without relying on technical personnel.

Voice to Visualization

Talk to Your Database: AI-Powered Voice Querying.

Effortlessly manage your database with our Gen-AI technology.
Simply use voice commands to access insights like never before.

Solution Overview

Our Gen-AI-driven Voice-to-SQL Solution empowers business owners and decision-makers to query their database using natural voice commands, eliminating the need for SQL expertise. By integrating Whisper for speech-to-text and SQLCoder LLM for intelligent query generation, the system translates voice inputs into optimized SQL queries in real time. The results are then visualized instantly through an intuitive React-based frontend, enabling data-driven decision-making without technical barriers.

Tech Stack

- **Frontend :** React.js, Tailwind CSS, Axios, Recharts, react-mic
- **Backend :** FastAPI, Whisper API, SQLCoder (Ollama)
- **Database :** PostgreSQL / MySQL.
- **AI Models :** Whisper (Speech-to-Text), SQLCoder (Text-to-SQL)

Implementation

1. Voice Input Processing :

The user speaks a query, which is recorded using React-Mic in the frontend.

The recorded audio (.wav file) is sent to the FastAPI backend.

2. Speech-to-Text Conversion :

The backend uses OpenAI Whisper to transcribe the audio into text.

Multi-language and dialect support ensure accurate transcription

3. AI-Powered SQL Query Generation :

The transcribed text is processed by SQLCoder (LLM) to generate a structured SQL query.

The AI model understands database schema and user intent for accurate query formation.

Implementation

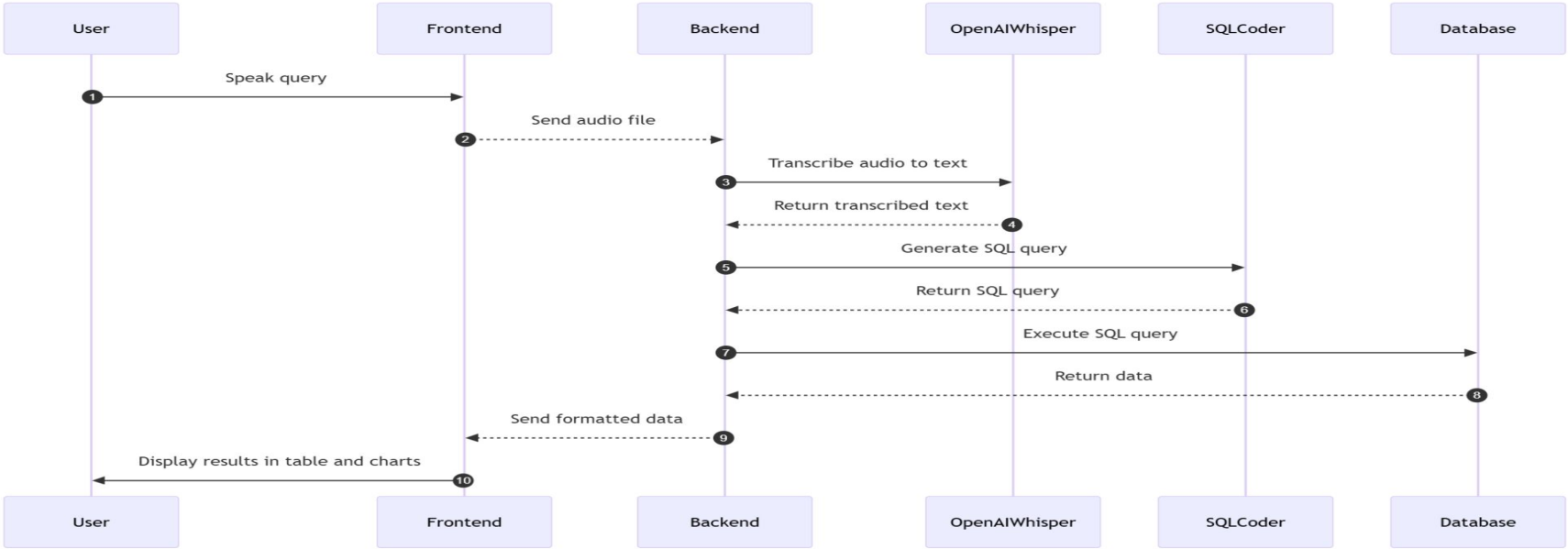
4. Query Execution & Data Retrieval :

The SQL query is executed on a PostgreSQL/MySQL database using SQLAlchemy.
Real-time data is retrieved and formatted for display.

5. Data Visualization & Insights :

Query results are displayed in a dynamic table and interactive charts using Recharts / Chart.js.

Sequence Diagram



Thank You :)