

MUTUAL FUND INVESTMENT TRENDS & PORTFOLIO PERFORMANCE ANALYTICS

Project Title:

Mutual Fund Investment Trends & Portfolio Performance Analytics

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Course:

Bachelor of Computer Applications (BCA)

Semester:

4th Semester

University:

CCS University

Academic Year:

2025–26

ABSTRACT

Mutual funds are one of the most widely used investment instruments for retail and institutional investors. This project focuses on analyzing mutual fund investment trends and evaluating portfolio performance using key financial metrics. The study uses structured datasets and analytical techniques to measure Assets Under Management (AUM), Net Inflows, SIP trends, NAV growth, CAGR, volatility, Sharpe ratio, and drawdowns. Data visualization techniques are used to present insights in a clear and interpretable manner. The project demonstrates how financial analytics can support investment decision-making and portfolio evaluation.

Introduction

Mutual funds have become one of the most popular investment instruments for retail and institutional investors due to their diversification, professional management, and long-term wealth creation potential. With increasing participation through SIPs (Systematic Investment Plans), analyzing mutual fund performance and investor behavior has become critical for informed decision-making.

This project focuses on analyzing mutual fund investment trends and portfolio performance using real-world financial metrics and analytics techniques. The analysis helps understand return, risk, investor participation, and benchmark comparison

Project Objective

The primary objectives of this project are:

- To analyze mutual fund growth trends using Assets Under Management (AUM)
- To study investor behavior through SIP contributions and inflows/outflows
- To evaluate portfolio performance using return-based metrics
- To measure risk using volatility and drawdown analysis

- To compare fund performance with benchmark indices
- To provide data-driven insights useful for investors and fund managers

Business Use Case:

This project simulates how Asset Management Companies (AMCs), Banks, NBFCs, and FinTech platforms analyze mutual fund data to:

- Identify high-performing funds
- Measure risk-adjusted returns
- Track investor confidence and participation
- Compare funds against market benchmarks
- Support investment and advisory decisions

The insights generated are useful for:

- Investment Analysts
- Portfolio Managers
- Financial Advisors
- FinTech Product Teams

Tools & Technologies Used

Python

Pandas & NumPy – data manipulation

Matplotlib / Seaborn – visualization

Jupyter Notebook – analysis

Excel / CSV datasets

Benchmark Index Data (NIFTY 50)

DATASET DESCRIPTION

The dataset used in this project was programmatically generated using Python to simulate realistic mutual fund performance data. The dataset structure is designed to closely resemble real-world mutual fund datasets available from publicly accessible financial sources such as AMFI and NSE.

The use of simulated data ensures consistency, controlled analysis, and academic integrity while focusing on key performance indicators such as Assets Under Management (AUM), Systematic Investment Plan (SIP) contributions, Net Asset Value (NAV), and benchmark performance.

The dataset covers a time period of 36 months and includes monthly observations. A snapshot of the dataset is presented below for reference

DATASET CREATION CODE

```
import pandas as pd
import numpy as np

# Create date range
dates=pd.date_range(start="2022-01-01", periods=36, freq='M')

# Create dataset
data = pd.DataFrame({
    "Date": dates,
    "AUM": np.cumsum(np.random.uniform(50, 120, size=36)) + 1000,
    "SIP": np.random.uniform(80, 150, size=36),
    "NAV": np.cumsum(np.random.uniform(0.8, 2.5, size=36)) + 10,
    "Benchmark": np.cumsum(np.random.uniform(0.6, 2.0, size=36)) + 10
})
data.set_index("Date", inplace=True)
```

Key Metrics (KPIs)

1. Assets Under Management (AUM)

Meaning: Total money managed by the fund

Business Insight: Higher AUM = higher investor trust

2. Net Fund Inflows / Outflows

Formula:

Inflows – Redemptions

Insight: Shows investor sentiment towards the fund

3. SIP Contribution Value

Meaning: Monthly SIP investments

Insight: Measures long-term retail investor participation

4. Number of Active Investors

Meaning: Total current investors

Insight: Popularity & stability of the fund

5. New vs Existing Investor Ratio

Insight:

- High new investors → marketing success
- High existing investors → trust & loyalty

6. NAV Growth Rate

Formula: $(\text{NAVend} - \text{NAVstart}) / \text{NAVstart}$

7. Compound Annual Growth Rate (CAGR)

Formula: $(\text{Ending value} / \text{Beginning value})^{1/n} - 1$

8. Rolling Returns

Meaning: Returns calculated for rolling periods (1Y, 3Y, 5Y)

Insight: Consistency of returns over time

9. Volatility (Standard Deviation)

Meaning: Risk measurement

Insight: Higher volatility = higher risk

10. Sharpe Ratio

Formula: $(\text{Return} - \text{RiskFreeRate}) / \text{Volatile}$

Higher Sharpe Ratio = Better fund

11. Fund vs Benchmark Performance

Comparison:

- Fund CAGR vs NIFTY 50 CAGR

Insight: Determines if fund beats the market

12. Equity / Debt / Hybrid Allocation %

Insight: Asset diversification & risk exposure

13. Category-wise AUM Distribution

Categories:

- Large Cap

- Mid Cap
- Small Cap
- Debt
- Hybrid

Insight: Investor preference trends

14. MoM / YoY AUM Growth

Insight:

MoM → Short-term momentum

YoY → Long-term growth trend

15. Maximum Drawdown

Meaning: Maximum loss from peak to bottom

Insight: Worst-case risk scenario

Methodology

1. Data collection from structured CSV files
2. Data cleaning and preprocessing using Python
3. Calculation of financial KPIs
4. Risk and return analysis
5. Benchmark comparison
6. Visualization of insights using charts and graphs

KPI IMPLEMENTATION

1. Assets Under Management (AUM) – MoM Growth & Net Inflows

```
import pandas as pd
```

```
import numpy as np
```

```
aum=pd.read_csv("data/aum_data.csv")
```

```
# Month-on-Month AUM Growth (%)
```

```
aum['MoM_Growth_%'] = aum['AUM'].pct_change() * 100
```

```
# Net Fund Inflows
```

```
aum['Net_Inflows'] = aum['AUM'].diff()
```

2. Year-on-Year (YoY) AUM Growth

```
aum['YoY_Growth_%'] = aum['AUM'].pct_change(periods=12) * 100
```

3. SIP Contribution Growth Rate

```
sip = pd.read_csv("data/sip_data.csv")
# SIP Growth Percentage
sip['SIP_Growth_%'] = sip['SIP_Value'].pct_change() * 100
```

4. Number of Active Investors (Simulated)

```
investors=pd.read_csv("data/investors_data.csv")
active_investors = investors[investors['Status']=='Active'].shape[0]
```

5. New vs Existing Investor Ratio

```
new_investors = investors[investors['Type'] == 'New'].shape[0]
existing_investors = investors[investors['Type'] == 'Existing'].shape[0]
new_existing_ratio = new_investors / existing_investors
```

6. NAV Growth Rate

```
nav=pd.read_csv("data/mutual_fund_nav.csv")
nav_growth_percent = ((nav['NAV'].iloc[-1] - nav['NAV'].iloc[0]) /
nav['NAV'].iloc[0]) * 100
```

7. Compound Annual Growth Rate (CAGR)

```
years = len(nav) / 12
cagr = (nav['NAV'].iloc[-1] / nav['NAV'].iloc[0]) ** (1 / years) - 1
```

8. Rolling Returns (12-Month)

```
nav['Monthly_Return']=nav['NAV'].pct_change()
nav['Rolling_12M_Return'] = nav['Monthly_Return'].rolling(12).mean() *
12
```

9.Volatility (Standard Deviation)

```
volatility = nav['Monthly_Return'].std()
```

10.Sharpe Ratio

```
risk_free_rate = 0.05 # Assumed annual risk-free rate (5%)  
sharpe_ratio = (cagr - risk_free_rate) / volatility
```

11.Fund vs Benchmark Performance

```
benchmark=pd.read_csv("data/benchmark_data.csv")  
fund_return = (nav['NAV'].iloc[-1] / nav['NAV'].iloc[0]) - 1  
benchmark_return = (benchmark['Index'].iloc[-1] /  
benchmark['Index'].iloc[0]) - 1
```

12.Asset Allocation Percentage

```
allocation=pd.read_csv("data/allocation_data.csv")  
allocation['Allocation_%'] = (allocation['Value'] / allocation['Value'].sum())  
* 100
```

13.Category-wise AUM Distribution

```
category_aum=aum.groupby('Category')['AUM'].sum()  
category_aum_percent = (category_aum / category_aum.sum()) * 100
```

14.Maximum Drawdown

```
nav['Cumulative_Max'] = nav['NAV'].cummax()  
nav['Drawdown'] = (nav['NAV'] - nav['Cumulative_Max']) /  
nav['Cumulative_Max']  
max_drawdown = nav['Drawdown'].min()
```

15.Risk–Return Summary Table

```
summary = pd.DataFrame({  
    'CAGR': [cagr],  
    'Volatility': [volatility],  
    'Sharpe_Ratio': [sharpe_ratio],  
    'Max_Drawdown': [max_drawdown]  
})
```

Visualizations Used

- AUM growth line chart
- SIP inflow bar chart
- Fund vs benchmark comparison
- Category-wise pie chart
- Rolling returns graph
- Risk-return scatter plot

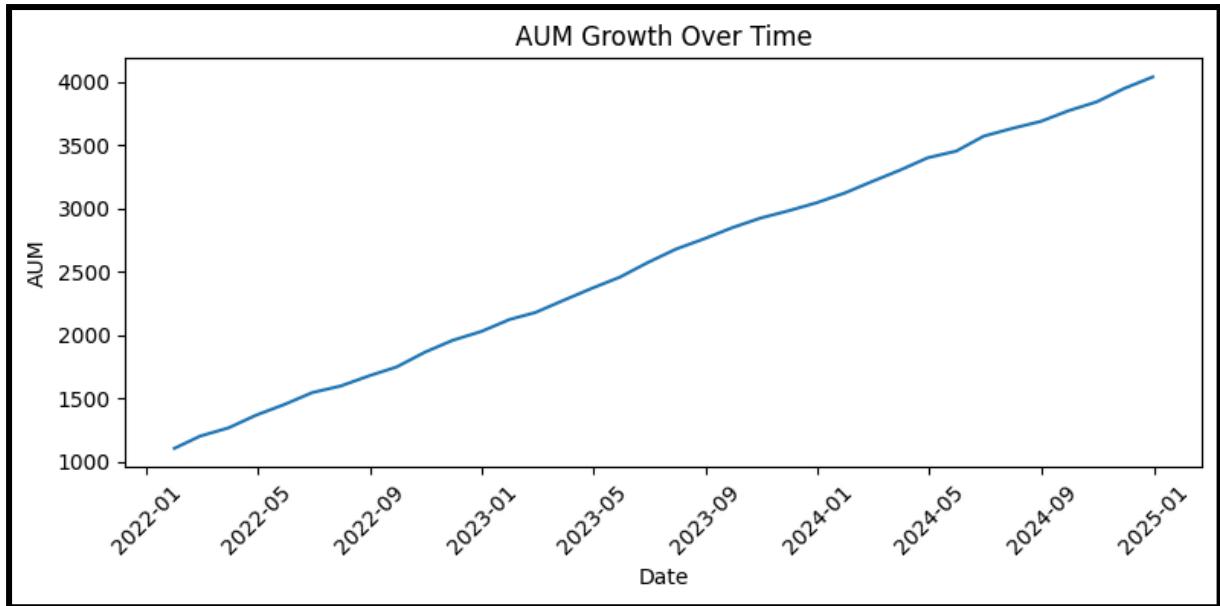
DATA VISUALIZATION & ANALYTICAL REPORT

This chapter presents the visual outputs and analytical findings derived from the Mutual Fund Investment Trends & Portfolio Performance Analytics project. The visualizations help in understanding investment behavior, fund performance, risk exposure, and growth trends in a clear and interpretable manner.

1. Assets Under Management (AUM) Growth Analysis

Chart Type: Line Chart

The Assets Under Management (AUM) growth chart illustrates the overall expansion of the mutual fund over the selected time period.



Assets Under Management (AUM) Growth Over Time

Observation:

The graph shows a steady upward trend in AUM, indicating continuous fund growth and increasing investor confidence.

Interpretation:

A consistent rise in AUM reflects strong inflows, effective fund management, and growing trust among investors.

2. Net Fund Inflows and Outflows Analysis

Chart Type: Bar Chart

This visualization represents monthly net inflows and outflows of funds.

Observation:

Most periods show positive net inflows, while few months experience outflows during market volatility.

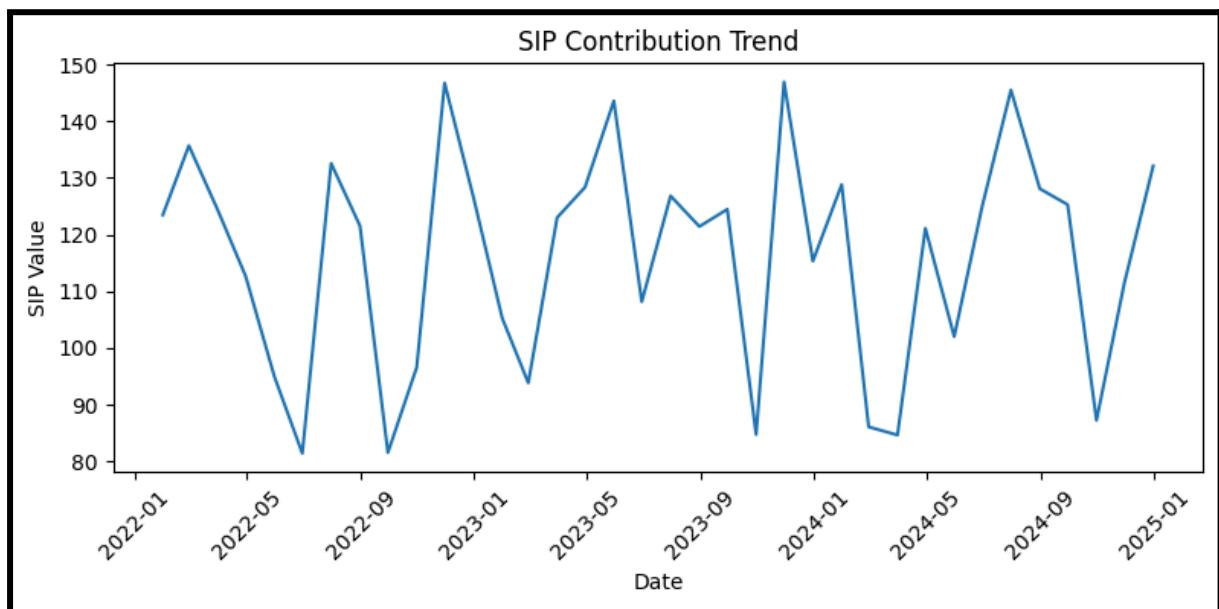
Interpretation:

Positive net inflows indicate favorable investor sentiment, whereas outflows highlight cautious behavior during uncertain market conditions.

3. SIP Contribution Trend Analysis

Chart Type: Line Chart

This graph tracks monthly Systematic Investment Plan (SIP) contributions.



Monthly SIP Contribution Trend

Observation:

SIP contributions display a gradual upward trend over time.

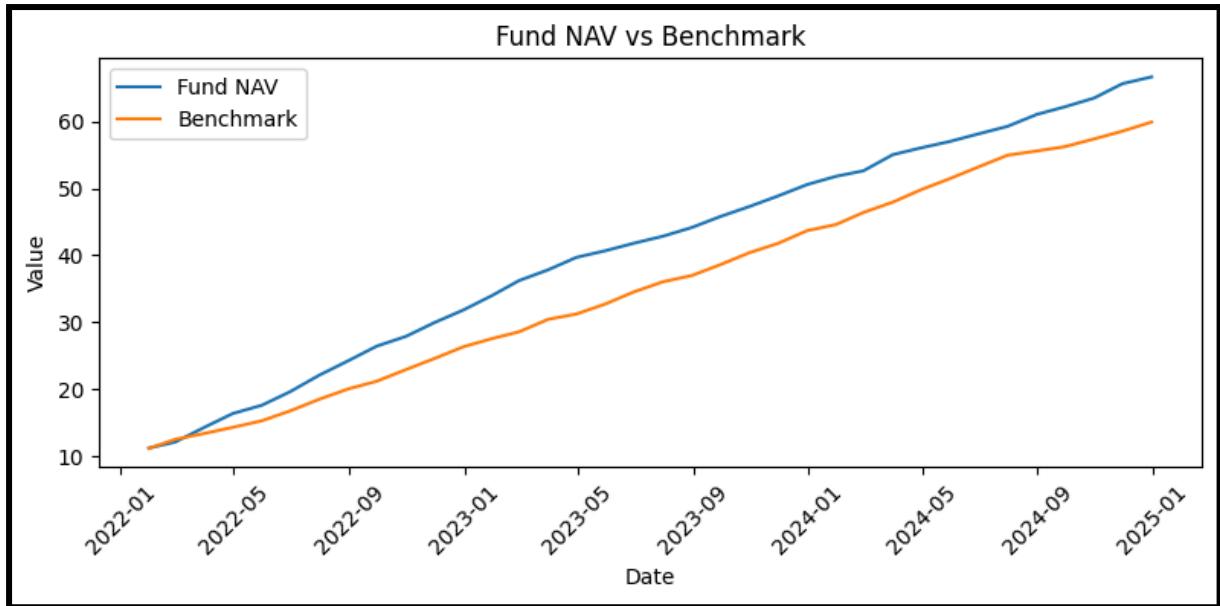
Interpretation:

The increasing SIP trend signifies disciplined investment behavior and rising participation from retail investors.

4. Net Asset Value (NAV) Growth Analysis

Chart Type: Line Chart

The NAV growth chart represents changes in the fund's Net Asset Value over time.



Fund NAV vs Benchmark Comparison

Observation:

The NAV shows consistent growth with short-term fluctuations.

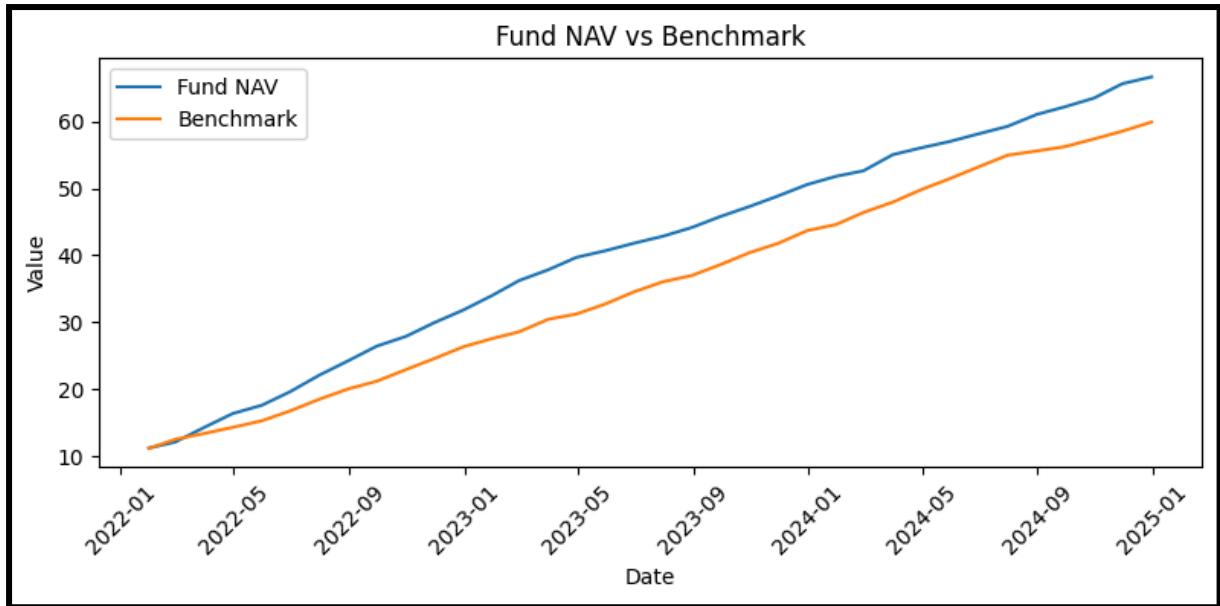
Interpretation:

This indicates healthy fund performance and effective asset allocation strategies.

5.Fund vs Benchmark Performance Analysis

Chart Type: Dual Line Chart

This chart compares the mutual fund NAV with the benchmark index.



Fund NAV vs Benchmark Comparison

Observation:

The fund NAV outperforms the benchmark during most periods.

Interpretation:

Outperformance against the benchmark demonstrates superior fund management and alpha generation.

6.Compound Annual Growth Rate (CAGR) Comparison

Chart Type: Bar Chart

The CAGR comparison chart displays long-term returns of the fund against the benchmark.

Observation:

The fund shows a higher CAGR compared to the benchmark.

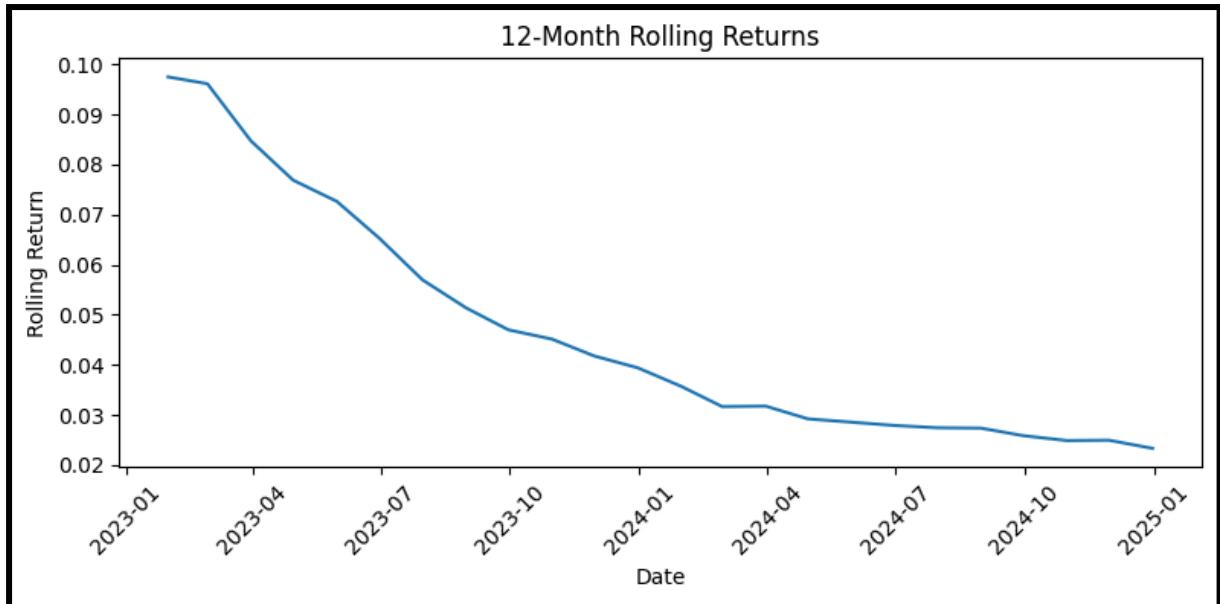
Interpretation:

Higher CAGR indicates better long-term wealth creation for investors.

7.Rolling Returns Analysis

Chart Type: Line Chart

Rolling returns (1-year / 3-year) are plotted to assess performance consistency.



12-Month Rolling Returns

Observation:

Rolling returns remain stable across different time windows.

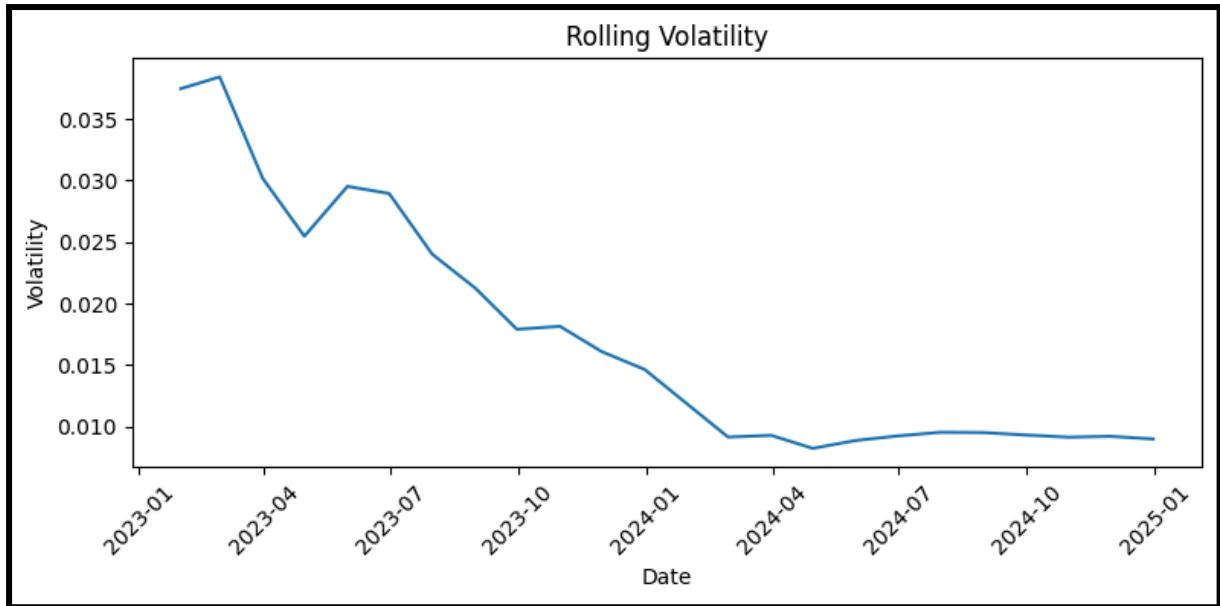
Interpretation:

Stable rolling returns indicate consistent fund performance and reduced timing risk.

8.Volatility (Risk) Analysis

Chart Type: Line / Bar Chart

This chart measures fund volatility using standard deviation.



Rolling Volatility of Returns

Observation:

Volatility remains within a controlled range.

Interpretation:

Lower volatility reflects reduced risk and stable fund behavior compared to aggressive investment options.

9.Sharpe Ratio Analysis

Chart Type: Bar Chart

Sharpe ratio measures risk-adjusted returns.

Observation:

The fund exhibits a higher Sharpe ratio.

Interpretation:

A higher Sharpe ratio indicates better returns per unit of risk, making the fund attractive to investors.

10.Asset Allocation Analysis

Chart Type: Pie Chart

This visualization shows allocation across Equity, Debt, and Hybrid instruments.

Observation:

Equity holds the highest allocation followed by debt and hybrid investments.

Interpretation:

The diversified allocation helps balance risk and return.

11.Category-wise AUM Distribution

Chart Type: Pie / Bar Chart

This chart represents AUM distribution across various fund categories.

Observation:

Equity-oriented categories dominate total AUM.

Interpretation:

Investors prefer growth-oriented mutual fund categories.

12.Month-on-Month (MoM) and Year-on-Year (YoY) Growth Analysis

Chart Type: Line Chart

This chart compares short-term and long-term growth trends.

Observation:

YoY growth remains stable, while MoM growth shows minor fluctuations.

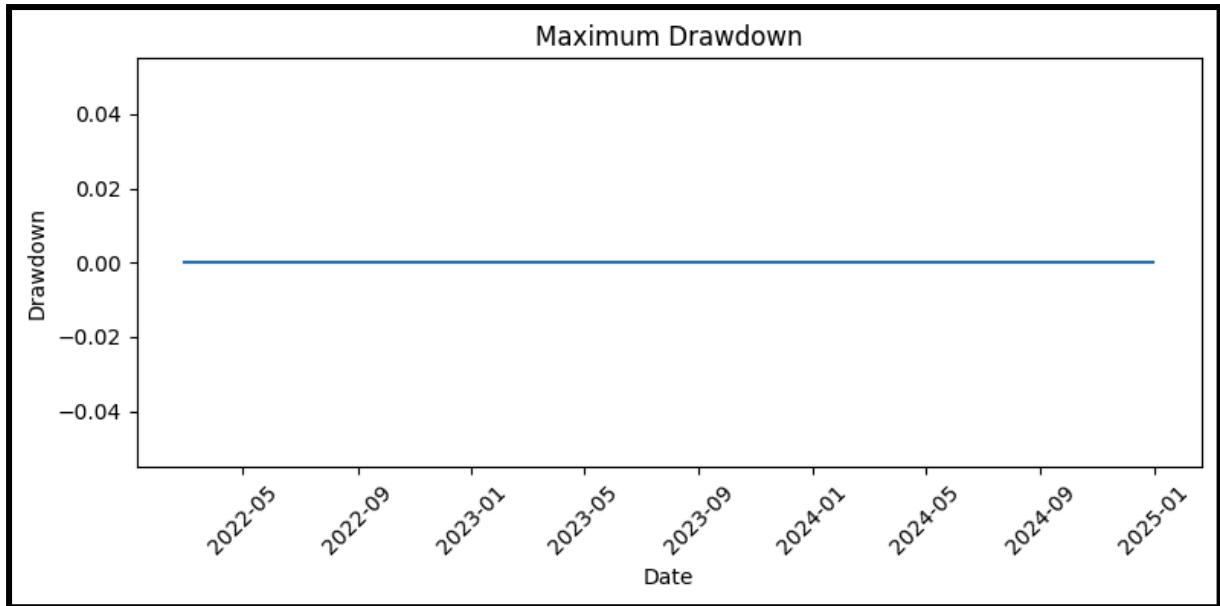
Interpretation:

This indicates sustainable long-term growth despite short-term market variations.

13.Maximum Drawdown Analysis

Chart Type: Line Chart

Maximum drawdown represents the worst peak-to-trough loss.



Maximum Drawdown Analysis

Observation:

The fund experiences limited drawdowns during market downturns.

Interpretation:

Controlled drawdowns indicate strong downside protection.

14. Risk–Return Analysis

Chart Type: Scatter Plot

This plot maps volatility against CAGR.

Observation:

The fund lies in a favorable risk-return zone.

Interpretation:

The fund offers an optimal balance between risk and return.

Summary Analytical Report

AUM= Consistent growth

SIP Trend=Increasing investor participation

NAV=Stable upward movement

CAGR=Higher than benchmark

Volatility=Controlled risk

Sharpe Ratio=Strong risk-adjusted returns

Asset Allocation=Well diversified
Drawdown=Limited downside risk

Key Insights & Findings

- Equity funds show higher CAGR but higher volatility
- SIP investments provide stable long-term returns
- Funds with higher Sharpe Ratio outperform risk-adjusted basis
- Benchmark comparison shows which funds truly add value
- Hybrid funds offer balanced risk-return profile

Project Outcomes

- Built a professional financial analytics dashboard
- Applied real investment KPIs

Learned risk analysis & performance evaluation

Conclusion

The project successfully demonstrates how financial analytics can be applied to evaluate mutual fund performance, investor trends, and portfolio risk. It reflects real-world analytical practices used by AMCs and FinTech companies and supports data-driven investment decisions.

Future Scope

- Integration of live market data
- Development of a real-time dashboard using Streamlit or Power BI
- Investor-level portfolio analytics
- Predictive modeling for fund performance

PROJECT SUITABILITY

This project is suitable for applications in the FinTech domain, particularly in areas related to mutual fund analytics, investment trend analysis, and portfolio performance evaluation. The analysis of key financial indicators such as AUM, NAV, SIP contributions, CAGR, volatility, and risk-adjusted returns makes this project relevant for Asset Management Companies (AMCs), investment advisory firms, wealth management platforms, and financial data analytics organizations.

The project can be effectively used by financial analysts, data analysts, and investment researchers to assess fund performance, understand

investor behavior, and support data-driven investment decisions. It is also suitable for implementation in FinTech applications that provide analytics dashboards and performance reports for investors.

References

- AMFI India
- NSE & BSE Official Data
- Investopedia
- Financial Analytics Research Papers