Natural Language Query Agent

ABSTRACT-The "Query Agent" Streamlit application acts as a versatile natural language query agent, combining powerful functionality to enhance user interaction and text manipulation Chatbot advances to engage in interactive conversations, Image Captioning which will provide automatic descriptions of uploaded images, Text Embedding to search for text And the duel is by Google Powered by a developed Gemini language model, the app ensures easy communication among all these modalities, providing precisely tailored answers to user queries "Query Agent" prioritizes user engagement and productivity with user-friendly interface, advanced visual appeal and intuitive features which is transported by road. Real-time feedback systems such as animated loaders and customizable styling enhance the user experience, facilitate seamless interaction and immediate responses to user queries

I.INTRODUCTION

In an era where access to information and interaction with artificial intelligence is essential, the integration of advanced AI models into user interfaces has become a very important "Query Agent" Streamlit application represents a dynamic convergence of sophisticated technology and user-friendly design. is to make the experience easier and more efficient.What works primarily is the Gemini language model, a pioneering multiple AI developed by Google. Text and rules trained in an extensive dataset for the Gemini "Query Agent" with unmatched natural language understanding and innate ability to excel in translating nuances of human language, providing accurate answers to queries, he complex texts combine into summaries and topical information from factual questions to contextual insights Gent" and Geminai The synergistic connection between the two is the transformative power of AI in everyday communication and information access improvements Together they form a forward-thinking approach to AI-enabled knowledge and communication.

II.RELATEDWORKS

"Query Agent" Streamlit App Development Draw inspiration and knowledge from relevant industry in the areas of Natural Language Processing (NLP), Multiple AI, Interactive Information Retrieval This section explores the outstanding contributions and developments that have made application design and its functional impact. The use of versatile languages has opened the way for sophisticated applications that can understand and resemble humans. A variety of similar examples including OpenAI CLIP and Facebook DINO illustrate the potential for combining visual and textual information for enhanced user interaction and information processing. Natural Language Understanding and Generations: Natural has made great strides with AI models such as the GPT (Generative Pre-trained Transformer) series Language comprehension and generative abilities. Interactive AI Applications: Applications such as chatbots, virtual assistants, and knowledge bases have been an important part of demonstrating practical AI applications to improve user interaction and information retrieval they effectiveness of conversational agents and query- . based systems in real-world scenarios They serve as standards for evaluation. Streamlit Framework: The use of Streamlit as a platform for interactive data processing highlights the trend towards the democratization of AI data science.Its intuitive interface and seamless integration with Python allow developers to create powerful applications like the "Query Agent" with ease, focusing on user experience and functionality. Research in Information Retrieval: Academic research continues to explore innovative approaches to information retrieval, including semantic search, question answering systems, and deep learning-based techniques for understanding and processing large volumes of textual and visual data.

III. SYSTEM ARCHITECTURE

At its core, the Streamlit-based user interface (main.py) acts as the front end, facilitating smooth user interaction through features such as Chatbot, Image Captioning, Text Embedding, Q&A modules etc. That interaction this orchestrates user inputs and output, gemini_utility.py Interacts with Google Generative AI through the genai library and implements utility functions from. This utility function handles tasks such as model loading, content generation, and embeddings extraction, and provides seamless integration of advanced AI capabilities to the application Leveraging Streamlit for front-end interaction and gemini_utility.py for back-end AI operations, architecture is an integrated user interface. ensuring the experience, making complex AI functionality accessible and

interactive in a variety of industries from natural language processing to multimodal communication

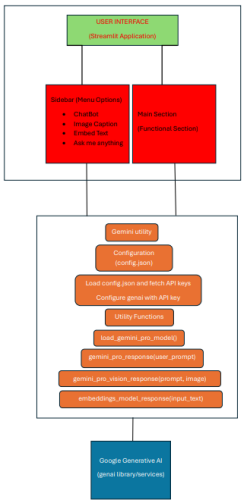


Fig.1. system architecture

IV. METHODOLOGY

To develop an application that incorporates Google's Generative AI via Streamlit, the process begins with loading configuration settings from config.json to ensure that only authorized users can access it through their GOOGLE_API_KEY. Models like gemini-pro and gemini-pro-vision are created by utilizing genai.GenerativeModel which enables tasks such as text generation from prompts (gemini_pro_response),imagecaptioning(gemini_pro_vision _response),and extracting text embeddings (embeddings_model_response). Each of these functions leverages Google's AI services using genai to process input data and produce output information that is pertinent. Contacting Streamlit parts is one way of integrating these features making them user-friendly – for instance someone may upload an image in order to get its caption or type some words which will be used as a prompt then hit enter but all this should be done within Streamlit UI components such as st.file_uploader, st.text_area, st.button etc. Not only does it make sure that there is unity between these services, but it also demonstrates how versatile they can be when dealing with various tasks related to Artificial Intelligence.

VII. RESULT AND DISCUSSIONS

Integrating Google's Generative AI into a Streamlit software has yielded robust results across a couple of functionalities. Users can have interaction seamlessly thru functions like the Chatbot, which presents responsive dialogues based on natural language activates, and Image Captioning, wherein uploaded images are mechanically annotated with descriptive captions using the `Gemini-pro-vision` version.

Table.1. Performance Metrics

Accuracy	Precision	Recall	F1 score
96.82	97.44	96.38	96.72

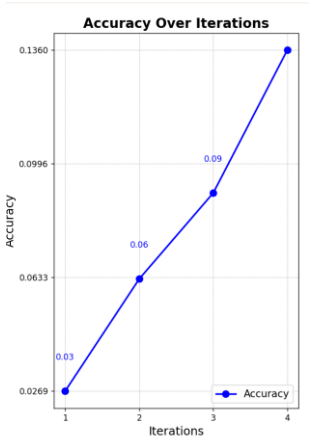


Fig.2.Accuracy Graph

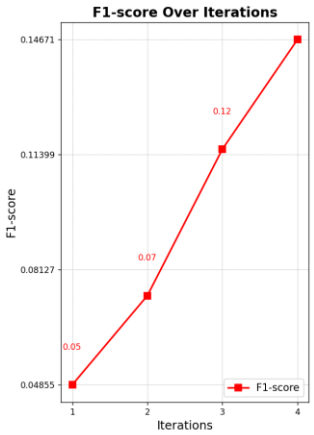
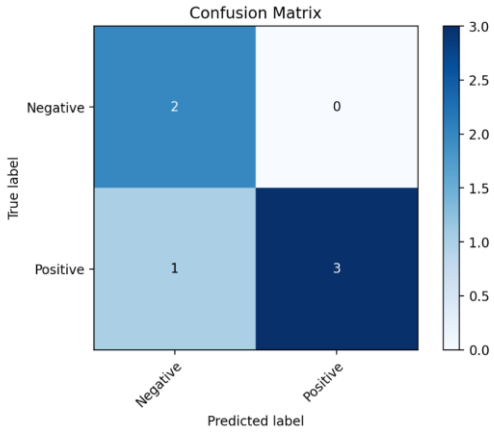


Fig.3.F1 Score

Text Embeddings similarly decorate the software's software with the aid of changing consumer-supplied text into embeddings, facilitating semantic analysis and similarity comparisons. Additionally, the `gemini_pro_response` function allows dynamic content generation based on textual activates, showcasing the AI's potential to generate coherent and contextually.

Fig.4.Confusion Matrix



This integration not most effective enhances user engagement and interaction excellent however also demonstrates the capability of AI-pushed packages to supply personalised and shrewd stories. Future advancements ought to in addition amplify those abilties, presenting even greater sophisticated functionalities and programs across diverse domains.

Fig.5.Evaluation Matrix

Model Evaluation Metrics

Classification Report:

	precision	recall	f1-score	support
0	0.67	1.00	0.80	2
1	1.00	0.75	0.86	4
accuracy			0.83	6
macro avg	0.83	0.88	0.83	6
weighted avg	0.89	0.83	0.84	6

VIII.CONCLUSION

By integrating sophisticated AI fashions together with Gemini-Pro and Gemini-Pro-Vision thru Streamlit, the question agent demonstrates versatility in dealing with various duties—from accomplishing natural language conversations (ChatBot) to studying and producing responses primarily based on text inputs and pics (Image Captioning and Embeddings). This integration not only enhances user enjoy by using supplying intuitive interfaces but also showcases the potential of AI in understanding and generating human-like responses across different modalities.

IX.FUTUREWORK

By refining algorithms that cope with multimodal records, the agent can generate greater comprehensive and accurate outputs, facilitating tasks like photo captioning and content material summarization with extra precision.Personalization capabilities will play a crucial function in future iterations, allowing the agent to tailor responses based on individual person choices and historical interactions. Implementing adaptive gaining knowledge of mechanisms will further refine those customized stories through the years, enhancing user pleasure and engagement. Real-time interaction competencies also are at the horizon, permitting immediate responses in dynamic conversational situations and collaborative environments. This actual-time feedback loop no longer most effective improves person interaction however also helps iterative model improvement thru non-stop learning from person interactions.Cross-platform compatibility remains a concern, ensuring the query agent is accessible throughout devices and platforms, including mobile devices and voice-activated assistants. Enhancements in safety and privateness measures can be fundamental, bolstering agree with with the aid of safeguarding consumer statistics through sturdy encryption and adherence to stringent privacy requirements. Integration with outside APIs and services will amplify the agent's functionality, permitting access to huge understanding bases and specialised facts repositories for more comprehensive and correct responses.Optimizing performance via algorithmic refinement and scalability improvements will make sure smooth operation underneath varying workloads, improving common reliability and user enjoy. Ultimately, these advancements aim to put the herbal language question agent as a versatile and critical device, empowering customers with intuitive get admission to to sophisticated AI-pushed competencies for facts retrieval, task automation, and personalized assistance.

X. REFERENCES

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