Mutual Fund Analysis Report

A Comprehensive Analysis, Recommendation, and Forecasting Summary

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Part 1: Market-Wide Analysis & Recommendations

Mutual Fund Analysis & Recommendation Engine¶

This notebook provides a three-part, in-depth analysis of mutual funds:

1. **Comprehensive Analysis Engine:** Calculates a full statistical profile for every fund.
2. **Dynamic Recommendation Engine:** Recommends the best funds based on your specific investment timeline.
3. **Supporting Visual Analysis:** Tools for diversification and deep-diving into individual funds.

Part 1: The Analysis Engine (The "Backend")¶

■ Step 1: Setup & Memory-Safe SQL Data Loading¶

Objective: Establish a robust and memory-efficient connection to the mutual fund database. The logic first filters out non-relevant or structurally unsuitable mutual funds (e.g., closed-ended, FMPs, ETFs) using a comprehensive keyword-based exclusion list.

Why: This filtering ensures we're analyzing only **open-ended, investable funds** meant for long-term investors and avoids skewed analysis from temporary or fixed-structure funds. Memory efficiency is critical for large-scale databases, especially in Jupyter environments.

```
--- Step 1: Connecting to SQL Server to identify unsuitable funds to exclude ---

Identified 18123 unsuitable schemes (FMPs, Fixed Term, etc.) to exclude from loading.

--- Step 2: Loading historical data for suitable, open-ended funds from SQL ---

Successfully loaded a manageable subset of 7026478 records.
```

■ Step 2: Comprehensive Statistical Engine¶

Objective: Build a complete historical and statistical profile for each mutual fund. We calculate historical NAV returns (1Y, 3Y, 5Y, 10Y), CAGR, fund age, and since-inception returns.

Innovations:

- A memory-efficient `.loc` and `.get_indexer()` based custom function is used to fetch historical NAVs—avoiding `merge_asof` which is error-prone on large data.
- Returns are normalized to **CAGR** format to make funds across different timeframes comparable.

Why: These metrics are essential for investors to assess consistency, longevity, and performance expectations.

■ Step 3: Risk and Return Statistical Profile¶

Objective: Add a quantitative risk layer to the fund analysis by calculating:

- **Annual Expected Return**
- **Annualized Volatility**
- **Sharpe Ratio**

Why: This moves us beyond raw returns into **risk-adjusted performance**—critical for understanding whether high returns came with disproportionately high volatility. Sharpe Ratio, in particular, helps to compare "return per unit of risk".

■ Step 4: Curated Display Table¶

Objective: Produce a **final investor-friendly table** that summarizes all key statistics and ranks funds by long-term performance (5Y returns).

Why: This acts as the "backend summary" that feeds into both the visual layer and the recommendation engine. It's the first high-level insight view for fund analysts or end-users.

--- Step 3: Calculating comprehensive metrics for all funds ---

Final number of active, open-ended funds for analysis: 5045

--- Step 4: Calculating all historical returns (new robust method) ---

--- Step 5: Calculating statistical profile ---

--- Step 6: Generating Final Report ---

--- Master Analysis Table: Curated for Investors ---

	scheme_name	Fund Age (Yrs)	Since Inception Return (%)	10Y Return (%)	5Y Return (%)	3Y Return (%)	1Y Return (%)	Expected Annual Return (%)	Annualized Volatility (%)	Sharpe Ratio
23	quant Small Cap Fund - IDCW Option - Regular Plan	19.32	14.34	18.79	38.68	27.66	-6.79	26.94	56.82	0.41
24	quant Small Cap Fund - Growth - Regular Plan	19.32	14.69	19.71	38.61	27.63	-6.79	27.60	56.05	0.42
382	ICICI Prudential Infrastructure Fund - Growth	19.33	14.12	16.24	37.12	31.35	-0.94	19.43	23.94	0.65
2605	BANDHAN SMALL CAP FUND - DIRECT PLAN GROWTH	5.42	35.31	17.82	36.96	33.92	8.09	46.29	22.16	1.91

735	Nippon India Small Cap Fund - Growth Plan - Gr...	14.86	21.04	20.73	36.32	26.02	-5.31	27.72	20.25	1.17
736	Nippon India Small Cap Fund - Growth Plan - Bo...	14.86	21.04	20.73	36.32	26.02	-5.31	27.72	20.25	1.17
487	quant Infrastructure Fund - IDCW Option - Regu...	17.86	7.39	18.10	36.03	20.93	-14.50	12.00	24.08	0.34
488	quant Infrastructure Fund - Growth Option	17.86	7.40	18.09	36.00	20.93	-14.50	12.02	24.10	0.34
530	HDFC Infrastructure Fund - Growth Plan	17.36	9.98	11.16	35.70	31.02	-4.12	15.54	25.68	0.45
2537	ICICI Prudential Commodities Fund - Direct Pla...	5.79	30.11	16.46	35.38	22.76	1.15	42.02	28.73	1.33
2327	TATA Small Cap Fund Direct Plan - Reinvestment...	6.71	25.60	16.52	35.08	27.29	1.38	35.72	21.29	1.49

2324	Tata Small Cap Fund-Direct Plan-Growth	6.71	25.60	16.52	35.08	27.29	1.38	35.72	21.29	1.49
2325	TATA SmallCap Fund - Direct Plan - Payout of I...	6.13	27.22	15.89	35.08	27.29	1.38	37.65	21.97	1.54
2671	SBI Magnum Children's Benefit Fund - Investmen...	4.81	36.62	16.19	35.01	24.47	5.55	45.11	15.82	2.60
2370	BANK OF INDIA Small Cap Fund Direct Plan Growth	6.59	28.73	18.11	34.84	25.59	-0.62	39.82	23.23	1.55
2603	BANDHAN SMALL CAP FUND - REGULAR PLAN GROWTH	5.42	33.14	16.80	34.81	32.00	6.68	43.95	22.16	1.81
2319	Invesco India Smallcap Fund - Direct Plan - Gr...	6.74	25.35	16.45	34.55	28.80	5.88	35.95	23.42	1.37
2395	Edelweiss Small Cap Fund - Direct Plan - Growth	6.46	28.00	17.28	34.42	24.39	1.82	38.88	22.49	1.55

	scheme_name								
756	BANDHAN Infrastructure Fund - Regular Plan - G...	14.39	11.90	15.19	34.40	29.98	-11.49	17.79	22.50	0.62
315	DSP India T.I.G.E.R. Fund - Regular Plan - Growth	19.32	13.33	15.73	33.86	28.74	-8.26	18.63	24.27	0.61

■ Part 2: The Recommendation Engine (Frontend)¶

Objective: Based on the user's investment horizon and risk tolerance, score and rank mutual funds using a **custom suitability algorithm**.

Logic:

- Risk-normalized scoring weights based on user profile.
- Funds must match or exceed the desired investment duration.
- Split results into **Core (diversified)** and **Specialized (thematic)**.

Why: This system generates **personalized, goal-aligned fund recommendations** while distinguishing between diversified vs. sector-specific options.

--- Set Your Investment Goal Below ---¶

```
--- Recommendations for a 1-Year Horizon with High Risk Tolerance ---


--- Top 15 Core Diversified Funds ---
These are generally suitable as the main part of a portfolio.
```

	scheme_name	Suitability Score	Expected Annual Return (%)	Annualized Volatility (%)	Sharpe Ratio	Fund Age (Yrs)
2621	Union Midcap Fund - Direct Plan - IDCW Option	0.92	45.58	20.17	2.07	5.33
2620	Union Midcap Fund - Direct Plan - Growth Option	0.92	45.58	20.17	2.07	5.33
2605	BANDHAN SMALL CAP FUND - DIRECT PLAN GROWTH	0.91	46.29	22.16	1.91	5.42

2619	Union Midcap Fund - Regular Plan - IDCW Option	0.88	43.55	20.19	1.96	5.33
2618	Union Midcap Fund - Regular Plan - Growth Option	0.88	43.55	20.19	1.96	5.33
2608	BANDHAN SMALL CAP FUND - REGULAR PLAN GROWTH	0.87	43.95	22.16	1.81	5.42
4079	Tata Gold Exchange Traded Fund	0.81	37.29	15.14	2.20	1.53
3764	Kotak Nifty Smallcap 50 Index Fund - Direct Pl...	0.81	40.97	22.75	1.63	2.28
3765	Kotak Nifty Smallcap 50 Index Fund - Direct Pl...	0.81	40.97	22.75	1.63	2.28
3748	ICICI Prudential Innovation Fund - Direct Plan...	0.80	35.25	13.23	2.37	2.24
3763	Kotak Nifty Smallcap 50 Index Fund - Regular P...	0.80	40.18	22.74	1.59	2.28
3762	Kotak Nifty Smallcap 50 Index Fund - Regular P...	0.80	40.18	22.74	1.59	2.28
2711	quant ESG Integration Strategy Fund - Growth O...	0.79	39.25	20.80	1.70	4.72
652	Aditya Birla Sun Life Savings Fund - Disciplin...	0.79	84.64	259.92	0.31	16.10

	scheme_name	Suitability Score	Expected Annual Return (%)	Annualized Volatility (%)	Sharpe Ratio	Fund Age (Yrs)
2710	quant ESG Integration Strategy Fund - IDCW Opt...	0.79	39.21	20.81	1.70	4.72

--- Top 5 Specialized & Thematic Funds ---
These funds focus on specific sectors. They have performed exceptionally well but carry higher concentration risk.

	scheme_name	Suitability Score	Expected Annual Return (%)	Annualized Volatility (%)	Sharpe Ratio	Fund Age (Yrs)
2671	SBI Magnum Children's Benefit Fund - Investmen...	0.96	45.11	15.82	2.60	4.81
3787	HDFC Defence Fund - IDCW Option - Direct Plan	0.94	53.38	29.13	1.70	2.16
3788	HDFC Defence Fund - Growth Option - Direct Plan	0.94	53.38	29.13	1.70	2.16
3789	HDFC Defence Fund - Growth Option	0.94	51.95	29.13	1.65	2.16
3786	HDFC Defence Fund - IDCW Option	0.94	51.95	29.13	1.65	2.16

Part 3: Diversification Analysis¶

A well-diversified portfolio contains funds that don't all move together. Use the **Dendrogram** to pick funds from different color clusters. Use the **Correlation Heatmap** to see the exact relationship strength (lower is better for diversification).

■ Part 3a: Diversification Analysis via Clustering and Correlation¶

Objective: Enable portfolio construction that avoids over-concentration by analyzing **co-movement between top fund returns**.

Tools Used:

• **Hierarchical Clustering (Dendrogram):** Visual groupings of similar funds
• **Correlation Heatmap:** Precise relationship quantification

Why: Helps investors select funds that do not all rise and fall together, increasing portfolio stability through **uncorrelated assets**.

■ Part 3b: Technical Deep Dive into the Top Fund¶

Objective: Zoom in on the **top recommended core fund** to assess its NAV behavior, momentum, volatility trends, and potential entry signals.

Techniques Used:

- SMAs (20, 50, 200-day)
- Bollinger Bands
- RSI (Relative Strength Index)

Why: These indicators help detect overbought/oversold signals and general trend direction—useful for tactical timing decisions.
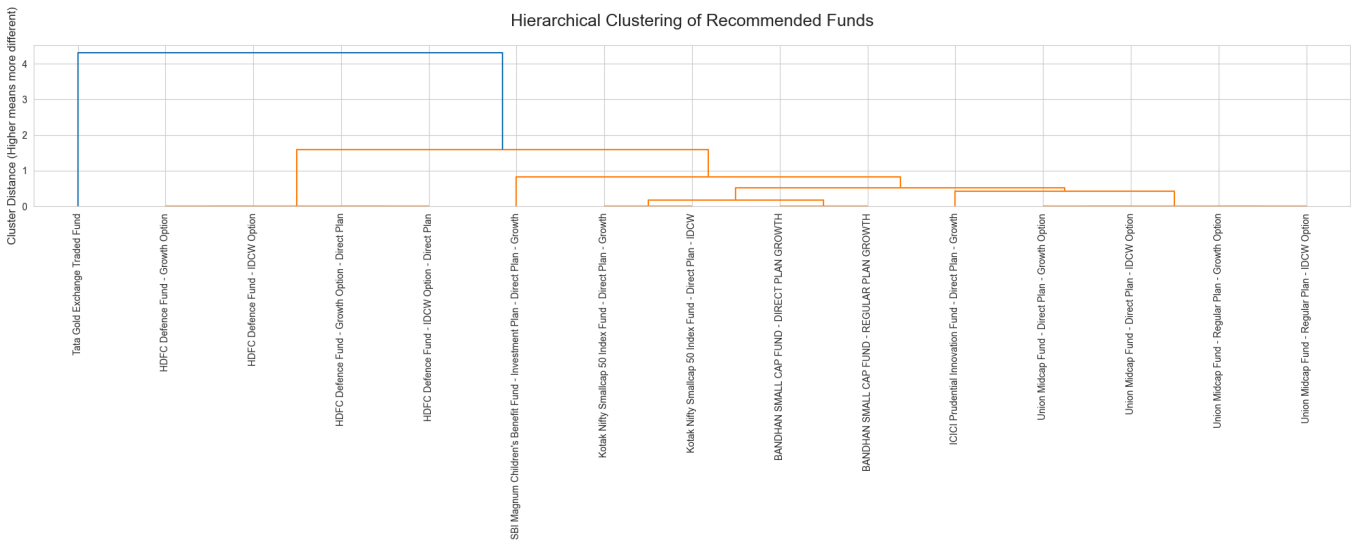
```
--- Analyzing Diversification for Top Recommended Funds ---
This analysis helps you pick funds that don't all move in the same direction.

--- Fund Cluster Analysis (Dendrogram) ---
Tip: For good diversification, try to pick funds from different main branches (colors).

C:\Users\ANEEK SARKAR\AppData\Local\Temp\ipykernel_24012\3085307852.py:41: ClusterWarning: The symmetric non-negative hollo
 linked = hierarchy.linkage(1 - correlation_matrix, method='ward')
```
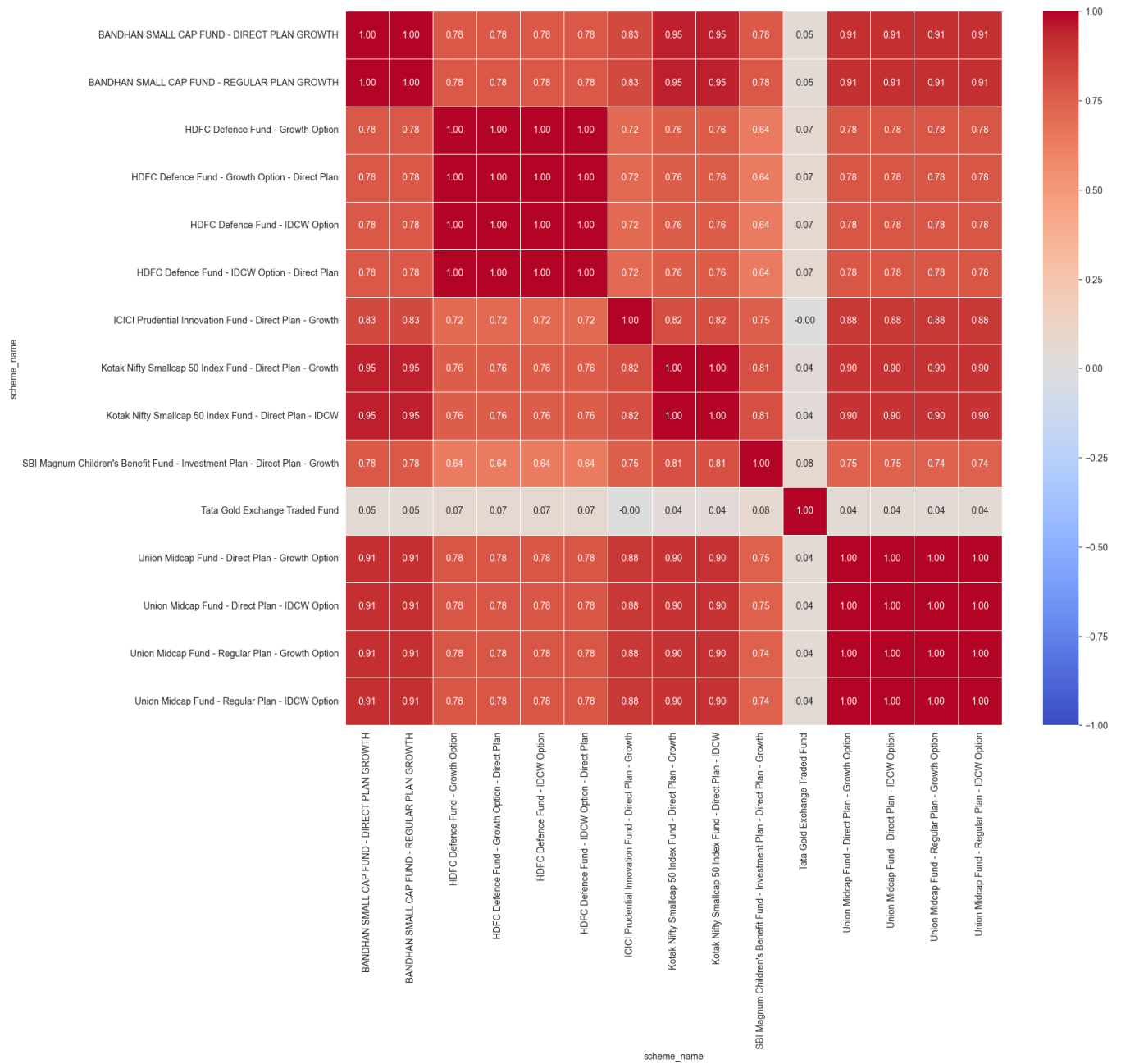

Hierarchical Clustering of Recommended Funds

```
--- Correlation Matrix (Heatmap) ---
This shows the exact relationship strength. Lower numbers (blue/cooler colors) are better for diversification.
```

Correlation Matrix of Daily Returns

| scheme_name	BANDHAN SMALL CAP FUND - DIRECT PLAN GROWTH	BANDHAN SMALL CAP FUND - REGULAR PLAN GROWTH	HDFC Defence Fund - Growth Option	HDFC Defence Fund - Growth Option - Direct Plan	HDFC Defence Fund - IDCW Option	HDFC Defence Fund - IDCW Option - Direct Plan	ICICI Prudential Innovation Fund - Direct Plan - Growth	Kotak Nifty Smallcap 50 Index Fund - Direct Plan - Growth	Kotak Nifty Smallcap 50 Index Fund - Direct Plan - IDCW	SBI Magnum Children's Benefit Fund - Investment Plan - Direct Plan - Growth	Tata Gold Exchange Traded Fund	Union Midcap Fund - Direct Plan - Growth Option	Union Midcap Fund - Direct Plan - IDCW Option	Union Midcap Fund - Regular Plan - Growth Option	Union Midcap Fund - Regular Plan - IDCW Option
BANDHAN SMALL CAP FUND - DIRECT PLAN GROWTH	1.00	1.00	0.78	0.78	0.78	0.78	0.83	0.95	0.95	0.78	0.05	0.91	0.91	0.91	0.91
BANDHAN SMALL CAP FUND - REGULAR PLAN GROWTH	1.00	1.00	0.78	0.78	0.78	0.78	0.83	0.95	0.95	0.78	0.05	0.91	0.91	0.91	0.91
HDFC Defence Fund - Growth Option	0.78	0.78	1.00	1.00	1.00	1.00	0.72	0.76	0.76	0.64	0.07	0.78	0.78	0.78	0.78
HDFC Defence Fund - Growth Option - Direct Plan	0.78	0.78	1.00	1.00	1.00	1.00	0.72	0.76	0.76	0.64	0.07	0.78	0.78	0.78	0.78
HDFC Defence Fund - IDCW Option	0.78	0.78	1.00	1.00	1.00	1.00	0.72	0.76	0.76	0.64	0.07	0.78	0.78	0.78	0.78
HDFC Defence Fund - IDCW Option - Direct Plan	0.78	0.78	1.00	1.00	1.00	1.00	0.72	0.76	0.76	0.64	0.07	0.78	0.78	0.78	0.78
ICICI Prudential Innovation Fund - Direct Plan - Growth	0.83	0.83	0.72	0.72	0.72	0.72	1.00	0.82	0.82	0.75	-0.00	0.88	0.88	0.88	0.88
Kotak Nifty Smallcap 50 Index Fund - Direct Plan - Growth	0.95	0.95	0.76	0.76	0.76	0.76	0.82	1.00	1.00	0.81	0.04	0.90	0.90	0.90	0.90
Kotak Nifty Smallcap 50 Index Fund - Direct Plan - IDCW	0.95	0.95	0.76	0.76	0.76	0.76	0.82	1.00	1.00	0.81	0.04	0.90	0.90	0.90	0.90
SBI Magnum Children's Benefit Fund - Investment Plan - Direct Plan - Growth	0.78	0.78	0.64	0.64	0.64	0.64	0.75	0.81	0.81	1.00	0.08	0.75	0.75	0.74	0.74
Tata Gold Exchange Traded Fund	0.05	0.05	0.07	0.07	0.07	0.07	-0.00	0.04	0.04	0.08	1.00	0.04	0.04	0.04	0.04
Union Midcap Fund - Direct Plan - Growth Option	0.91	0.91	0.78	0.78	0.78	0.78	0.88	0.90	0.90	0.75	0.04	1.00	1.00	1.00	1.00
Union Midcap Fund - Direct Plan - IDCW Option	0.91	0.91	0.78	0.78	0.78	0.78	0.88	0.90	0.90	0.75	0.04	1.00	1.00	1.00	1.00
Union Midcap Fund - Regular Plan - Growth Option	0.91	0.91	0.78	0.78	0.78	0.78	0.88	0.90	0.90	0.74	0.04	1.00	1.00	1.00	1.00
Union Midcap Fund - Regular Plan - IDCW Option	0.91	0.91	0.78	0.78	0.78	0.78	0.88	0.90	0.90	0.74	0.04	1.00	1.00	1.00	1.00

```
--- Diversification Summary ---
The average correlation among your selected funds is: 0.73
Suggestion: Your selected funds are quite similar. Consider replacing one with a fund from a different cluster.


--- Individual Fund Deep-Dive ---
Analyzing the top recommended core fund: Union Midcap Fund - Direct Plan - IDCW Option
```

Technical Analysis for Union Midcap Fund - Direct Plan - IDCW Option
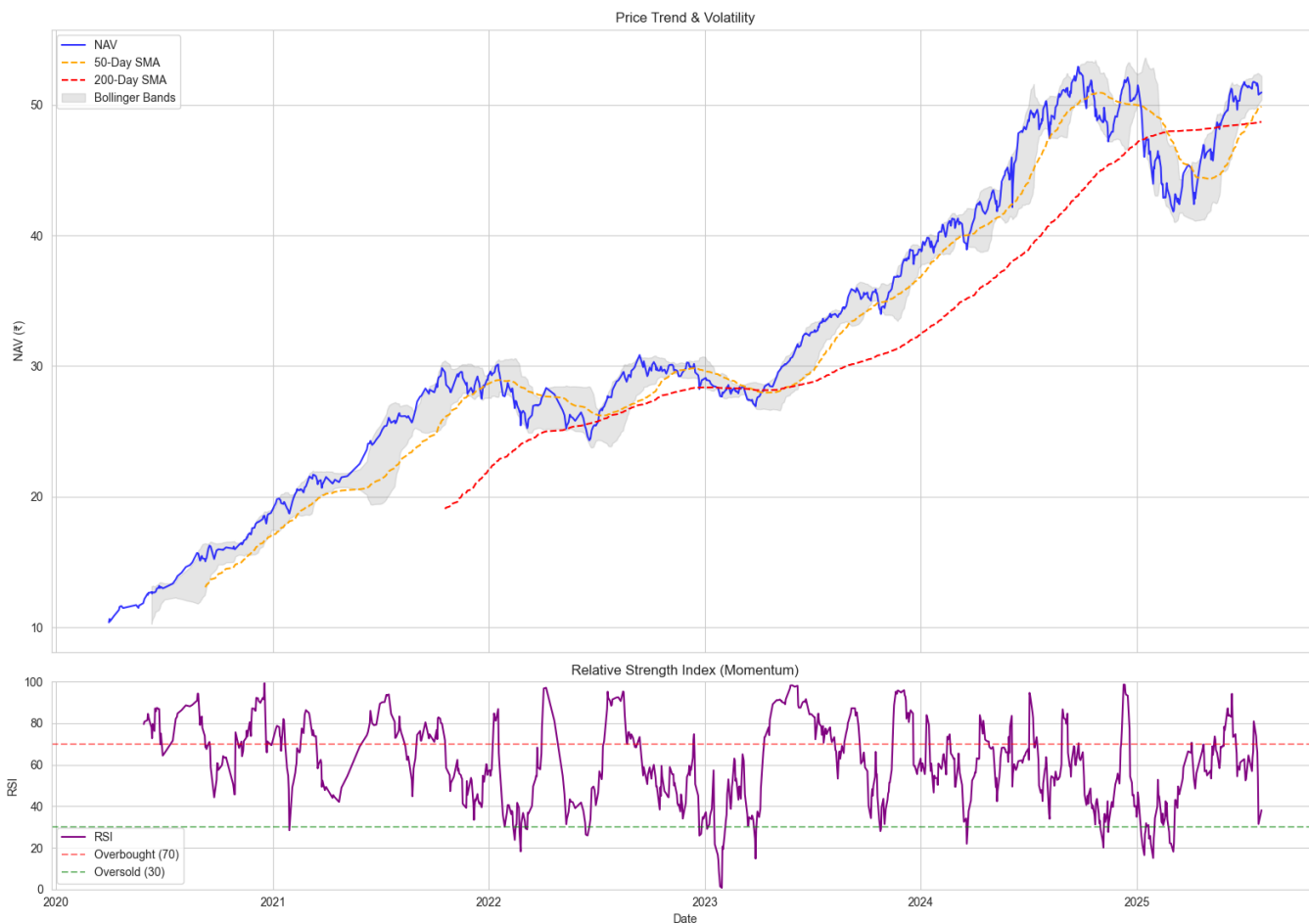
■ Part 4: Personalized Final Portfolio Recommendation¶

Objective: Construct a **final diversified investment portfolio** of high-suitability mutual funds that also **minimize internal correlation**.

Steps:

• Start with highest scoring fund
• Iteratively add low-correlation funds
• Optionally include a thematic/specialized satellite fund

Why: This creates a **smart portfolio**—well-performing but not over-exposed to a single trend or asset behavior. We also ensure that recommendations are practical (i.e., limited to funds with enough historical data).

```
================================================================================
== YOUR FINAL DIVERSIFIED PORTFOLIO RECOMMENDATION ==
================================================================================

Hello! Based on your goal of a 1-year investment with High risk, here is a sample portfolio designed for you.

The main goal of this portfolio is **diversification**. This simply means not putting all your eggs in one basket. We've se

--- Your Recommended Core Portfolio ---
```

	scheme_name	Suitability Score	Expected Annual Return (%)	Annualized Volatility (%)
2621	Union Midcap Fund - Direct Plan - IDCW Option	0.92	45.58	20.17

	scheme_name			
4079	Tata Gold Exchange Traded Fund	0.81	37.29	15.14

--- Why These Funds Were Chosen ---

2622. **Union Midcap Fund - Direct Plan - IDCW Option**: This fund was added because it's a strong performer that is also q

4080. **Tata Gold Exchange Traded Fund**: This fund was added because it's a strong performer that is also quite different

--- Optional 'Satellite' Fund for Higher Growth ---

For investors comfortable with more risk, you can add a small portion of your investment to a specialized fund. These are l

	scheme_name	Suitability Score	Expected Annual Return (%)
2671	SBI Magnum Children's Benefit Fund - Investmen...	0.96	45.11

This fund focuses on a specific theme and has a low correlation (0.41) to your core portfolio, making it a good high-risk,

Disclaimer: This is a statistically generated recommendation based on historical data. Past performance is not indicati

■ Final Thoughts & Summary¶

This notebook presents a fully functional **Mutual Fund Analysis & Recommendation Engine**. Here's what we achieved:

- ■ **Back-End Analysis Engine:** Calculated detailed historical and statistical performance profiles using efficient SQL and pandas logic.
- ■ **Custom Recommendation Engine:** Personalized fund recommendations based on user-defined risk and timeline.
- ■ **Visual Diversification Tools:** Used clustering and correlation to enable smarter fund selection.
- ■ **Technical Deep-Dive:** Fund-specific indicators helped investors interpret timing and performance signals.
- ■ **Portfolio Builder:** Automated selection of low-correlation, high-return mutual funds for a diversified investment basket.

This project demonstrates how data science can drive real-world, investor-facing financial intelligence.

Part 2: Individual Fund Forecasting

■ Mutual Fund NAV Forecasting & Growth Analysis¶

This notebook provides a forward-looking analysis of a selected mutual fund. It uses a combination of statistical models to forecast future Net Asset Value (NAV) and analyzes historical growth patterns to provide a comprehensive view.

Methodology:

1. **Fund Selection:** We connect to the database and select a specific fund for analysis.
2. **Data Preparation:** The historical data for the fund is loaded and prepared for time-series modeling.
   Dual-Model Forecasting: We use two distinct models:
   - **Prophet:** A robust model from Meta that excels at handling seasonality and trend changes.
   - **Holt-Winters:** A classic statistical model that is effective for data with trend and seasonality.
4. **Ensemble Prediction:** The predictions from both models are averaged to create a more stable and reliable 'ensemble' forecast.
5. **Visualization & Analysis:** The results are presented through intuitive charts, including future NAV projections and historical year-over-year performance.

Part 1: Setup and Environment¶

Objective: Load all necessary libraries and configure the environment for analysis and visualization.

```
E:\envs\AI_torch\Lib\site-packages\tqdm\auto.py:21: TqdmWarning: IProgress not found. Please update jupyter and ipywidgets.
 from .autonotebook import tqdm as notebook_tqdm

Importing plotly failed. Interactive plots will not work.
```

■ Part 1: Environment setup complete.

Part 2: Fund Search (Optional Helper)¶

This part helps you find the scheme code for a fund you're interested in. It only searches from the pre-filtered list of suitable funds.

```
--- Part 2: Fund Search ---
Found 24 matching funds. Copy the 'scheme_code' of the fund you wish to analyze below:
```

scheme_code	scheme_name
204100640	SBI Magnum Income Fund-REGULAR PLAN-Bonus
209100639	SBI Magnum Income Fund-REGULAR PLAN-Growth

220100638	SBI Magnum Income Fund - Regular Plan - Half Yearly - Income Distribution cum Capital Withdrawal Option (IDCW)
221101169	SBI Magnum Children's Benefit Fund - Savings Plan - REGULAR PLAN - GROWTH
268102201	SBI MAGNUM NRI - SHORT TERM BOND PLAN-GROWTH
331102202	SBI MAGNUM NRI - SHORT TERM BOND PLAN-DIVIDEND
496102056	SBI Magnum Income Plus Fund - Savings Plan (D)
505102208	SBI MAGNUM NRI FLEXIASSET PLAN-DIVIDEND
528102207	SBI MAGNUM NRI FLEXIASSET PLAN-GROWTH
578102054	SBI Magnum Medium Duration Fund - Regular Plan - Income Distribution cum Capital Withdrawal Option (IDCW)
847102055	SBI Magnum Income Plus Fund - Savings Plan (G)
103502507	OLD-SBI Magnum Income Fund - F R P - Long Term - Inst. (G)
106602508	SBI Magnum Income Fund - F R P - Long Term - Inst. (D)
113202053	SBI MAGNUM MEDIUM DURATION FUND - REGULAR PLAN - GROWTH
338348490	SBI Magnum Children's Benefit Fund - Investment Plan - Direct Plan - Growth
338448489	SBI Magnum Children's Benefit Fund - Investment Plan - Regular Plan - Growth
593819824	SBI MAGNUM MEDIUM DURATION FUND - DIRECT PLAN - GROWTH
593919825	SBI Magnum Medium Duration Fund - Direct Plan - Income Distribution cum Capital Withdrawal Option (IDCW)
599219713	SBI Magnum Income Fund - Direct Plan - Half Yearly - Income Distribution cum Capital Withdrawal Option (IDCW)
599321940	SBI Magnum Income Fund - Direct Plan - Quarterly Income Distribution cum Capital Withdrawal Option (IDCW)

599421944	SBI Magnum Income Fund - Regular Plan - Quarterly Income Distribution cum Capital Withdrawal Option (IDCW)
599519712	SBI Magnum Income Fund-DIRECT PLAN - Bonus
599619714	SBI Magnum Income Fund-DIRECT PLAN -Growth
721519719	SBI Magnum Children's Benefit Fund - Savings Plan - DIRECT PLAN - GROWTH

Part 3: Data Loading & Validation¶

Objective: Connect to the database and load the complete historical NAV data for a single, user-selected fund.

```
--- Part 3: Data Loading & Validation ---
■ Fund 100639 is valid. Loading data from database...

■ Successfully loaded 3820 records for: 'SBI Magnum Income Fund-REGULAR PLAN-Growth'.
```

Part 4: Data Preparation for Forecasting¶

Objective: Check for data sufficiency and create a continuous daily time series for the models.

```
--- Part 4: Preparing for Forecast ---
Data sufficiency check passed. Preparing time-series...
■ Time-series data prepared.
```

Part 5: Dual-Model Forecasting¶

If the data is sufficient, we proceed with fitting both Prophet and Holt-Winters models to generate a 1-year forecast.

```
Fitting Prophet model...

13:23:29 - cmdstanpy - INFO - Chain [1] start processing

13:23:33 - cmdstanpy - INFO - Chain [1] done processing

Prophet model fitting complete.

Fitting Holt-Winters model...

Holt-Winters model fitting complete.

Creating ensemble forecast...
■ Ensemble forecast created.
```

Part 6: Investment Projection & Visualization¶

Objective: Translate the forecast into an actionable table and a clear visual representation.

```
--- Key Forecasted NAV Values for SBI Magnum Income Fund-REGULAR PLAN-Growth ---
```

Timeframe	Forecasted Date	NAV (■)
1 Month	2025-06-...	...06329
3 Months	2025-11-...	...10728
6 Months	2026-02-...	...02026
1 Year	2026-07-...	...07630

```
Generating forecast visualization...
```


Historical NAV and 1-Year Forecast for: SBI Magnum Income Fund-REGULAR PLAN-Growth
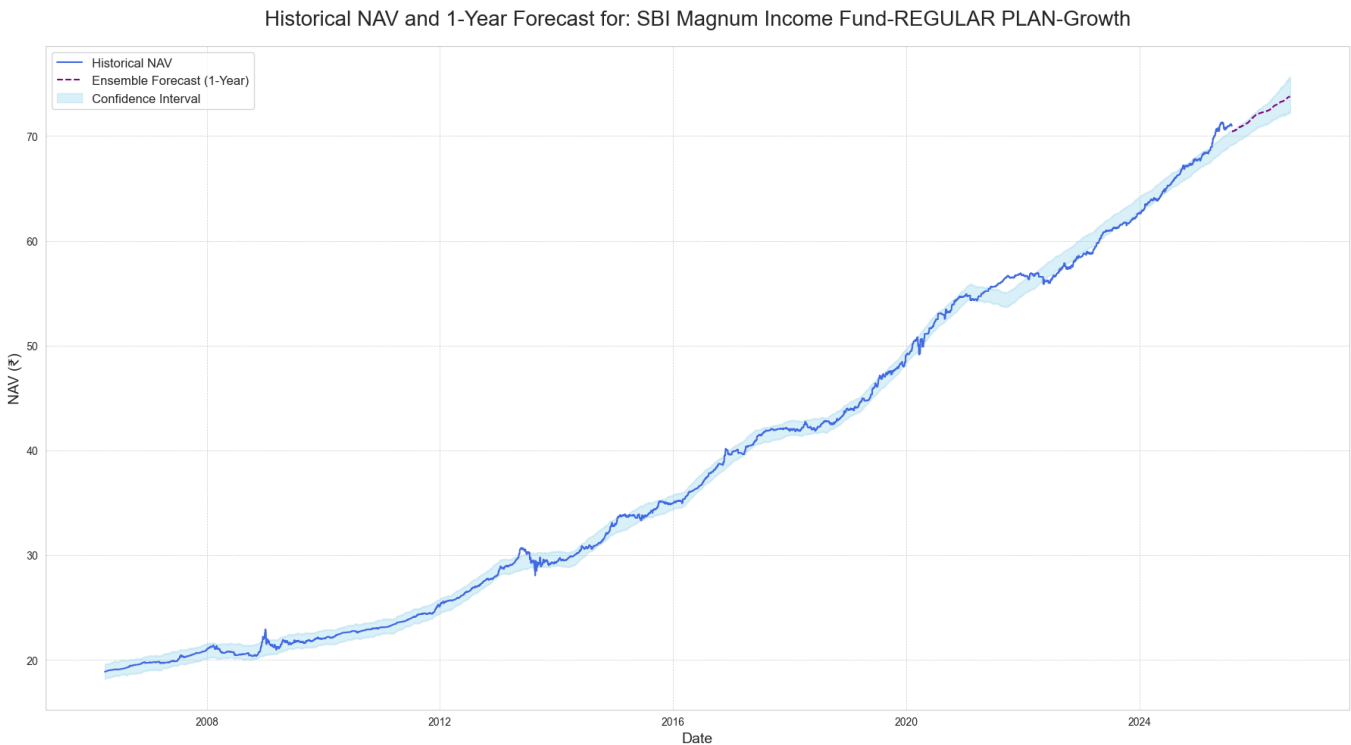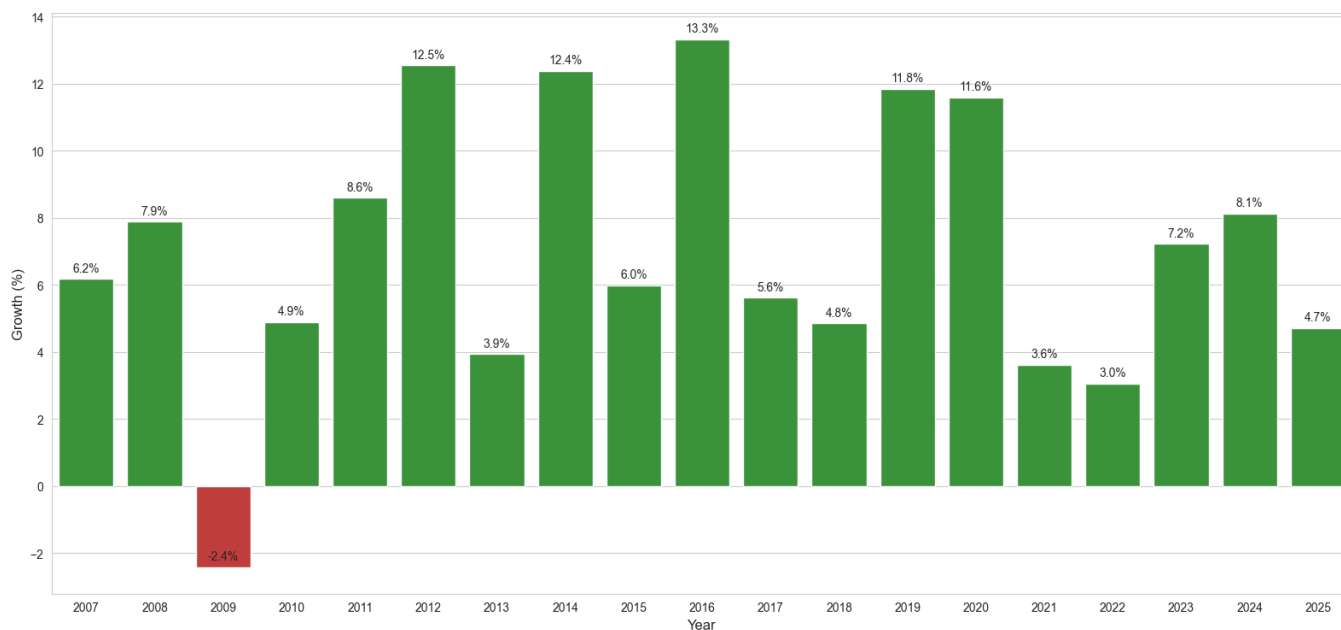
Part 7: Historical Performance Analysis¶

Objective: Analyze the fund's historical year-over-year (YoY) growth to provide context.

```
Calculating and plotting year-over-year growth...
```

Historical Year-over-Year Growth for SBI Magnum Income Fund-REGULAR PLAN-Growth

Part 8: Final Summary & Disclaimer¶

This analysis provides a data-driven forecast based on the fund's historical behavior. The ensemble approach helps to create a more balanced prediction by leveraging the strengths of two different models.

Disclaimer: *The forecasts presented here are based on statistical models and historical data. Past performance and predicted results are not guarantees of future returns. Financial markets are subject to various risks and uncertainties. This analysis is for informational purposes only and should not be considered as financial advice. Always consult with a qualified financial advisor before making any investment decisions.*