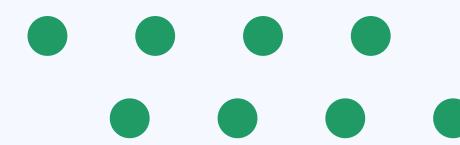




# Financial Health Monitoring System

Predictive Analytics for  
Corporate Financial Risk  
Assessment





# Broke Busters



MUSI CALORI  
TEAM LEAD



SHANE MWANGI  
NOTEBOOK  
CRISP DM



MICHAEL MAINA  
NOTEBOOK  
TRACKING TOOL  
DEPLOYMENT



IVY CHELAGAT  
NONTECHNICAL  
PRESENTATION



HASSAN ALI  
README



# Problem Statement



Investors often rely on outdated or incomplete financial information



A data-driven approach is needed to evaluate financial health accurately



Our project analyzes key financial statements to assess performance and risk clearly.



# Why It Matters



Investors need clear insights to identify stable and profitable opportunities.



Lenders require reliable financial indicators to evaluate credit risk.



Business leaders depend on data-driven analysis to plan and manage growth effectively.



# Project Objectives

## MAIN:

To build a **data analysis and scoring system** that evaluates a company's financial health using real-world financial data.

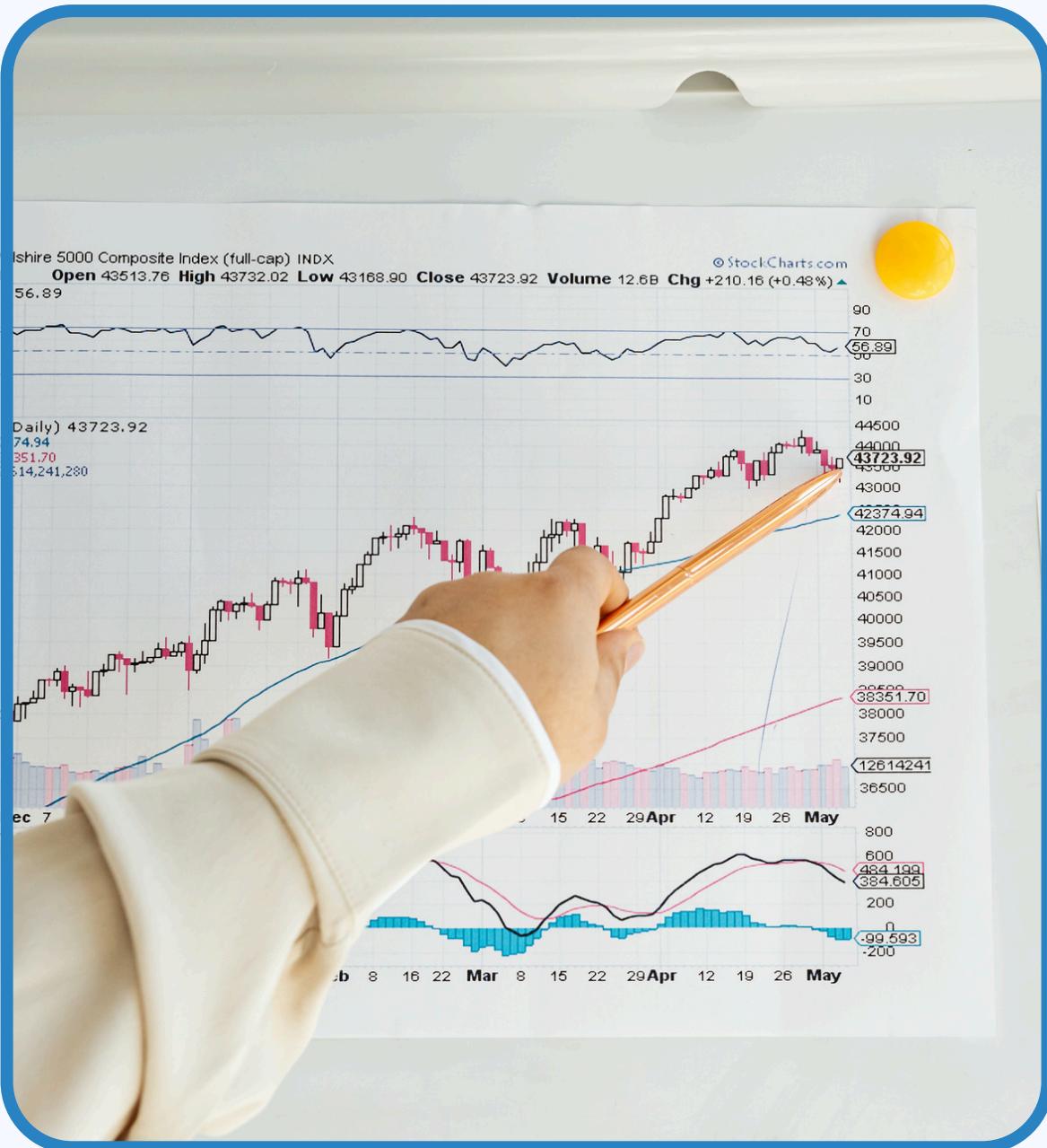
## SPECIFIC:

- Collect and clean financial data from Yahoo Finance.
- Analyze key financial metrics like revenue and profitability trends.
- Build a financial health scoring model.
- Visualize insights with clear charts and dashboards.
- Provide data-driven recommendations for decision-makers.





# Data Understanding



## Data Sources:

- Yahoo Finance API and related financial datasets

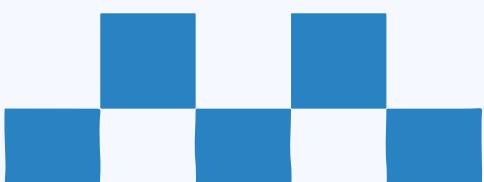
## Datasets Used:

- Income Statements
- Balance Sheets
- Cash Flow Statements
- Stock Price History

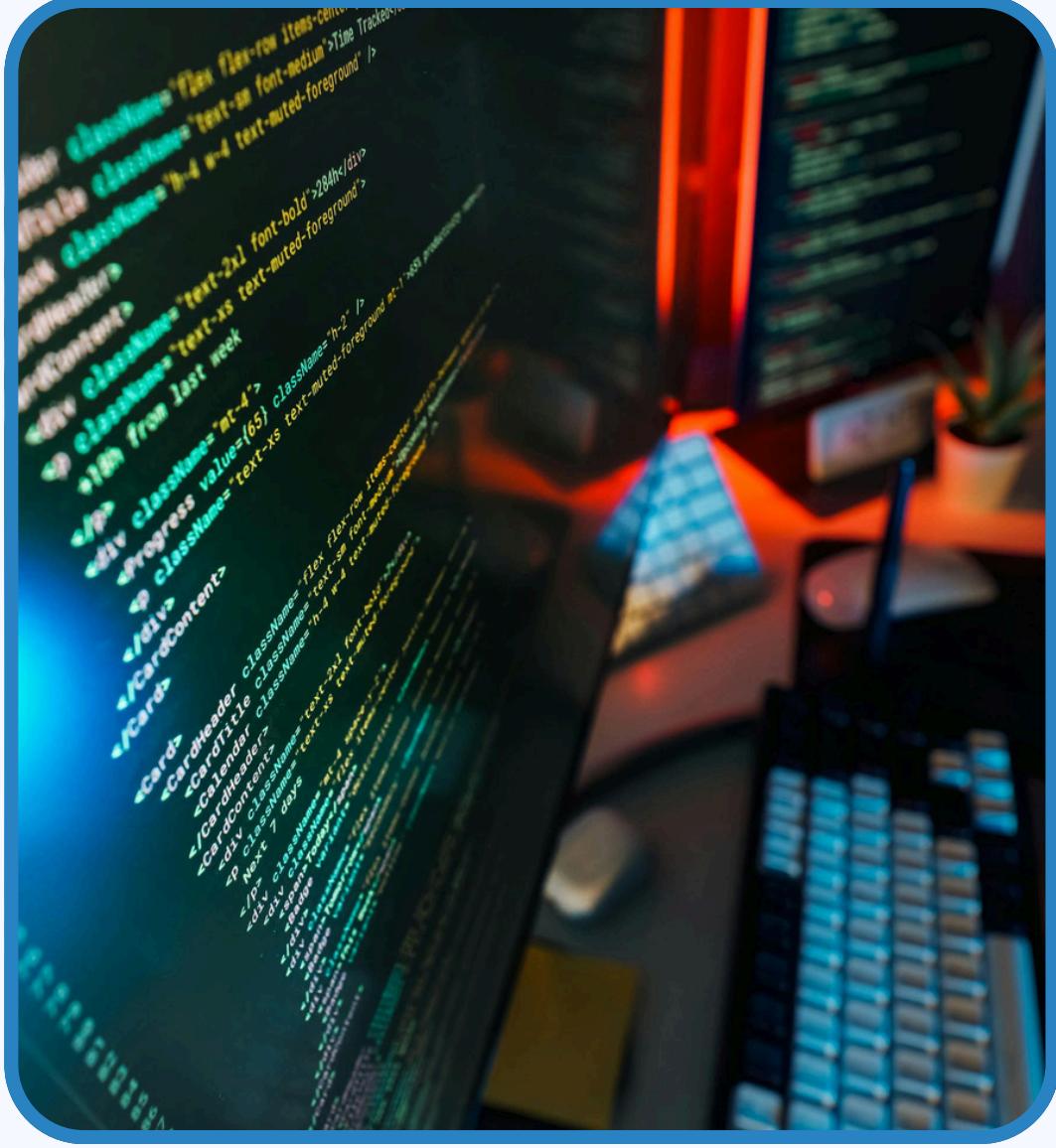
Combined S&P 500 and NASDAQ tickers.

Filtered for companies with Market Cap  $\geq \$100M$  for data relevance.

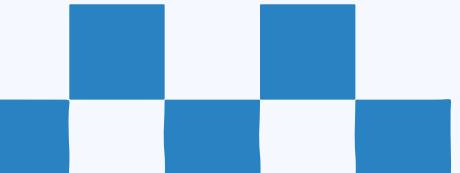
Final Dataset: 495 companies, covering 99.5% of the total market cap

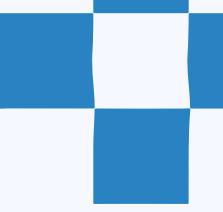


# Data Pipeline & Engineering



- **Extraction:** Fetched data for 495+ tickers using yfinance with caching for efficiency.
- **Cleaning & Standardization:**
  - Handled missing values.
  - Scaled financial figures to **Billions** for consistency.
  - Removed duplicates.
- **Feature Engineering:** Calculated critical financial ratios.
- **Merging:** Created a unified master dataset for analysis.





# Feature Engineering & Key Ratios

We engineered a suite of financial ratios to power our model:

- **Profitability:**
  - Gross Margin, Operating Margin, Net Margin
  - Return on Assets (ROA), Return on Equity (ROE)
- **Leverage & Liquidity:**
  - Debt to Equity Ratio, Current Ratio
- **Cash Flow:**
  - Free Cash Flow (FCF), FCF Yield, CapEx Ratio
- **Risk Score:**
  - **Altman Z-Score** (A composite risk indicator)





# Altman Z-Score Methodology

ORIGINAL ALTMAN Z-SCORE (1968):

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E$$

Where:

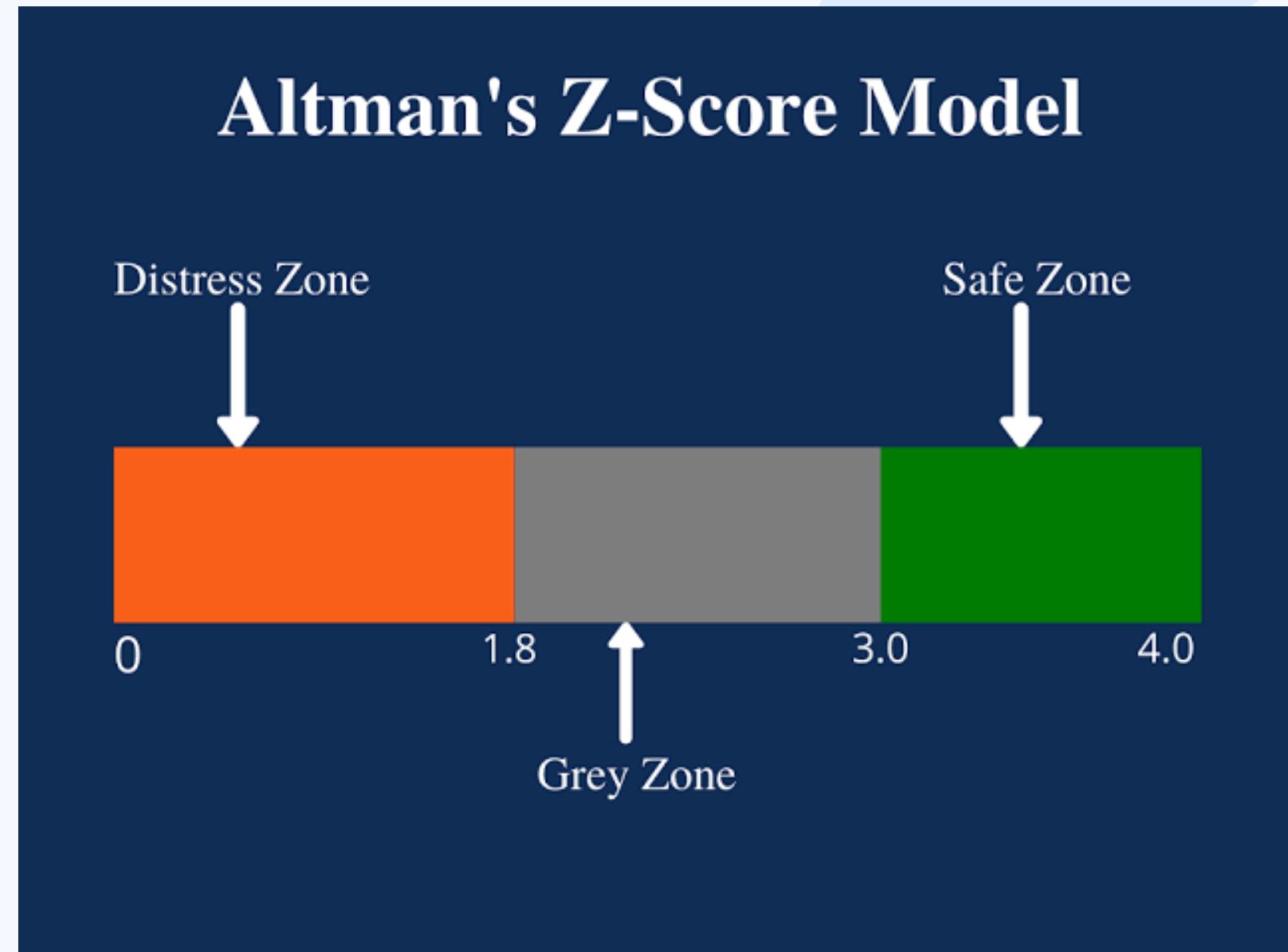
A = Working Capital / Total Assets

B = Retained Earnings / Total Assets

C = EBIT / Total Assets

D = Market Value Equity / Total Liabilities

E = Sales / Total Assets



# Model Approach

## Models Used

- Random Forest – baseline classification.
- XGBoost – improved handling of complex patterns and imbalance.

## Features

- Financial ratios + Altman Z-Score.

## Target

- Financial Health Category: Safe / Grey / Distress



# Model Evaluation

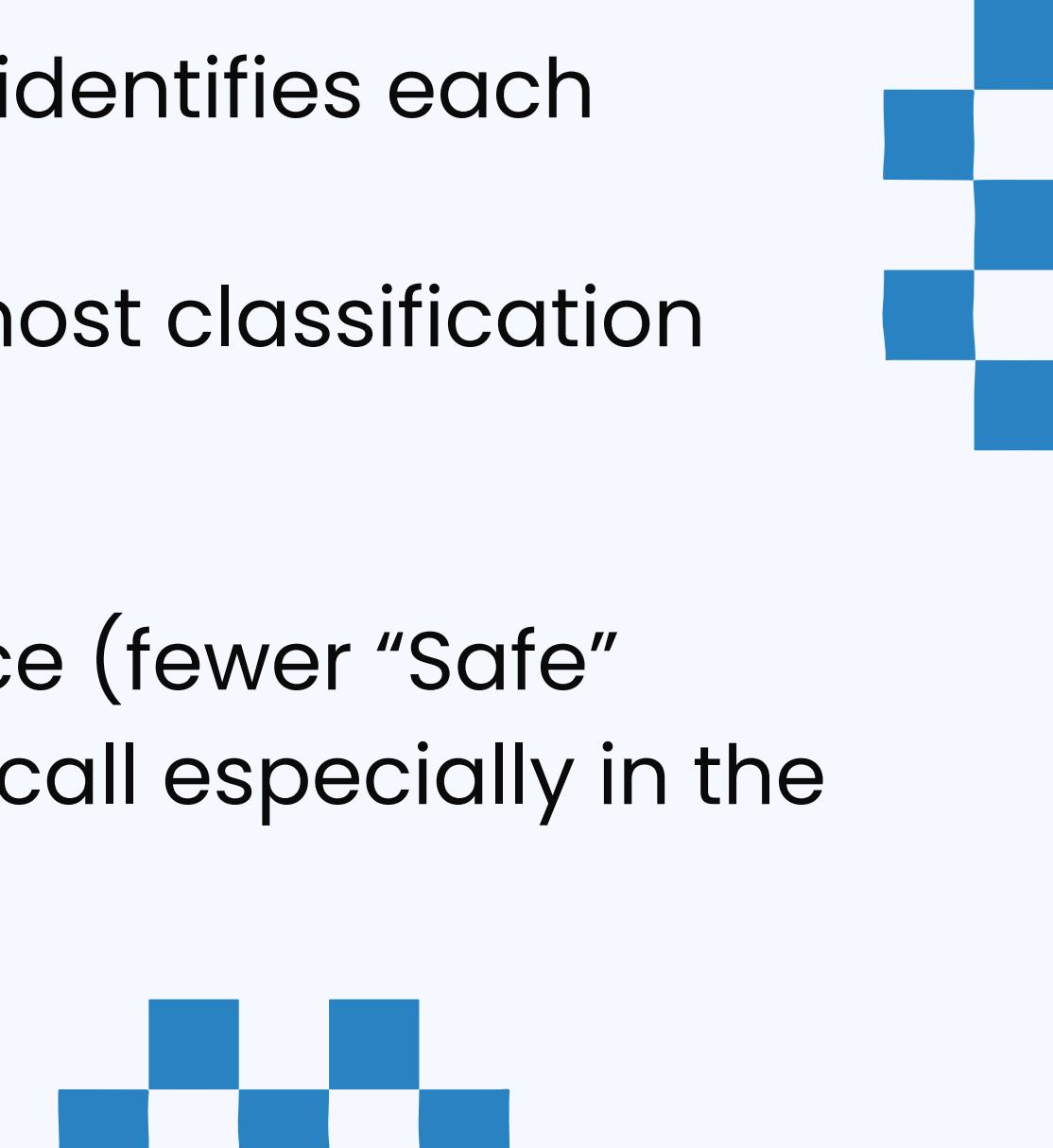


## Evaluation Metrics Used

- Accuracy: Overall correctness of the model.
  - Random Forest = 83%
  - Xgboost = 83%
- Precision & Recall: To measure how well the model identifies each financial health class correctly.
- Confusion Matrix: Shows where the model makes most classification errors.

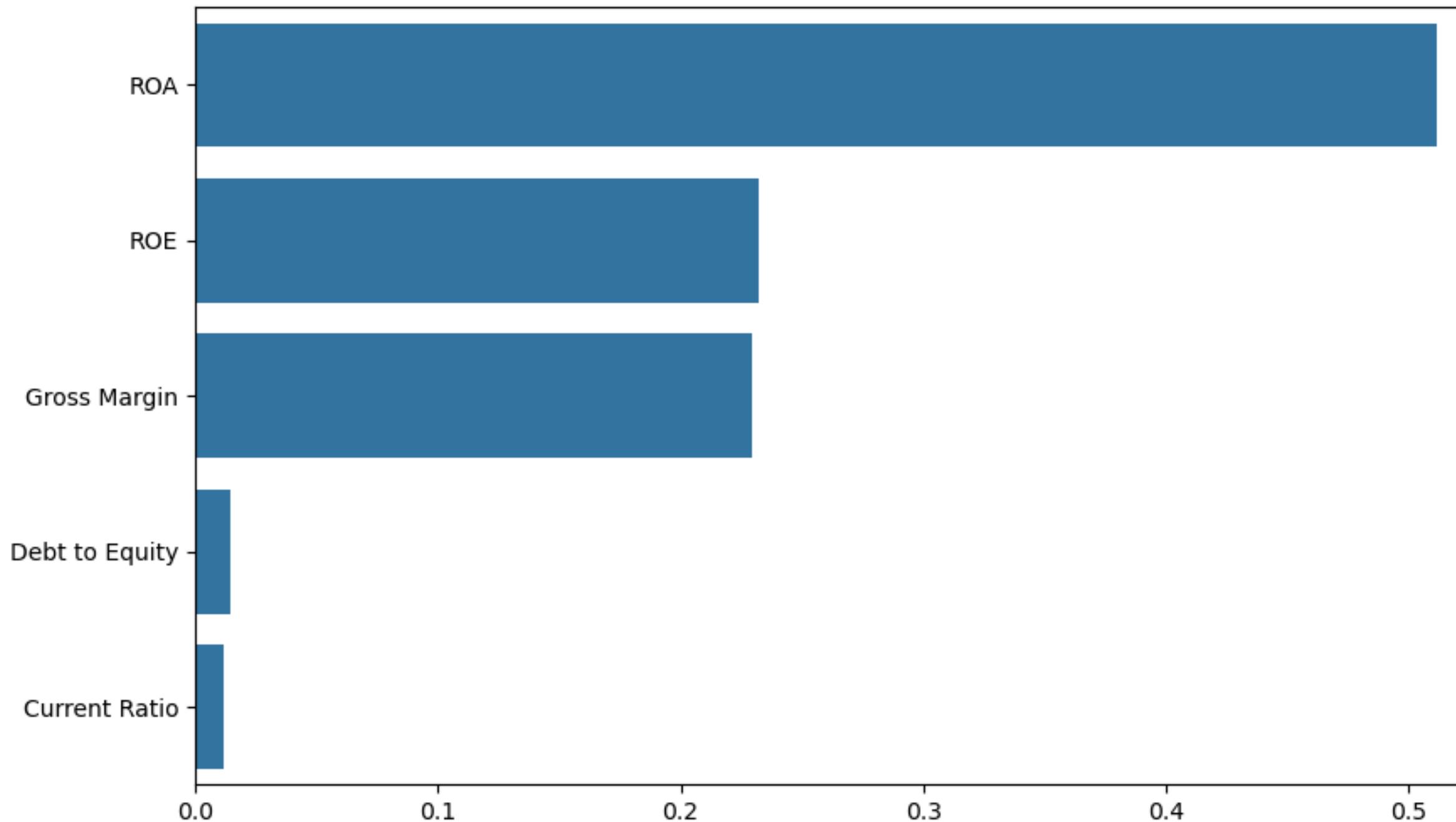
## Key Result

- Performance varied by class due to class imbalance (fewer “Safe” companies in the dataset), affecting precision & recall especially in the Safe category



# Feature Importance

Top 5 Feature Importances (Random Forest)



Profitability and liquidity ratios are the strongest signals of financial health.

Companies that generate steady earnings and manage short-term cash obligations tend to score higher.



# Metrics of Success



**Balanced Recall Across Classes:** The model should correctly identify companies in all risk categories, not just the majority class.



**Focus on Distress Detection:** The most important goal is minimizing false negatives so that financially distressed companies are not misclassified as safe.



**Desired Outcome:** Improved and more even recall scores for Safe, Grey, and Distress categories to support reliable decision-making.





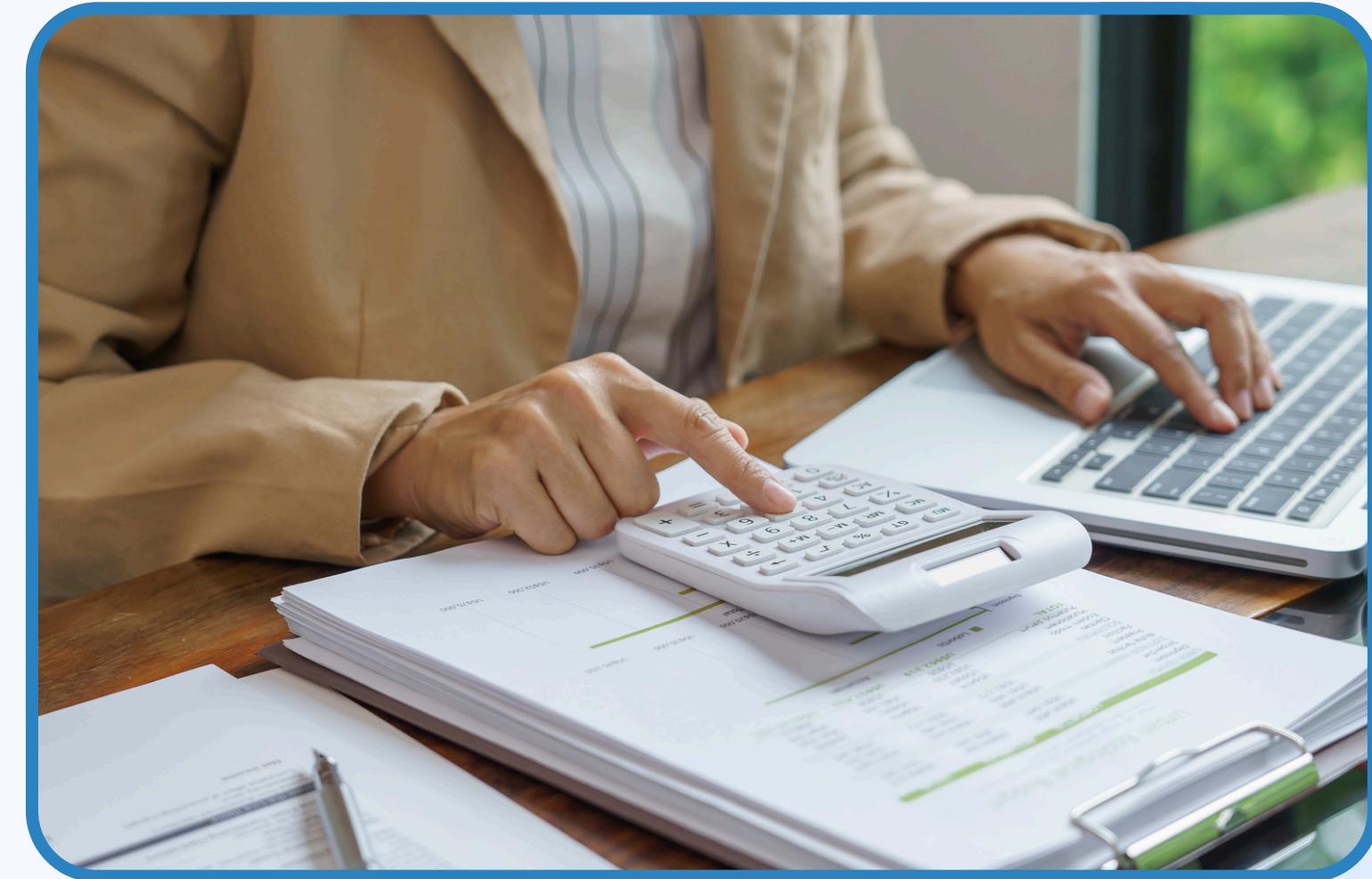
**Scalable Data Pipeline:** Successfully built a system that collects, cleans, and processes financial data for many companies efficiently.



**Financial Risk Indicator (z-Score):**  
Average Z-Score  $\approx 1.3$ , suggesting most companies in the sample show signs of potential financial distress.



**Data Quality Check:** A small number of negative values appeared in profit-related fields, which is expected for loss-making firms and confirms the importance of our cleaning steps.



# Conclusion





# Recommendations

- 1. For Safe Companies:** Continue current financial practices and consider strategic reinvestment for growth (e.g., new markets or product expansion).
  - 2. For Grey-Zone Companies:** Review costs and efficiency, and strengthen cash reserves to improve financial stability.
  - 3. For Distressed Companies:** Consider debt restructuring and streamline operations by reducing or removing underperforming activities.
  - 4. For Investors & Lenders:** Use the financial health score as a screening tool, prioritize Safe, monitor Grey and apply caution or risk controls for Distressed companies.
- 



# Next Steps



Link scores to actionable guidance: Translate each risk level (Safe, Grey, Distress) into practical business advisory messages to support real-world financial decisions.



Add model explainability: Use SHAP to clearly show which financial features drive each prediction



Create dashboards: Build visualizations that display Z-Score trends and financial health ratings in an easy-to-read format.



# Deployment

To make the financial health analysis accessible and interactive, we deployed the model using Streamlit

- Users can upload company financial data directly into the app.
- The system calculates key financial ratios and assigns a Financial Health Score (Safe / Grey / Distress).
- The app visualizes results through clear indicators for easy interpretation



Thank You  
Very Much

