**ABSTRACT**

**Text-to-SQL LLM App**

Aparna Bharathi Suresh | Pavan Srivatsav Devarakonda | Sai Naga Sanjana Chippada |

Shravani Dattaram Gawade | Sujatha Deepraj Joshi

The growing needs of storing data and using it for a variety of applications has been on rise. However, traditional SQL querying is a barrier for non-technical users which has given a market need for developing an intuitive natural language to SQL systems. Through this project we aim to bridge the gap by developing an application for converting the natural language into SQL which would make data more accessible without requiring technical expertise. This will democratize data access reducing the reliance on technical experts and utilizing their expertise in other challenging fields. To achieve this, we will leverage Large Language Models such as GPT - 4 or Llama for converting the natural language into optimized SQL queries, which then will be executed on relational databases such as MySQL. We will build a python-based API using FastAPI or Flask integrating LangChain for LLM orchestration and SQLAlchemy for database connectivity. ChromaDB will be used to store the database schema embeddings to retrieve the relevant schema before the query generation. We will perform agentic workflow integration to implement a feedback loop using Langchain Agents to validate the SQL correctness. The testing and validation will be done against the spider dataset – a challenging, cross-domain text-to-SQL and semantic parsing benchmark with 200 databases and more than 10,000 natural language inquiries with SQL query annotations. We will also conduct usability tests with the actual users. Additionally, vLLM will be used for inference purposes. This application will empower employees across various fields enabling them to make decisions based on data without spending much time on learning SQL-querying.

Reference Links:

Dataset - <https://huggingface.co/datasets/xlangai/spider>

FasAPI -<https://devdocs.io/fastapi/>

SQLAlchemy - <https://docs.sqlalchemy.org/en/20/>