**SQL QUERY AGENT USING WATSONX.AI**

**Problem Statement**

In modern data-driven businesses, SQL query generation remains a challenge for non-technical users. Business analysts, managers, and decision-makers often struggle with retrieving insights from databases due to their limited SQL expertise. Traditional methods require technical knowledge or dependency on database administrators, causing inefficiencies, delays, and potential misinterpretations of data.

**Solution Statement**

Our **SQL Query Agent** powered by **Watsonx.ai** with Integration of Streamlit as UI and Python as Programming Language (backend), enables non-technical users to generate accurate SQL queries using Generative AI(GenAI). By leveraging IBM Watsonx.ai, the solution transforms plain English questions into optimized SQL queries, reducing dependency on technical teams and accelerating data-driven decision-making.

**Business Scenario**

Consider a retail company with multiple databases storing sales, inventory, and customer data. A store manager wants to quickly retrieve last month’s sales for a specific region but lacks SQL expertise. Traditionally, this request would be forwarded to a database administrator, leading to delays. With the **SQL Query Agent**, the manager can simply ask, *"Show me total sales for the Northeast region in the last month"*, and the AI automatically generates and executes the required SQL query instantly and then get his work done by himself within minutes with this AI Assistance.

**How the Solution Works**

1. **User Input:** The user enters a natural language query via a web interface (Streamlit)
2. **AI Processing:** Watsonx.ai’s NLP model(*ibm/granite-34b-code-instruct*) interprets the intent and constructs an optimized SQL query.

**Demonstration Walkthrough**

* **Step 1:** A user types, *"What were the top 5 selling products last quarter?"* into the SQL Query Agent interface.
* A black screen with white text

  AI-generated content may be incorrect.**Step 2:** The AI parses the request and generates an SQL query:

Figure 1: AI Generated SQL QUERY

**Services Used in Watsonx.ai**

* + PromptLab
  + Wx.ai Notebook
  + Parameter Set
  + Project / Deployment Space.

**Procedure followed to built this application:**

* Logged into Wx.ai, Open PromptLab “Free Structure”. Selected Foundation Model “ibm/granite-34b-code-instruct”.
* Set the Inference Parameters. Optimizing with various prompts and Saved as “Notebook”.
* With Python as a backend. Created Deployment function as “Deploy as AI Service” in the notebook and selected the default runtime, software specifications. Finally, Deployed a function as AI Service.
* Go to the created deployment space and copy the endpoint URL for RESTAPI calls.
* Go to VSCode, install all the required libraries which is mentioned in the “requirements.txt” file.
* Build a streamlit application using python ibm-sdk.
* Go to the folder where the streamlit application “app.py” file. Open Terminal and run the application in your local computer with the command “streamlit run app.py”
* You can see the following widget with <http://localhost:850>.

**A blue background with white text

AI-generated content may be incorrect.**

Figure 2: Streamlit HomePage

* A screenshot of a computer

  AI-generated content may be incorrect.To test the application, enter any query. For Instance: “*What is the total amount of humanitarian assistance provided by non-governmental organizations (NGOs) to countries in Africa in the last 5 years?”*

Figure 3: Results of the Given Query

**Future Scope with Watsonx.ai**

1. **AI-Powered Query Optimization:** Watsonx.ai improves SQL accuracy and efficiency by understanding database structures and user intent.
2. **Seamless Integration:** Works with various SQL databases (PostgreSQL, MySQL, IBM Db2, etc.).
3. **No-Code Accessibility:** Enables non-technical users to interact with complex databases effortlessly.
4. **Continuous Learning:** The AI model refines query generation based on user interactions for improved accuracy.

**Conclusion**

The **SQL Query Agent using Watsonx.ai** transforms how businesses interact with their databases. By enabling natural language-driven SQL generation, it minimizes reliance on technical teams, speeds up decision-making, and enhances productivity. This AI-powered solution not only democratizes data access but also ensures businesses remain agile in the digital era.

\*\*\*\*\* THE END \*\*\*\*\*