Leverage Generative AI for Data Analysis and Insights

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Time: 30 minutes

Learning Objectives

By the end of this activity, you will be able to:

- Understand the capabilities of Generative AI models for analyzing structured data
- Practice formulating effective prompts to extract specific insights from datasets
- Analyze and interpret AI-generated results
- Explore different output formats for presenting data
- Apply critical evaluation to AI-generated analysis

Tools Required

Choose Your Generative AI Interface:

Google:

- AI Studio (developer platform)
- Gemini (consumer solution)

Anthropic / Claude:

- Claude Console (developer platform)
- Claude.ai (consumer solution)

Mistral:

- Mistral Console (developer platform)
- Mistral Chat (consumer solution)

OpenAI:

- OpenAI Platform (developer platform)
- ChatGPT (consumer solution)

Dataset:

The provided CSV file contains quarterly financial performance data across multiple business units.

CSV format :
https://github.com/rihanamsaddek/Transformative-potential-of-Generative-AI---Lab-3.0/blob/main/Financial%20Performance%20Dataset%20-%20Sheet1%20(1).csv

PDF format :
https://github.com/rihanamsaddek/Transformative-potential-of-Generative-AI---Lab-3.0/blob/main/Financial%20Performance%20Dataset%20-%20Sheet1.pdf

XLSX format :

https://github.com/rihanamsaddek/Transformative-potential-of-Generative-AI---Lab-3.0/blob/main/Financial%20Performance%20Dataset.xlsx

Instructions

1. Introduction

Large language models can serve as powerful analytical assistants for professionals across all industries, enabling:

1. Rapid analysis of structured data
2. Identification of trends and patterns
3. Generation of insights that might take hours to produce manually

This activity will guide you through using AI to analyze a dataset and extract actionable insights for decision-making, a skill valuable whether you work in operations, marketing, human resources, sales, or any other business function.

2. Explore the Data

- Download the provided CSV file and open it in ***Excel, Google Sheets, or a text editor***
- Take 3-5 minutes to familiarize yourself with the data structure:
    - **What are the columns?** Identify metrics, dimensions, and time periods
    - **What type of information does each column contain?** Revenue, costs, margins, etc.
    - **What initial questions come to mind?** Consider profitability, growth trends, regional performance, or variance analysis

Data exploration considerations:

- Are there any obvious data quality issues?
- What key performance indicators (KPIs) can be calculated?
- What comparisons would be valuable (period-over-period, business unit, regional)?

3. Initial Prompts: Performance Overview

Upload the file to your chosen AI platform and start with these foundational prompts. Pay attention to how the AI interprets your requests and the accuracy of its calculations.

Prompt 1: Provide a summary of performance by business unit, including total revenue, total costs, and profit margin for each.

Prompt 2: Calculate the quarter-over-quarter revenue growth rate for each business unit.

Prompt 3: Which quarter showed the strongest overall profitability, and what was the company-wide profit margin?

4. Iterative Prompting: Deeper Analysis

Refine your analysis by asking more specific questions that would typically require manual calculations and extensive review:

Profitability Analysis:

- Identify the top 3 business units by profit margin and explain what might be driving their performance.
- Which business unit has the highest cost-to-revenue ratio, and how does it compare to the company average?

Trend Analysis:

- Show the revenue trend across all quarters for each business unit. Are there any seasonal patterns
- Compare Q4 2024 performance to Q1 2024 performance across all business units. Which showed the most improvement?

Regional Performance:

- Which region generated the highest total revenue across all quarters, and what was the average profit margin for that region?

- Compare the North America and Europe regions: which has better profitability and why?

Variance Analysis:

- Calculate the variance between Q3 and Q4 2024 revenue for each business unit. Which had the largest absolute change?

5. Exploring Output Formats

AI models can present data in various formats suitable for executive presentations or business reports. Experiment with these prompts:

Structured Tables:

- Create a table showing quarterly revenue and profit margin by business unit.
- Generate a summary table with total revenue, total costs, and profit margin by region.

Visual Representations:

- Present the quarterly revenue trend for the Investment Banking business unit as a bar chart.
- Create a pie chart showing the revenue contribution of each business unit to total company revenue.
- Generate a line chart comparing profit margins across quarters for all business units.

Formatted Reports:

- Create an executive summary table with year-to-date totals by business unit, sorted by profitability.

Pro Tip: Try the same prompts across different platforms and compare:

1. The quality of financial analysis
2. The accuracy of calculations
3. The clarity of visualizations
4. The depth of insights provided

Critical Evaluation Guidelines

Always verify AI-generated financial analysis:

✓ **Double-check calculations** - Spot-check key figures against your own calculations
✓ **Validate assumptions** - Ensure the LLM hasn't made incorrect assumptions about the data
✓ **Consider limitations** - AI cannot replace professional judgment, especially for complex financial decisions
✓ **Verify regulatory compliance** - Ensure outputs meet your organization's reporting standards
✓ **Assess data privacy** - Be mindful of uploading sensitive financial information to cloud-based LLMs

Red Flags to Watch For:

- Mathematical errors in calculations
- Misinterpretation of financial terminology
- Overly confident predictions without caveats
- Recommendations that lack business context

Model Selection Considerations:

Governance Considerations

Financial services operate under stringent regulatory requirements. Consider:

- **Data Privacy:** Does your data contain sensitive customer or proprietary information?
- **Compliance:** SOC 2, ISO 27001, GDPR, and other certifications
- **Auditability:** Can you explain how the AI reached its conclusions?
- **Data Residency:** Where is your data processed and stored?

Privacy & Security Resources:

- Google Gen AI Privacy
- OpenAI Enterprise Privacy
- Anthropic Privacy Policy

Key Capabilities for Financial Analysis

- **Context Window:** Important for analyzing large financial statements or multi-year data
- **Numerical Accuracy:** Critical for financial calculations
- **Structured Data Processing:** Ability to work with tables, CSV files, and spreadsheets

- **Multimodality:** Can process charts, financial statements (PDFs), and structured data
- **Reasoning Ability:** Can interpret financial metrics and provide strategic insights

Performance Factors

- **Latency:** How quickly do you need results? Real-time analysis vs. batch processing
- **Cost:** Token usage for large financial datasets can add up
- **Accuracy:** Financial analysis requires high precision - test extensively before deployment

Conclusion

Generative AI can significantly accelerate data analysis workflows across all business functions, but it should augment, not replace, professional expertise. Use these tools to:

- Handle routine analysis efficiently
- Generate initial insights quickly
- Explore data from multiple angles
- Create presentation-ready outputs

Then apply your professional judgment and domain knowledge to validate findings and make informed decisions.