UniSQLBot: Bridging Natural Language and SQL Queries

UniSQLBot makes databases accessible through natural language.

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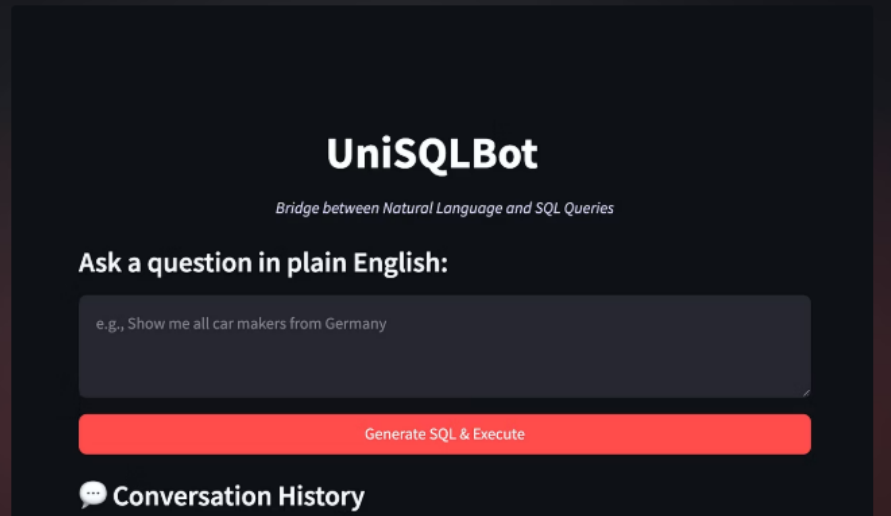


The Problem: SQL Skills as a Barrier

1 **Technical Expertise Required**

Accessing databases shouldn't need SQL knowledge.

2 **Democratizing Data Access**

Many users are blocked by the need for technical skills.

3 **Need for Natural Interaction**

A solution is needed for natural language database interaction.

Our Solution: UniSQLBot

Chatbot Interface

Translates plain English to SQL queries.

GPT-3.5 Turbo

Powered by OpenAI API for natural language processing.

SQLite Backend

Executes SQL and visualizes results.

Technical Stack

Frontend

Streamlit chat UI (Dark Theme).

Backend

- Schema Parsing
- Prompt Creation
- SQL Execution
- Visualization (matplotlib + seaborn)

Data

Spider Dataset (10K+ NL-SQL pairs, 200 DBs).

Prompt Engineering

1

Schema-Aware

Uses schema-aware prompt formatting.

2

Sampled

Samples shown with table names, columns, and rows.

3

Instruction-Heavy

Enforces SQL generation via prompts.

UniSQLBot uses detailed prompts to ensure accurate SQL generation.

Key Features

Ambiguity Support

Handles ambiguous queries and greetings.

Schema Display

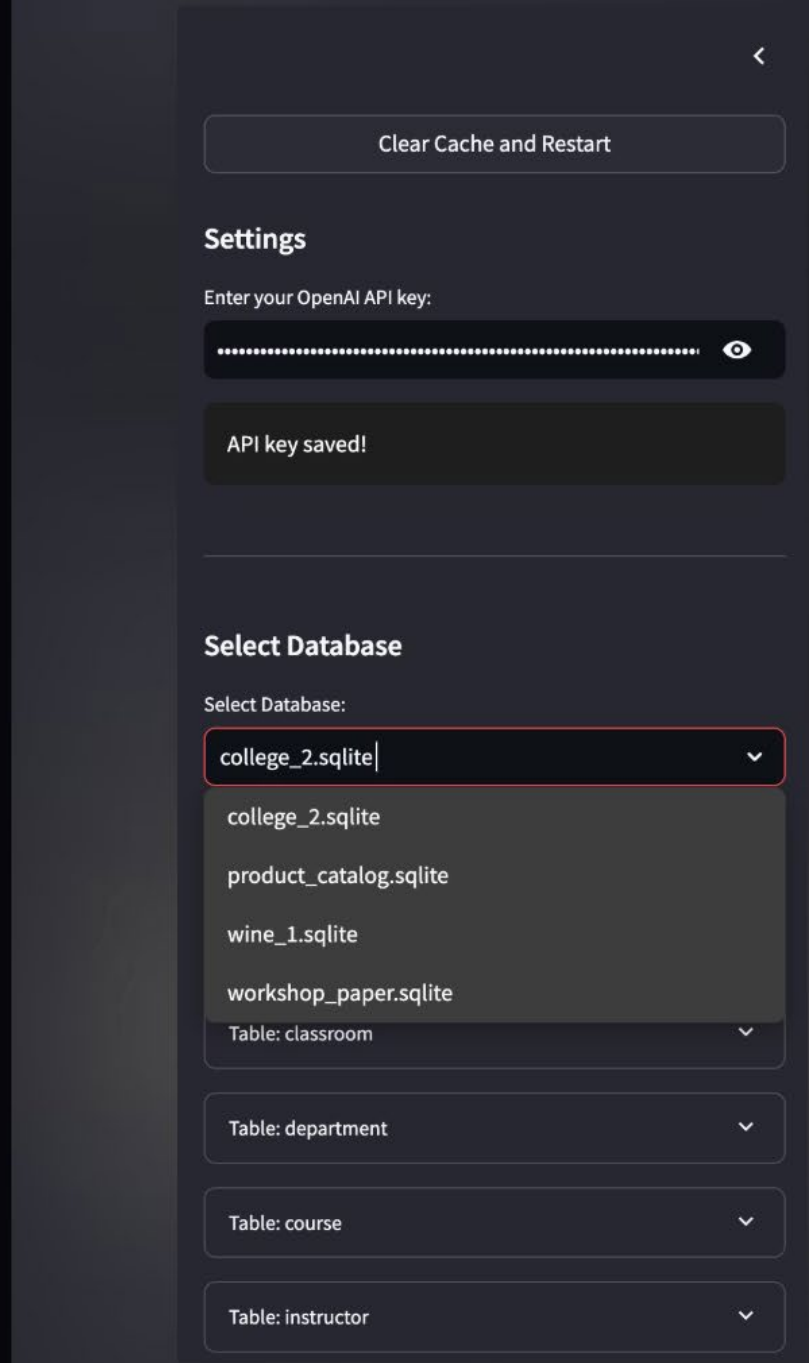
Displays DB schema.

Query History

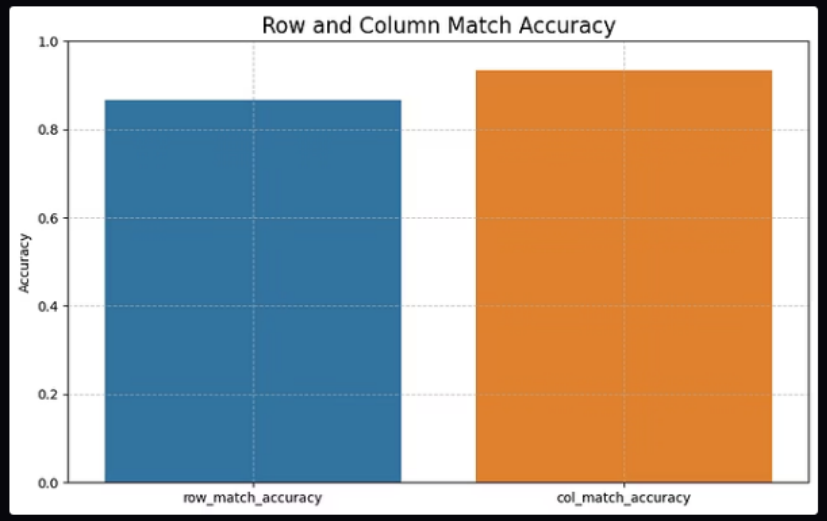
Stores query history with timestamps.

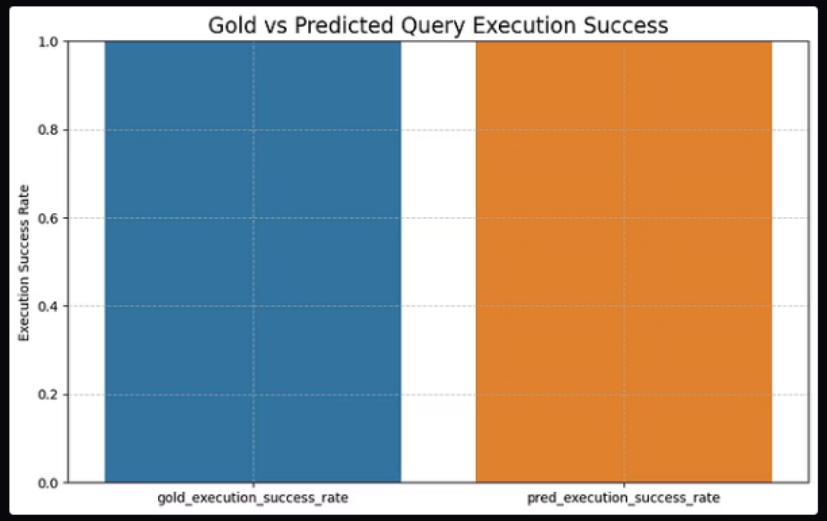
Visualizations

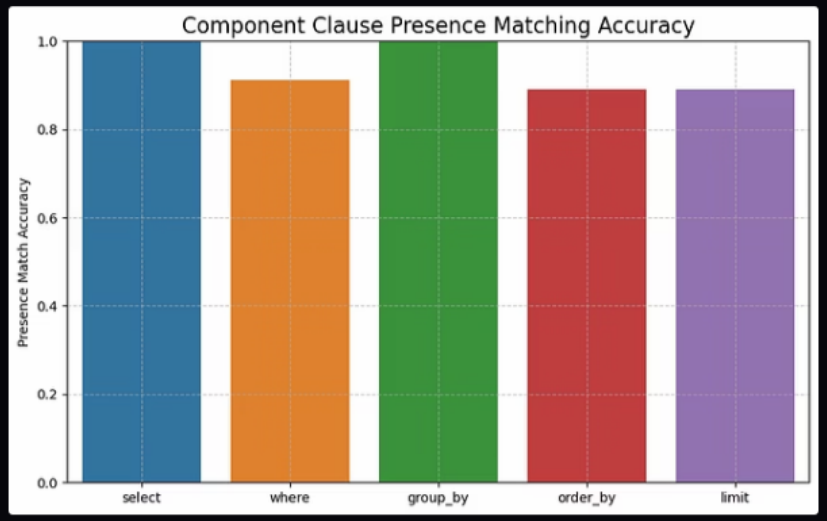
Generates bar and scatter plots.

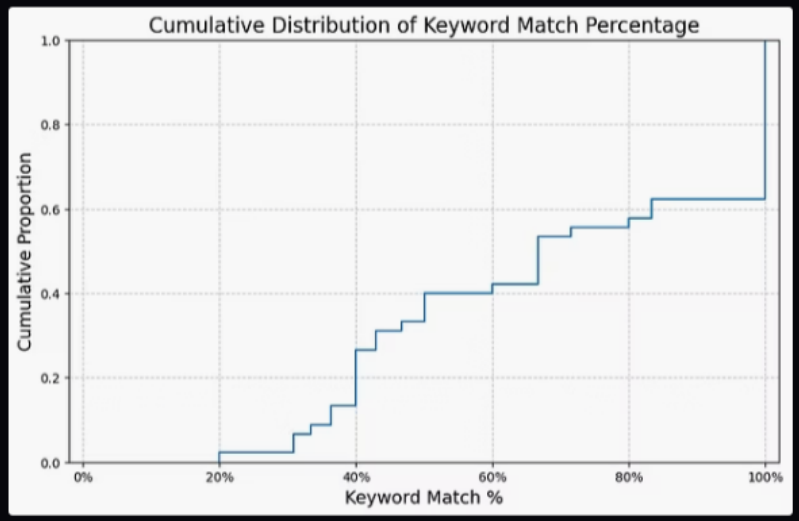


Evaluations









Future Work

Plan: Fine-tune model, support multi-turn queries.

Enhance compatibility with other DBMS (Postgres, MySQL).