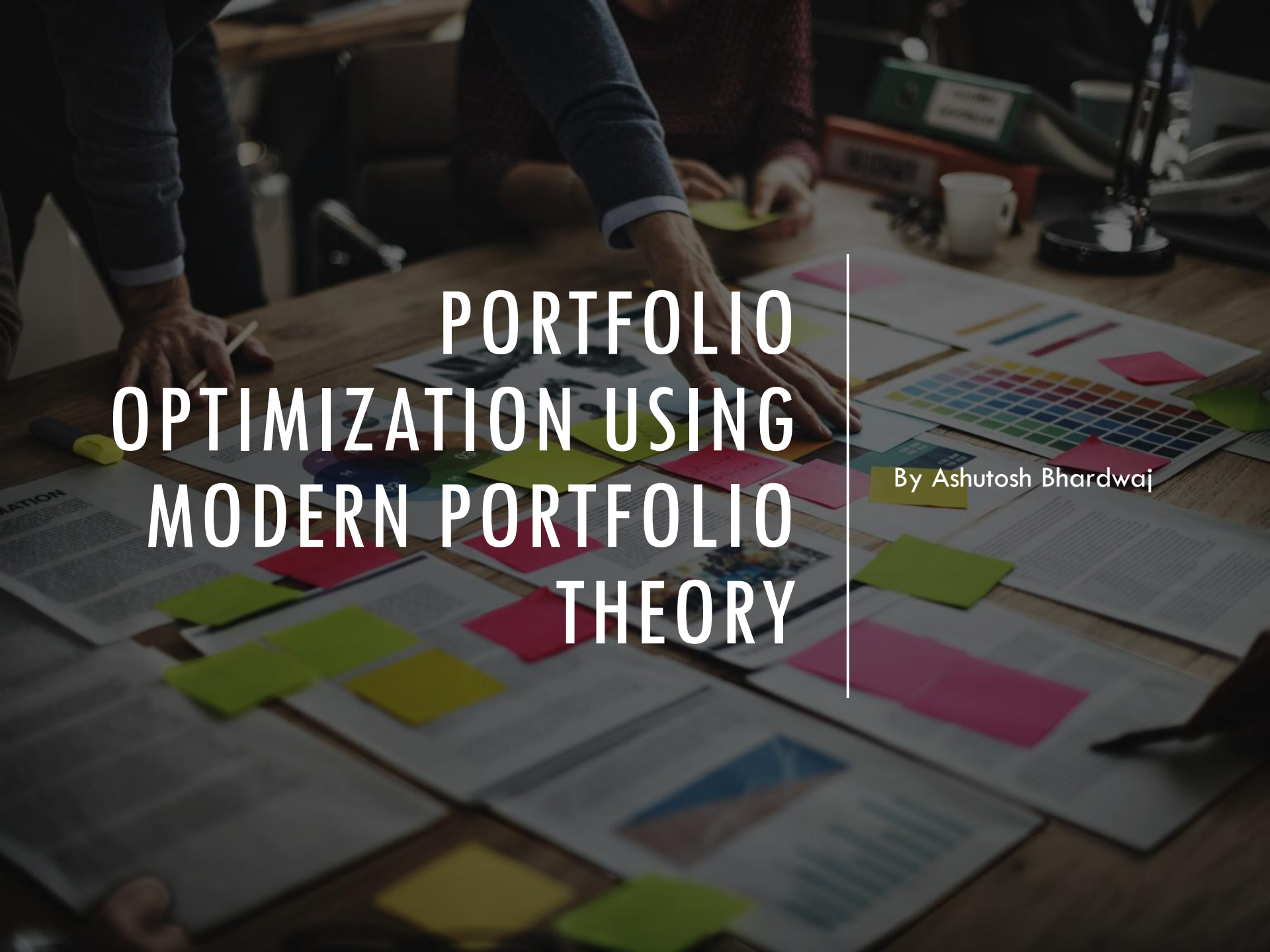


PORTFOLIO OPTIMIZATION USING MODERN PORTFOLIO THEORY

By Ashutosh Bhardwaj

PROJECT OVERVIEW

Objective: Optimize investment portfolio using Modern Portfolio Theory (MPT).

Tool: Python

Outcome: Achieved a 36.19% improvement in Sharpe Ratio (risk-adjusted return).

METHODOLOGY

- Collected historical stock data using yfinance

- Calculated daily returns and covariance matrix

- Defined objective: Maximize Sharpe Ratio

- Used Scipy optimizer (SLSQP) for optimal weights

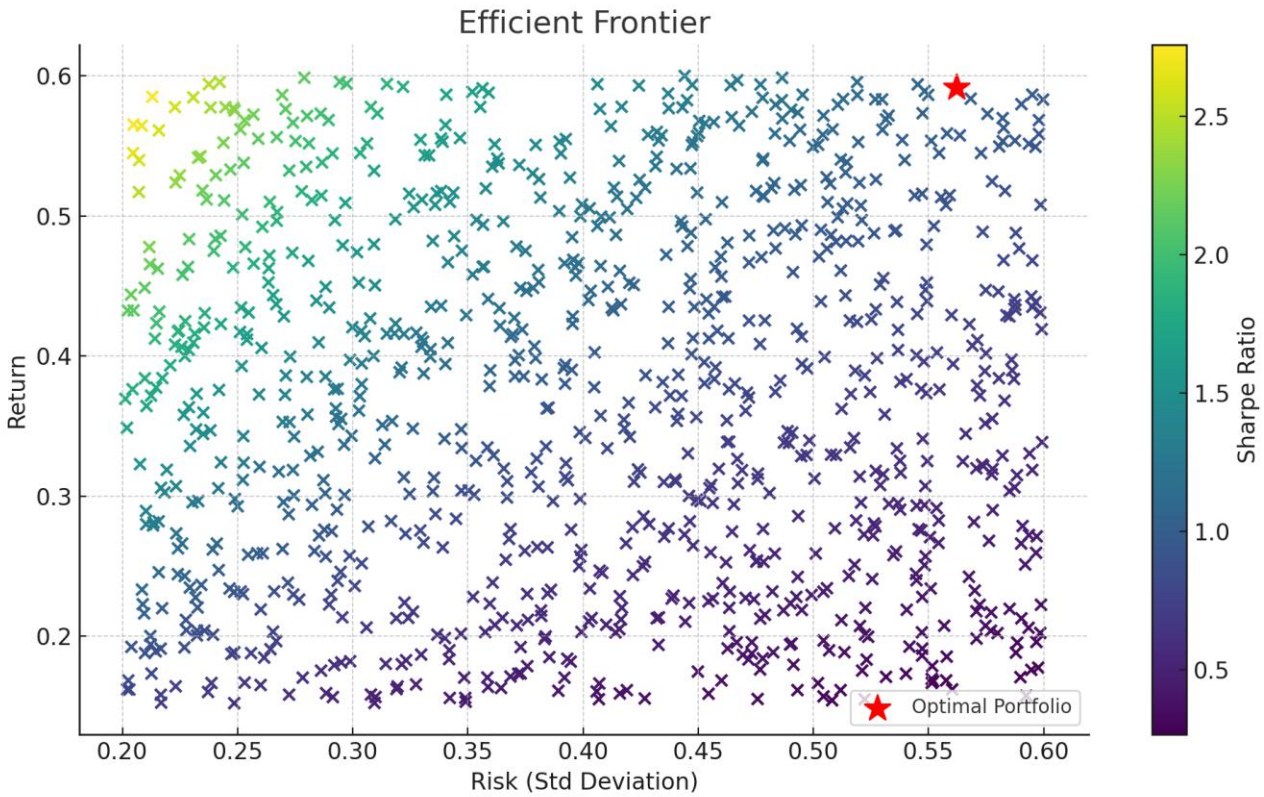
- Simulated 10,000 random portfolios to visualize efficient frontier

OPTIMAL PORTFOLIO RESULTS

Optimal Weights:
Apple: 31.80%
Microsoft: 0.00%
Google: 0.00%
Amazon: 0.00%
Tesla: 68.20%
Return: 59.15%
Risk (Std Dev): 56.23%
Sharpe Ratio: 1.05

BASELINE PORTFOLIO RESULTS

- Equal Weight Allocation:
- Each Asset: 20%
- Return: 27.77%
- Risk: 35.96%
- Sharpe Ratio: 0.77
- Improvement in Sharpe Ratio: 36.19%



EFFICIENT FRONTIER VISUALIZATION