

AI-Powered Sales KPI Dashboard with Agentic AI

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ABSTRACT

In today's data-driven business world, executives and managers require more than just visual dashboards—they need intelligent systems that can interpret, analyze, and explain sales performance in real time. This project presents an AI-powered Sales KPI Dashboard designed to meet those needs by combining intuitive visualizations with advanced AI capabilities. Using Apple's 2024 Global Sales Dataset, the system automatically processes uploaded sales data and delivers personalized performance insights for different managerial roles, including CXOs, Division Heads, and Line Managers.

The dashboard is built using Streamlit for interactivity, Pandas and NumPy for data handling, and LangChain integrated with Google Gemini Pro to generate natural language insights and visual explanations. The application also supports agentic behavior, enabling it to understand user context, answer business questions in plain English, and generate data-driven recommendations. Unlike traditional dashboards, this system adapts dynamically based on user role and performance trends, making it a step toward autonomous decision support. Overall, the project demonstrates how Agentic AI can enhance sales intelligence by reducing manual effort and providing strategic, data-backed guidance for decision-makers.

KEYWORDS

Agentic AI, Sales KPI Dashboard, Streamlit, LangChain, Google Gemini Pro, Business Intelligence, Natural Language Insights, Role-Based Analytics, Autonomous Decision Support, Apple Sales Data

1 Introduction

In the fast-paced world of business, sales performance is not just about numbers—it's about understanding patterns, spotting opportunities, and making timely decisions [1]. Traditional dashboards and reporting tools, while useful, often require manual interpretation and don't always cater to the specific needs of different business roles. For leaders like CXOs, Division Heads, and Line Managers, there's a growing demand for smarter systems

that not only present data but also explain what it means and what actions to consider.

This project introduces an AI-Powered Sales KPI Dashboard that does exactly that. It uses Agentic AI principles to deliver a personalized, intelligent experience for users at different managerial levels [1]. The system is built using Streamlit for a user-friendly interface and integrates Google Gemini Pro (via LangChain) to provide real-time insights, automatically generated charts, and answers to natural language questions. It processes raw sales data—sourced from Apple's 2024 Global Sales Report—into meaningful metrics like total revenue, sales targets, and growth rates.

Unlike static business intelligence tools, this dashboard adjusts its output based on user role, interprets sales trends using LLMs, and even suggests strategies. This report outlines how the system was designed and implemented, and how it lays the foundation for an autonomous decision-support tool in enterprise environments [1].

2. Related Work

2.1 Traditional Dashboards in Business Intelligence

Sales dashboards have long served as the backbone of business intelligence strategies, enabling organizations to monitor performance through visual and interactive metrics. Widely used tools like Tableau, Microsoft Power BI, and Qlik offer seamless data integration, user-friendly interfaces, and rich visualizations that help decision-makers track KPIs effectively [1].

Despite their usefulness, these tools are heavily dependent on manual configuration. Users are required to define metrics, select data fields, generate visuals, and interpret results on their own. While this has transformed data reporting, traditional dashboards often fall short in key areas, including real-time insights, role-specific personalization, and the ability to generate recommendations autonomously. Furthermore, they lack natural language interfaces, making them less accessible to users without

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technical expertise. As the complexity of enterprise data increases, these limitations have become more apparent [2].

2.2 Rise of Large Language Models (LLMs) in Business Analytics

Recent advancements in Large Language Models (LLMs)—like GPT from OpenAI, Gemini from Google, and Claude from Anthropic—are revolutionizing business analytics by enabling deeper interaction with both structured and unstructured data [3]. These models can generate insightful outputs from natural language inputs, such as reports, summaries, data transformations, and even visualization code.

Frameworks like LangChain, PandasAI, and GPT-DataPilot have made LLMs more accessible by embedding them into existing data workflows. They allow users to:

- Summarize tabular data from CSV/Excel
- Generate automated business reports
- Translate natural language questions into SQL queries
- Generate Python code for visualizations

These capabilities lower the technical barrier for non-experts and enable more intuitive data exploration. However, most LLM applications still rely on one-off prompts and do not remember previous tasks or adapt to evolving user goals, limiting their autonomy [4].

2.3 Emergence of Agentic AI

Agentic AI represents the next step in AI evolution—where models function as independent agents that perceive their environment, make decisions, and act on long-term objectives. Tools like AutoGPT, BabyAGI, and LangGraph exemplify this shift, introducing mechanisms like task memory, multi-step planning, and dynamic goal-setting [5].

Such systems can execute a series of tasks with minimal user input, refining their strategies through feedback loops. While agentic AI is promising, most implementations are still in early development and experimental phases. Applications that combine agentic behavior with business dashboards or analytics remain rare, especially in commercial use.

2.4 Bridging the Gap: This Project's Approach

This project bridges the gap between traditional dashboards and autonomous AI systems. It combines Streamlit's interactive visualizations with Google Gemini's natural language reasoning (via LangChain) and integrates foundational elements of Agentic AI to deliver a dynamic sales dashboard.

The system supports:

- Role-based dashboard views (CXO, Division Head, Line Manager)
- AI-generated text insights tailored to uploaded data
- Natural language Q&A functionality
- Automated visualization generation through AI-written code

This integration enables the dashboard not just to present KPIs, but also to interpret trends, identify anomalies, and make strategic recommendations. It demonstrates how businesses can benefit from a truly intelligent and adaptive decision-support system.

3. Approach

3.1 Dataset Overview

This project is built on the Apple 2024 Global Sales Dataset, a rich and comprehensive collection of structured sales records released in January 2025. The dataset captures both transactional and aggregated sales figures, encompassing over 1,000 rows of data. It includes detailed breakdowns across multiple product categories—iPhones, iPads, Macs, Wearables, and Services Revenue—enabling a well-rounded analysis of Apple's global sales performance. The geographical segmentation spans four major regions: Europe, Greater China, North America, and the Rest of Asia, offering global diversity in the data. This diversity allowed the system to support multi-level KPI analysis, catering to executive-level overviews for CXOs and granular insights for Line Managers. The dataset's depth and variety made it ideal for demonstrating how role-based analytics can adjust contextually based on the user's perspective [2].

3.2 Data Cleaning and Preprocessing

Before building the dashboard, the raw data underwent a structured data cleaning and preprocessing phase, involving both manual and programmatic efforts to ensure accuracy, consistency, and usability:

- **Column Standardization:** All column names were formatted in lowercase, with spaces and special characters removed.
- **Revenue Conversion:** Services revenue, originally reported in billions, was converted into millions to bring it in line with unit-based hardware sales figures.
- **Derived Fields:** Metrics like actual sales, sales targets, and sales vs. target were calculated to support KPI visualization.
- **Null Value Handling:** Missing values were replaced with zeros to ensure analytical continuity.

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- **Data Filtering:** To improve performance during development, the dashboard processed only the top 5,000 rows using Streamlit's caching [6].

These steps ensured that the system operated with reliable, business-ready data and enabled seamless integration with AI-driven modules.

3.3 Technologies Used

A modern and layered tech stack was employed:

- **Streamlit** provided an interactive front-end to present customized dashboards based on user roles.
- **Pandas and NumPy** handled backend data transformations and KPI calculations.
- **Matplotlib and Seaborn** rendered the static visualizations that set the groundwork for dynamic visuals.
- **LangChain and Google Gemini** formed the AI reasoning layer. LangChain structured the flow of interaction, while Gemini generated strategic insights, answered user queries, and even produced Python code to build charts [4][5]. This combination of tools ensured a system that was not only analytical and dynamic, but also adaptive and intelligent in nature.

3.4 Agentic AI Capabilities Integrated

Though full agent autonomy is part of future plans, several agentic behaviors have already been implemented:

- **Context-Aware Role Adaptation:** The system customizes its layout and KPIs based on whether the user is a CXO, Division Head, or Line Manager, offering personalized data views [3].
- **Automated Reasoning:** Gemini interprets uploaded data and suggests patterns, trends, and strategic actions—mimicking human analysts [4][5].
- **Natural Language Q&A:** The dashboard allows users to ask domain-specific questions and receive contextual, data-informed responses using Gemini's reasoning capabilities [3].
- **Autonomous Data Interpretation:** The AI agent highlights deviations or patterns in data without requiring user input—reducing manual interpretation.
- **Dynamic Prompt Engineering:** The prompt structure adapts based on role, data, and context, paving the way for goal-driven interaction [5].

3.5 Final Deliverables

This implementation produced a fully functional system with intelligent automation across the analytics pipeline:

- A secure file upload system for structured data.
- Contextual dashboards tailored to user roles.
- AI-generated insights and Python-based chart code.
- A natural language interface backed by Gemini.
- Cleaned and preprocessed data with standardized KPIs.

Together, these deliverables bring to life a powerful AI-driven dashboard that acts not just as a tool for viewing metrics but as a business advisor capable of guiding decisions with minimal human effort [1][4][5].

4. Implementation

The system is designed to be scalable, modular, and adaptable to different user roles, ensuring both technical and non-technical stakeholders can benefit from its features. It integrates traditional data analytics techniques with state-of-the-art AI capabilities to offer intelligent, personalized insights that aid in decision-making.

4.1 File Upload and Validation Module

The application begins with a Streamlit-based interface that enables users to upload sales datasets in CSV or Excel format. To ensure responsiveness and usability, the system processes only the first 5,000 rows at runtime using Streamlit's caching functionality. The uploaded data is validated and cleaned using Pandas. Column names are standardized—converted to lowercase, whitespace trimmed, and special characters removed—to ensure consistency across datasets and avoid runtime errors. This automated pipeline ensures that data quality issues do not hinder downstream analysis or visualization, aligning with best practices in business intelligence workflows [2][6].

4.2 Metrics Computation Engine

Once the data is successfully ingested, the dashboard computes critical sales metrics:

- **Actual Sales** is calculated by summing hardware unit sales (iPhones, iPads, Macs, Wearables) and converting Services Revenue from billions to millions.
- **Sales Target** is computed as 90% of actual sales to simulate a performance threshold.
- **Sales vs. Target** represents the variance between actual performance and the expected benchmark.

These metrics are appended to the dataset and are reused throughout the application for generating KPIs, visualizations, and AI interpretations. This automated KPI computation not only enhances operational efficiency but also reduces the manual workload typically associated with such analyses [3].

4.3 Role-Based Dashboard Rendering

One of the key innovations of this project is its **context-aware user interface**, which changes dynamically based on the user’s role. When users select their role—CXO, Division Head, or Line Manager—from the sidebar, the dashboard presents tailored visualizations:

- The **CXO View** highlights aggregate metrics such as total revenue, average growth, and profit margins.
- The **Division Head View** allows regional filtering and displays region-specific trends.
- The **Line Manager View** drills down into salesperson-level performance.

This role-based view personalization is a foundational principle of intelligent dashboards, aiming to reduce cognitive load by presenting only relevant metrics for decision-making [7].

4.4 AI Insight Generation

To incorporate **agentic intelligence**, the system leverages Google Gemini via LangChain to generate AI-driven insights. Upon triggering the “Generate AI Insights” button, the backend constructs a detailed prompt based on the current dataset and selected user role. Gemini returns structured insights that include:

- Top and bottom-performing regions or segments
- Key sales trends
- Anomalies and unexpected patterns
- Strategic recommendations

These insights are not only displayed in the interface but also offered as downloadable reports. This capability enhances the dashboard from a passive reporting tool to an active business advisor, reflecting the direction of agentic AI systems [1][4][5].

4.5 AI-Powered Chart Generation

In addition to textual insights, the dashboard includes dynamic chart creation powered by Gemini. The LLM generates Python code using matplotlib or seaborn to visualize important sales KPIs. This code is automatically cleaned (e.g., removing `plt.show()`), executed in a sandboxed environment, and the resulting chart is displayed inline. This feature demonstrates the synergy between data visualization and autonomous reasoning, a major advancement over traditional static dashboards [4].

4.6 Natural Language Q&A Module

Another innovative feature is the natural language interface that allows users to ask questions like:

- “Which region performed the best?”
- “Which segment exceeded the target by the largest margin?”

A structured prompt is created from a sample of the dataset and the user’s query. Gemini processes the input and returns a natural language answer. This approach reduces technical barriers and simulates the function of a virtual analyst, paving the way for conversational business intelligence systems [3][4].

5. Results and Output

5.1 Dashboard Initialization and Data Upload

Upon launching the application, users are welcomed by a clean interface built using Streamlit. The dashboard allows uploading sales data in either CSV or Excel formats. Once a valid file is uploaded, the system immediately validates and processes the data shown in *Figure 1: File Upload and Dashboard Initialization*

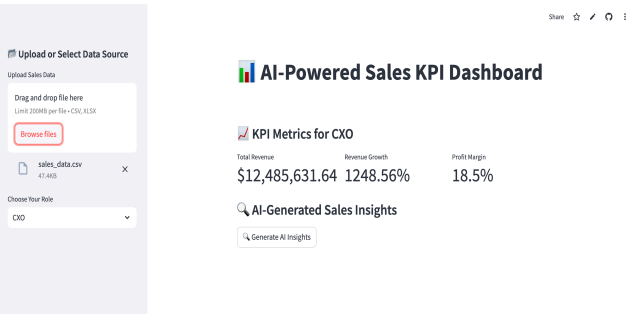


Figure 1: File Upload and Dashboard Initialization

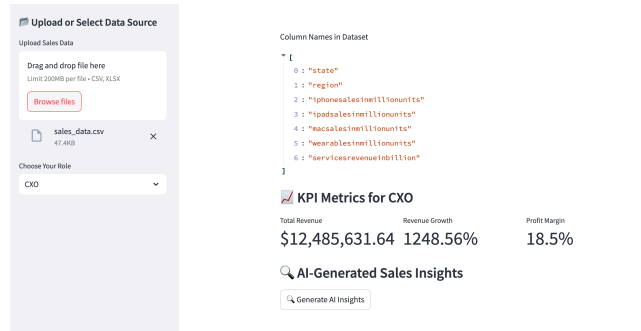


Figure 2: Dataset Column Preview

Column names are displayed to ensure that the dataset is structured correctly before proceeding showed in *Figure 2*:

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Dataset Column Preview. This immediate feedback helps avoid input errors and assures users of successful data ingestion.

5.2 Role-Based Dashboard Customization

The dashboard offers role-specific views for CXO, Division Head, and Line Manager. Users can select their role using a dropdown shown in *Figure 3: Role-Based Dashboard with AI Insights*. For example, CXOs view global metrics like Total Revenue, Revenue Growth, and Profit Margin.

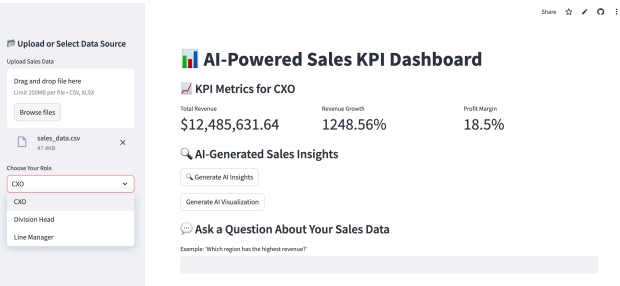


Figure 3: Role-Based Dashboard with AI Insights

Based on the selected role, the layout and KPIs are dynamically adjusted to show relevant information shown in *Figure 4: KPI Metrics for Division Head*, while Division Heads can filter metrics based on geographic regions such as "Greater China" to see regional performance.

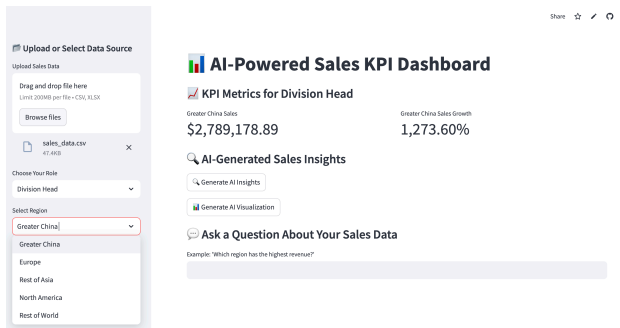


Figure 4: KPI Metrics for Division Head – Greater China

5.3 AI-Generated Insights

A core feature of the system is its ability to generate natural language insights using Google Gemini. When the "Generate AI Insights" button is clicked, the system produces a narrative report that includes:

- Top-performing regions
- Lagging segments
- Emerging sales trends

- Strategy suggestions

This empowers users to quickly interpret large datasets without manual analysis.

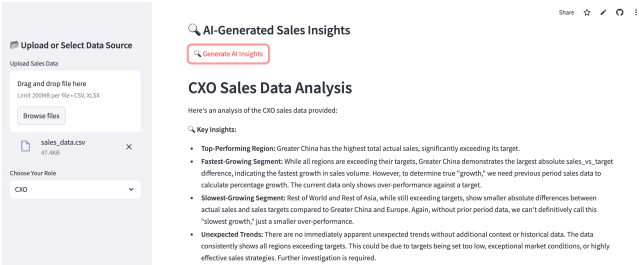


Figure 5: CXO Sales Insights Generated by AI

In Figure 5, CXO-level sales summary generated using Google Gemini. It highlights top-performing and underperforming regions, fastest-growing segments, and unexpected sales trends. This automated analysis eliminates the need for manual data exploration and provides immediate strategic observations for executive decision-makers.

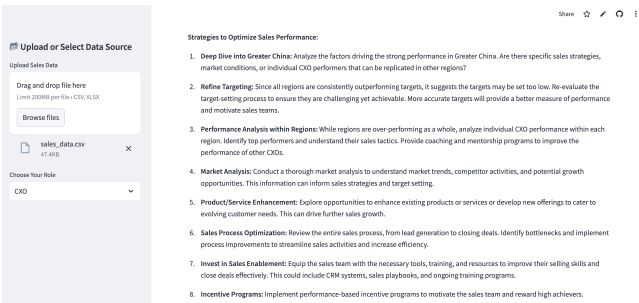


Figure 6: AI-Suggested Sales Optimization Strategies

The Figure 6: AI-Suggested Sales Optimization Strategies shows the AI-generated list of actionable recommendations based on sales data patterns. The insights cover market analysis, team training, sales process improvement, and regional strategy refinement. These suggestions mimic the role of a human business consultant, enabling faster strategic planning.

Additional Data Requirements for Deeper Analysis:

- **Historical Sales Data:** Previous period sales figures are essential to calculate growth rates and identify trends over time.
- **CXO-Specific Data:** Individual CXO sales data would allow for a more granular analysis of performance and identification of top performers.
- **Product/Service Breakdown:** Sales data broken down by product/service would reveal which offerings are driving growth and which may need attention.
- **Market Data:** External market data on competitor activities, market size, and growth potential would provide a more comprehensive understanding of the sales landscape.

By gathering more data and implementing these strategies, a clearer picture of CXO sales performance can be obtained, and more effective actions can be taken to optimize future sales outcomes.

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Figure 7: Additional Data Requirements for Deeper CXO Analysis

This *Figure 7: Additional Data Requirements for Deeper CXO Analysis*, illustrates the AI’s understanding of current data limitations and the types of additional data that would enhance the quality of sales analysis. It suggests the inclusion of historical data, competitor benchmarking, and detailed product breakdowns for more accurate forecasting and performance evaluation.

While this section highlights the CXO-level insights, the system also offers tailored analysis for other key roles within the organization. For **Division Heads**, the dashboard adjusts its focus to regional performance, allowing users to explore insights specific to a selected region—such as identifying which market is outperforming or falling behind.

For **Line Managers**, the dashboard drills down to the performance of individual sales team members, helping managers recognize top performers and spot areas needing support. This role-based adaptability ensures that each user receives insights that are directly relevant to their goals and responsibilities, making the dashboard a truly personalized decision-support tool.

5.4 AI-Driven Visualization

To make visual analysis seamless, the system generates charts using AI-written matplotlib or seaborn code. The AI analyzes a snapshot of the uploaded data, writes Python code for visualization, and executes it within the dashboard. This makes it possible to explore key metrics graphically without writing any code manually.

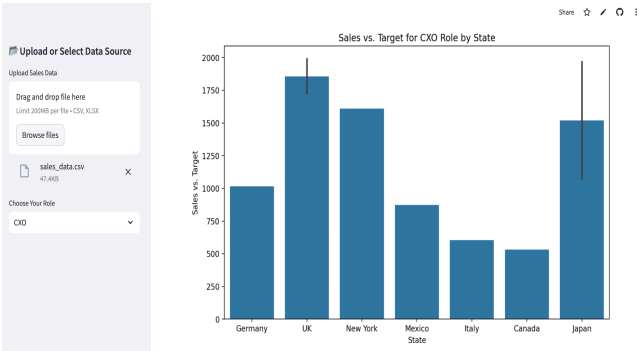


Figure 8: CXO - Sales vs. Target by State

This *Figure 8: CXO - Sales vs. Target by State* visualization shows the performance comparison of actual sales against targets across various states for the CXO role. It highlights which states have significantly exceeded expectations, offering a high-level overview for strategic leadership decision-making.

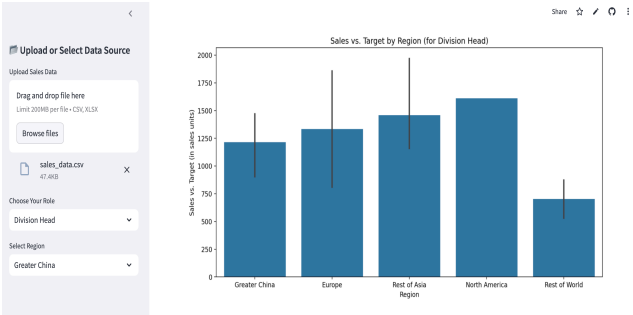


Figure 9: Division Head - Sales vs. Target by Region

In this *Figure 9: Division Head - Sales vs. Target by Region* chart visualizes regional sales performance for Division Heads. Each bar represents a region’s aggregated sales versus its target, supporting mid-level management in monitoring area-specific achievements and identifying regions needing strategic intervention.

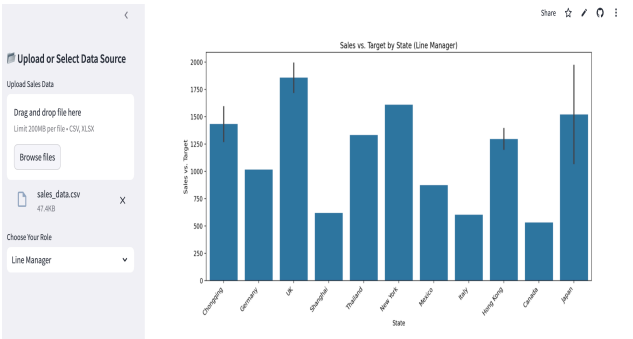


Figure 10: Line Manager - Sales vs. Target by State

Targeted at Line Managers, this visualization breaks down performance at a more granular, state level shown in Figure 10: Line Manager - Sales vs. Target by State. It allows frontline managers to analyze their team's local sales contributions, evaluate gaps, and take corrective measures at the operational level.

5.5 Natural Language Q&A Interaction

The dashboard also supports a natural language question-answering feature. Users can type in queries like “Which region exceeded its sales target?” and receive direct, AI-generated responses based on the dataset. This reduces the technical barrier for business users and makes the tool more accessible.

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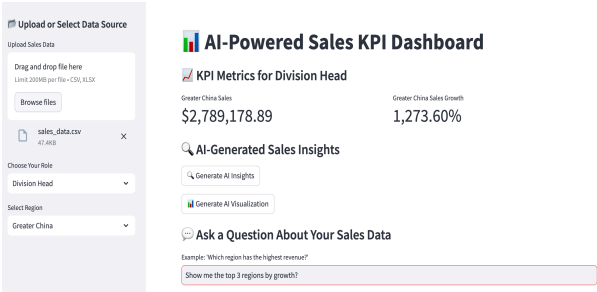


Figure 11: Role-Based Dashboard and AI Query Input

This Figure 11: Role-Based Dashboard and AI Query Input illustrates the dynamic dashboard view when a Division Head selects "Greater China" as the region. It shows role-specific KPIs such as total sales and sales growth. The dashboard also includes interactive features like AI-generated insights, visualizations, and a natural language Q&A input field. The user query example—"Show me the top 3 regions by growth?"—demonstrates the intuitive interface for asking analytical questions.

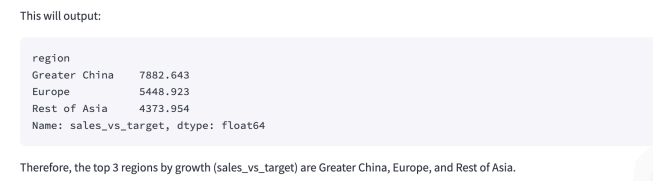


Figure 12: AI-Generated Output for Top 3 Regions by Growth

This Figure 12: AI-Generated Output for Top 3 Regions by Growth shows the system's response to a natural language query submitted in the dashboard interface. Using AI reasoning powered by the Gemini model, the system analyzes the dataset and returns a ranked list of regions based on their "sales_vs_target" values. The output identifies Greater China, Europe, and Rest of Asia as the top-performing regions in terms of growth.

6. Discussion

The AI-powered Sales KPI Dashboard developed successfully demonstrates how modern AI technologies can enhance business intelligence tools beyond traditional capabilities. The system not only processes and visualizes large datasets but also interprets them intelligently to support better decision-making at various organizational levels.

One of the standout features of the dashboard is its role-based adaptability. Unlike conventional dashboards that present static views, this system dynamically adjusts its content depending on whether the user is a CXO, Division Head, or Line Manager. This ensures that each user sees only the information that is relevant to

their scope of responsibility, improving clarity and supporting faster, data-driven decisions.

The integration of Google Gemini via LangChain adds another layer of intelligence by enabling the system to generate insights automatically. This removes the need for users to perform complex queries or manual data analysis. Instead, a single click produces a summary highlighting key trends, performance gaps, and optimization strategies. These insights closely mimic the advisory function of a human business analyst and demonstrate the potential of Agentic AI systems in practical business applications.

Moreover, the AI-powered visualization feature bridges the gap between natural language and visual analytics. The system generates Python code for charts based on the user's context, which is then executed and displayed—all without requiring any programming knowledge from the user. This innovation not only saves time but also empowers non-technical users to engage deeply with the data.

The natural language Q&A module also plays a key role in making the dashboard accessible to a broader range of users. By allowing users to ask sales-related questions in plain English and receive contextually accurate responses, the dashboard aligns with the growing trend of conversational AI in business tools.

Conclusion

This project successfully demonstrates how modern AI technologies—specifically large language models and agentic AI principles—can be integrated into traditional business intelligence tools to create a more dynamic, interactive, and insightful sales analytics dashboard. By combining structured data processing with natural language interfaces and context-aware visualizations, the system provides personalized, role-specific insights that go beyond static charts and manual interpretation.

The dashboard automates key sales metric calculations, adapts its content based on the user's role (CXO, Division Head, Line Manager), and generates AI-driven narratives and visualizations using Google Gemini through LangChain. These capabilities transform the dashboard into an intelligent assistant that not only presents data but helps explain what it means and what action might be taken—bringing the concept of Agentic AI into a real-world business setting.

Overall, the project reflects a step forward in building intelligent decision-support systems that are scalable, user-friendly, and capable of autonomous insight generation. It sets a strong foundation for future enhancements, including deeper automation, multi-source data integration, and even more advanced agentic behavior.

REFERENCES

- [1] R. Bommasani, D. Holtzman, C. Liang, T. Ganguli, E. Zoph, and P. Abbeel. 2021. *On the opportunities and risks of foundation models*. arXiv preprint arXiv:2108.07258. <https://arxiv.org/abs/2108.07258>
- [2] H. Chen, R. H. L. Chiang, and V. C. Storey. 2012. *Business intelligence and analytics: From big data to big impact*. MIS Quarterly 36, 4 (2012), 1165–1188. <https://doi.org/10.2307/41703503>
- [3] H. Kaur and S. Singh. 2021. *Application of natural language interfaces in business intelligence tools*. International Journal of Information Management 57 (2021), 102221. <https://doi.org/10.1016/j.ijinfomgt.2020.102221>
- [4] P. Liang, A. Chen, W. Yu, X. Song, and H. Jiang. 2023. *LLMs for data analytics: Bridging natural language and structured data*. arXiv preprint arXiv:2304.08251. <https://arxiv.org/abs/2304.08251>
- [5] M. Shinn and A. Velivelli. 2023. *AutoGPT: Building autonomous AI agents using LLMs*. arXiv preprint arXiv:2306.12139. <https://arxiv.org/abs/2306.12139>
- [6] Y. Wang, L. Kung, and T. A. Byrd. 2018. *Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations*. Technological Forecasting and Social Change 126 (2018), 3–13. <https://doi.org/10.1016/j.techfore.2015.12.019>
- [7] H. Zhang, T. Xu, Y. Hu, and S. Wang. 2020. *A framework for intelligent business dashboards using real-time data*. Journal of Decision Systems 29, sup1 (2020), 103–117. <https://doi.org/10.1080/12460125.2020.1765175>