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Gemini Pro Financial Decoder

1. INTRODUCTION

1.1 Project Overview

The Gemini Pro Financial Decoder is an advanced AI-powered web application designed to simplify and automate financial statement analysis. The application is developed using Streamlit for the user interface and integrated with the Google Gemini API to generate intelligent, AI-driven insights from financial data.

The application enables users to upload important financial documents such as Balance Sheets, Profit & Loss Statements, and Cash Flow Statements in CSV or Excel formats. Once the files are uploaded, the system processes the data using Python-based data analysis libraries, extracts relevant numerical information, and prepares it for further evaluation. The processed data is then sent to the Gemini AI model, which analyzes trends, identifies patterns, and generates a structured financial summary in simple language.

In addition to AI-generated insights, the system provides graphical representations of key financial metrics through interactive charts and visualizations. These visual tools help users easily understand revenue trends, expense patterns, profit margins, and overall financial performance without requiring deep financial expertise. The platform also includes a PDF report generation feature, allowing users to download a well-structured report containing financial summaries and visual outputs for documentation or presentation purposes.

1.2 Purpose

The purpose of this project is to automate financial statement analysis and provide quick, accurate, and easy-to-understand insights. Many small businesses and students struggle to interpret financial documents manually. This system reduces manual effort, improves clarity, and enables better decision-making through AI-generated summaries and visual representations.

2. IDEATION PHASE

2.1 Problem Statement

Financial statement analysis is a critical process for understanding the financial health and performance of a business. However, analyzing financial documents such as Balance Sheets, Profit & Loss Statements, and Cash Flow Statements is often time-consuming and requires strong domain knowledge in accounting and finance. Many small business owners, startups, and students do not possess advanced financial expertise, making it difficult for them to interpret key financial indicators such as revenue growth, profit margins, liquidity position, and expense trends.

Traditional financial analysis involves manual calculations, ratio analysis, and detailed examination of multiple data points, which increases the possibility of human error and misinterpretation. Additionally, financial data is typically presented in tabular format, which may appear complex and overwhelming for non-financial users. This creates a gap between raw

financial data and meaningful decision-making insights.

Therefore, there is a strong need for an intelligent and automated system that can process financial data efficiently, interpret it accurately, and present clear, concise, and visually understandable insights. The solution should reduce manual effort, save time, and help users make informed financial decisions with confidence.

2.2 Empathy Map Canvas

Understanding user behavior and emotions was an important part of designing the Gemini Pro Financial Decoder. Users, especially small business owners and students, often think about questions such as: “Is my business profitable?”, “Are my expenses increasing?”, or “Am I financially stable?” However, when they look at raw financial statements filled with numbers, columns, and accounting terms, they often feel confused and uncertain.

Users say that financial reports are difficult to interpret without professional guidance. Many express that they spend too much time trying to understand financial documents and still feel unsure about their conclusions. They feel stressed when making financial decisions because incorrect interpretation may lead to losses or poor planning.

From an empathy perspective, users need a system that simplifies complex financial data into easy-to-understand language. They want quick summaries, visual representations of trends, and clear explanations of financial performance. By addressing these emotional and practical needs, the Gemini Pro Financial Decoder provides a user-friendly platform that transforms complicated data into meaningful insights, reducing confusion and increasing confidence in decision-making.

2.3 Brainstorming

During the ideation phase, several potential solutions were discussed and evaluated. Initial ideas included developing a manual financial calculator tool that performs basic ratio analysis. Another idea was to create a dashboard-based financial visualization system that only displays charts and numerical summaries. While these solutions addressed certain aspects of the problem, they still required users to interpret the results manually.

The team then explored the possibility of building an AI-powered financial assistant that could automatically analyze uploaded financial data and generate human-like explanations. After evaluating feasibility, innovation value, and practical implementation, the idea of integrating Google Gemini AI with a Streamlit-based web application was selected as the most effective solution.

This approach combines automated financial analysis, intelligent insight generation, graphical visualization, and report generation in a single platform. By leveraging artificial intelligence, the system not only processes numerical data but also explains financial performance in simple language. This makes the final solution more comprehensive, user-centric, and technologically advanced compared to traditional financial tools.

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

■ SAYS	■ THINKS
<p><i>What have we heard them say?</i></p> <ul style="list-style-type: none">• "I need summaries in minutes, not hours."• "This report is too technical — give me key numbers."• "I can't miss a trend before my deadline."• "Can AI just tell me if this company is healthy?"• "Manual extraction is killing my productivity."	<p>Users</p> <p>Sarah — Financial Analyst</p> <p>Rajesh — CEO / Executive</p> <p>Mark — Financial Journalist</p> <p><i>All three need AI-powered financial insights instantly.</i></p> <p><i>What are their wants, needs, hopes?</i></p> <ul style="list-style-type: none">• "What if I miss a red flag in the data?"• "I wish AI could summarize this instantly."• "Visuals would help me explain this to the board."• "Can I trust AI insights for strategic decisions?"• "There must be a smarter way to do this."
■ DOES	■ FEELS
<p><i>What behavior have we observed?</i></p> <ul style="list-style-type: none">• Manually reads 50+ page reports every quarter.• Copies PDF data into Excel to build summaries.• Asks analysts to pre-process data before reviewing.• Googles jargon terms to understand reports.• Rushes through analysis under tight deadlines.	<p><i>What are their fears and frustrations?</i></p> <ul style="list-style-type: none">• Overwhelmed by volume and complexity of data.• Stressed by time pressure — no room for error.• Frustrated when reports lack clear insights.• Anxious about wrong decisions due to unclear data.• Relieved when AI simplifies complex analysis.

User accesses the web application and uploads financial documents in CSV or Excel format.

After clicking the Analyze button, the system processes the uploaded data and prepares it for analysis.

The processed data is sent to the Gemini API, which generates intelligent financial summaries and insights. Finally, the user views visual charts and downloads the structured PDF report for further

3.2 Solution Requirement

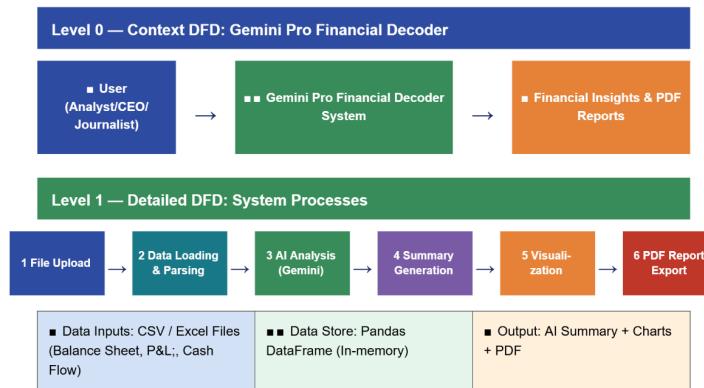
Functional Requirements:

- Upload CSV files
- Display uploaded data
- Generate AI-based financial summary
- Visualize numeric trends using line charts
- Generate downloadable PDF report

Non-Functional Requirements:

- Secure API key management
- Fast response time
- User-friendly interface

3.3 Data Flow Diagram



3.4 Technology Stack

- **Frontend:** Streamlit
- **Backend Logic:** Python
- **Data Processing:** Pandas
- **AI Integration:** Google Gemini API
- **Visualization:** Streamlit Line Charts
- **PDF Generation:** ReportLab
- **Version Control:** Git & GitHub

4. PROJECT DESIGN

4.1 Problem Solution Fit

The Gemini Pro Financial Decoder effectively addresses the challenges involved in manual financial statement analysis. Many users struggle with interpreting complex financial data due to lack of expertise and time constraints. The proposed solution automates the analysis process by converting raw numerical data into structured insights using artificial intelligence. It reduces manual calculations, minimizes errors, and eliminates the need for deep accounting knowledge.

The system aligns perfectly with user needs by providing clear summaries, visual charts, and downloadable reports in a simple interface. By combining automation with intelligent interpretation, the solution ensures that users can quickly understand financial performance and

make informed decisions efficiently.

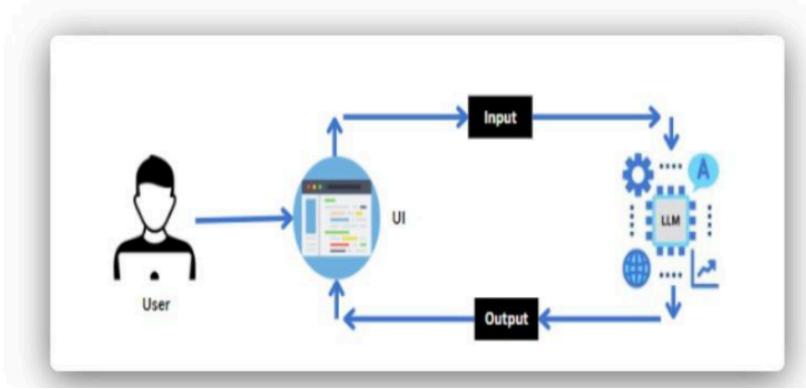
4.2 Proposed Solution

The proposed solution is a web-based AI-powered financial analysis platform developed using Streamlit and integrated with the Gemini API. The application allows users to upload financial documents in CSV or Excel formats, after which the system processes and analyzes the data automatically.

The platform not only performs numerical analysis but also generates human-readable financial summaries using artificial intelligence. It visualizes important financial metrics through charts and graphs to improve clarity. Additionally, it provides a downloadable PDF report containing the analysis results. The solution integrates automation, AI intelligence, visualization, and reporting into a single user-friendly system, making financial analysis faster and more accessible.

4.3 Solution Architecture

Architecture:



5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

The Gemini Pro Financial Decoder project was developed using the Agile methodology, which allowed the team to build the application in an incremental and flexible manner. Agile was chosen because it supports continuous improvement, regular feedback, and adaptive planning throughout the development cycle. Instead of completing the entire project at once, the work was divided into smaller, manageable iterations called sprints. This approach helped the team focus on specific functionalities in each phase while maintaining steady progress.

The project was structured into four major sprints, each targeting a core module of the system. The first sprint focused on implementing the file upload feature, enabling users to upload financial documents in CSV and Excel formats. The second sprint concentrated on data

visualization, where financial metrics were displayed using charts and graphs for better interpretation. The third sprint involved integrating the Google Gemini API to enable AI-based financial analysis and automatic insight generation. The fourth sprint was dedicated to implementing the PDF report generation feature, allowing users to download structured financial summaries.

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

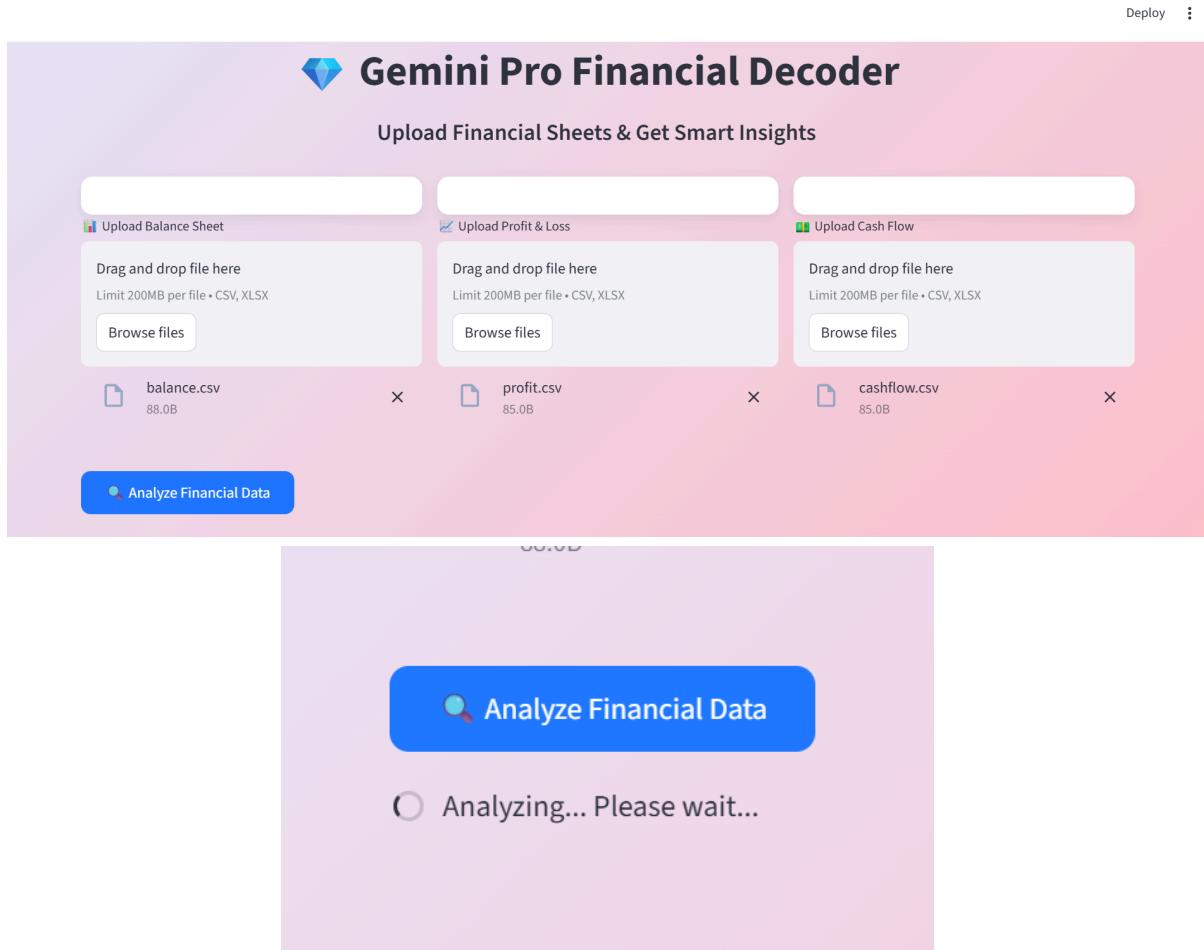
Functional testing was conducted to ensure that every module of the application worked according to the defined requirements. The file upload functionality was tested with different file formats such as CSV and Excel to verify proper validation, error handling, and data processing. The system was checked for incorrect file types, missing values, and corrupted data to ensure it responds with appropriate error messages. The AI summary generation module was tested to confirm that the Gemini API correctly analyzed financial data and generated meaningful, human-readable insights. Additionally, the visualization module was verified to ensure that charts and graphs accurately represented the processed financial data without distortion or miscalculation.

Performance testing was performed to evaluate the system's responsiveness and stability under different conditions. The response time for file uploads, data processing, AI analysis, and PDF generation was measured to ensure smooth user experience. API connectivity with the Gemini service was tested multiple times to confirm reliable communication and proper handling of

network delays or failures. The application was also tested with multiple file uploads to ensure it could handle repeated operations without crashing or slowing down significantly.

7. RESULTS

7.1 Output Screenshots



📊 Financial Analysis Report

As a professional financial analyst, I have reviewed the provided financial statements for three periods. The data indicates a company on a strong and improving financial trajectory.

Summary

The company demonstrates excellent financial performance over the analyzed periods. There is robust growth in revenue, profitability, and asset base, supported by strong cash generation from operations. The company maintains a healthy capital structure with moderate leverage and a significant equity base. Overall, the company appears to be growing sustainably and generating substantial value for its shareholders.

Key Metrics

Here are some key financial metrics calculated across the three periods:

Metric	Period 0	Period 1	Period 2
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Key Metrics

Here are some key financial metrics calculated across the three periods:

Metric	Period 0	Period 1	Period 2
Profitability			
Net Profit Margin	40.0%	41.7%	46.7%
Solvency / Leverage			
Debt-to-Equity Ratio	0.67	0.71	0.67
Equity Ratio	60.0%	58.3%	60.0%
Cash Flow Strength			
Free Cash Flow	15,000	18,000	24,000
Net Cash Flow	18,000	22,000	29,000

Trends

1. Revenue & Profitability Growth:

- Revenue has shown consistent and accelerating growth: 50,000 → 60,000 (20% increase) → 75,000 (25% increase).
- Expenses are growing at a slower rate than revenue (16.7% then 14.3%), leading to significant operating leverage.
- Net Profit has grown even faster than revenue, from 20,000 → 25,000 (25% increase) → 35,000 (40% increase), indicating improving operational efficiency.
- Net Profit Margin has steadily increased from 40.0% to 46.7%, which is an exceptionally strong margin.

2. Balance Sheet Expansion & Structure:

- Total Assets have grown steadily (100,000 → 120,000 → 150,000), suggesting business expansion.
- Equity has shown robust growth (60,000 → 70,000 → 90,000), primarily driven by retained earnings (Net Profit).
- Liabilities have also increased (40,000 → 50,000 → 60,000), but the Debt-to-Equity Ratio has remained stable and moderate (around 0.67-0.71), indicating that the company is not becoming overly reliant on debt financing. The Equity Ratio remains strong, consistently around 60%.

3. Cash Flow Performance:

- Operating Cash Flow has shown continuous and strong growth (20,000 → 25,000 → 30,000), reflecting the health of the core business operations and its ability to generate cash.
- Investing Activities show consistent negative values (-5,000 → -7,000 → -6,000), indicating ongoing capital expenditures and investment in the business's future growth.

Financial Visualizations

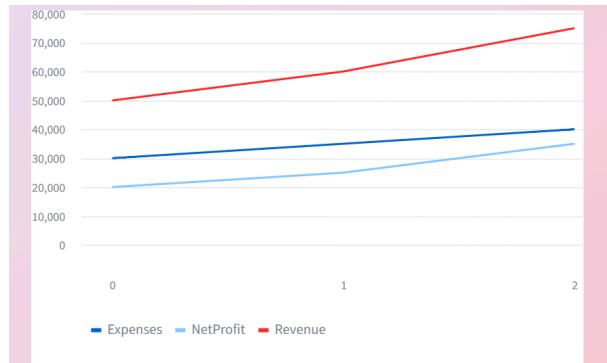
Balance Sheet

	Assets	Liabilities	Equity
0	100000		40000
1	120000		50000
2	150000		60000
3	\$	None	None



Profit & Loss Statement

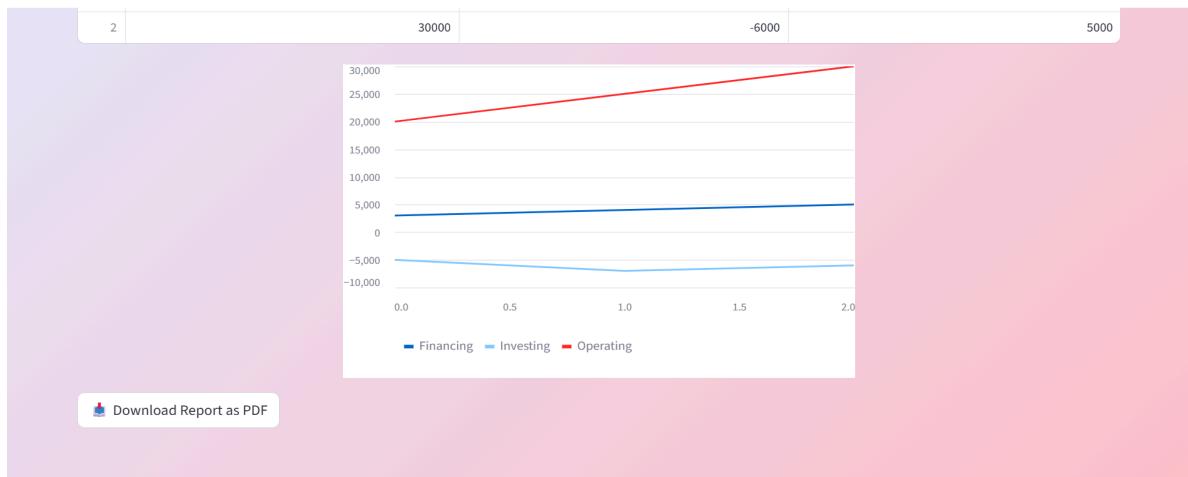
	Revenue	Expenses	NetProfit
0		50000	30000
1		60000	35000
2		75000	40000



Cash Flow Statement

	Operating	Investing	Financing
0		20000	-5000
1		25000	-7000
2		30000	-6000





8. ADVANTAGES & DISADVANTAGES

Advantages:

The Gemini Pro Financial Decoder provides automated financial insights, which significantly reduces manual effort and saves time for users. It also offers an easy-to-use interface with visual trend analysis and downloadable PDF reports, making financial data simple to understand and accessible.

Disadvantages:

The application requires a stable internet connection since it depends on the Gemini API for AI-based analysis. Additionally, the accuracy of results is limited to the quality and correctness of the uploaded financial data.

9. CONCLUSION

The Gemini Pro Financial Decoder successfully integrates Artificial Intelligence with financial data analysis to create an efficient and intelligent financial reporting system. The application automates the process of interpreting balance sheets, profit and loss statements, and cash flow statements, reducing manual effort and minimizing human errors. By leveraging AI-driven insights, the system transforms complex financial data into clear, structured summaries and meaningful interpretations.

The platform enhances decision-making by generating key financial metrics, ratio analysis, trend evaluations, and visual representations of financial performance. Interactive visualizations help users quickly understand growth patterns, profitability trends, solvency position, and cash flow stability. The downloadable PDF report feature further adds value by enabling easy documentation and professional sharing of financial insights.

This project demonstrates the practical implementation of AI in real-world financial analysis scenarios. It showcases how modern technologies such as Streamlit, Pandas, and AI APIs can be integrated to build scalable, user-friendly financial intelligence tools. Overall, the system proves that AI-powered financial analysis can significantly improve accuracy, efficiency, and strategic decision-making in business environments.

10. FUTURE SCOPE

- Multi-language support
- Advanced financial ratio analysis
- Real-time financial dashboard
- Cloud deployment
- Integration with accounting software

11. APPENDIX

Source Code

```
# Import Required Libraries

import streamlit as st

import pandas as pd

from reportlab.platypus import SimpleDocTemplate, Paragraph, Spacer

from reportlab.lib.styles import getSampleStyleSheet

from reportlab.lib.pagesizes import A4

from reportlab.lib.units import inch

import google.generativeai as genai

from dotenv import load_dotenv

import os
```

```
load_dotenv()

# Configure API Key
GOOGLE_API_KEY = os.getenv("GOOGLE_API_KEY")
genai.configure(api_key=GOOGLE_API_KEY)

# File Loading Function
def load_file(file):
    if file.name.endswith(".csv"):
        return pd.read_csv(file)
    else:
        return pd.read_excel(file)

# Gemini AI Summary Function
def generate_summary(balance_data, profit_data, cash_data):
    combined_text = ""
    if balance_data is not None:
        combined_text += "\nBalance Sheet:\n" + balance_data.head(15).to_string()
    if profit_data is not None:
```

```
combined_text += "\nProfit & Loss:\n" + profit_data.head(15).to_string()

if cash_data is not None:

    combined_text += "\nCash Flow:\n" + cash_data.head(15).to_string()
```

prompt = f"""\n

You are a professional financial analyst.

Analyze the financial statements and provide:

- Summary
- Key Metrics
- Trends
- Overall Financial Health

{combined_text}

"""\n

```
model = genai.GenerativeModel("gemini-2.5-flash")

response = model.generate_content(prompt)

return response.text
```

PDF Report Generation

```
def create_pdf(text):
    filename = "Financial_Report.pdf"
    doc = SimpleDocTemplate(filename, pagesize=A4)
    elements = []
    styles = getSampleStyleSheet()

    for line in text.split("\n"):
        elements.append(Paragraph(line, styles["Normal"]))
        elements.append(Spacer(1, 0.2 * inch))

    doc.build(elements)
    return filename
```

GitHub & Project Demo Link

<https://github.com/veeradevi08/Gemini-Pro-Financial-Decoder/>