**BizVectra Development Documentation**

**Overview:**

**BizVectra** is an AI-powered business intelligenceassistant built to analyze sales data, extract and generate insights using NLP and LLMs. This development presents reliable results via dynamic text, tables, and charts. The system integrates LangChain for retrieval and memory capabilities, enabling context-aware and data-grounded responses.

**Core Functionalities:**

1. **Data Ingestion & Preprocessing**
2. **LangChain-powered Retrieval with Custom Retriever (RAG+Tools)**
3. **Natural Language Insight Extraction**
4. **Multi-modal Output Generation**
5. **Model performance evaluation and monitoring**
6. **Interactive Streamlit Frontend**

**Step-by-Step Workflow:**

**Step 1: Load and Preprocess CSV Sales Data**

* Load data using pandas.
* Convert date columns to datetime.
* Group data by time periods (monthly, quarterly, yearly).

**Step 2: Convert Data into Documents for LangChain**

* Transform rows into Document objects for a structured format suitable for retrieval and analysis.
* Attach metadata like timestamp, region, category.

**Step 3: Create Vector Store with FAISS**

* Use FAISS as the vector store.
* Generate embeddings with OpenAI models (gpt-3.5-turbo).

**Step 4: Build a Custom Retriever and a RAG-Style QA Chain**

* Wrap FAISS retriever with a custom retriever class for filtering, stat-awareness, etc.
* Use RetrievalQA to from LangChain.
* Integrate custom retriever and LLM.
* Integrate tools and conversational-react-description type agent for multimodal capabilities.

**Step 5: Extract Insights Using NLP Prompts**

* Generate summaries and trends using prompt templates to guide the model
* Include examples in prompts (few-shot).

**Step 6: Generate model’s response and display**

* Generate response using custom tool with the RAG pipeline
* Display the response based on user query and store chat history for future conversations.

**Step 7: Generate Charts (Bar, Line, Pie) to visualize data insights**

* Use Matplotlib or Plotly.
* Accept chart type via Streamlit selectbox.

**Step 8: Streamlit Frontend UI**

* Custom dark theme with sidebar tools
* Evaluate button for model performance evaluation option
* Sticky positioning for UI elements
* Display LLM insight + chart + table together

**Additional Features:**

* **Memory**: Track conversation history and display in the streamlit UI
* **Tool Use**: Integrate code interpreter (pandas/plot executor)
* **Export**: Add option to download insights and evaluation logs as PDF/CSV for performance monitoring.

**Technologies Used:**

* **LangChain**: Retrieval, Chains, Memory
* **OpenAI LLM**: GPT for summarization and reasoning
* **FAISS**: Document similarity search
* **Streamlit**: UI
* **Matplotlib / Plotly**: Chart rendering

**Summary:**

BizVectra seamlessly combines structured data processing, NLP-powered insights, and interactive visualization, enabling business stakeholders to ask questions and receive AI-generated insights with clarity and depth.

**Sample Outputs:**

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