B.M.S COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to VTU, Belagavi)

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DEPARTMENT OF MACHINE LEARNING

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DATA VISUALISATION AND ANALYSIS(23AM5AEDVA)
ALTERNATIVE ASSESSMENT TOOL (AAT)

FINANCIAL INVESTMENT PORTFOLIO
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1. Introduction:

This report digs into the financial world, specifically focusing on how the Indian market is doing. The main goal is to compare the Nifty 50 index with a mix of mutual funds in a personal portfolio. By using visuals, we'll explore market trends, ways to reduce risk, and the returns on investments. The first part looks closely at how the Nifty 50 has performed over time. Then, we'll dive into the details of a diverse mutual funds portfolio. These graphs and charts aim to show why it's smart to spread investments across different types of assets, giving investors a clear view of managing risks and growing their money alongside the Indian market. This report encourages readers to join a data-driven journey, discovering the secrets to improving investment strategies and building strong portfolios.

2. Background:

Nifty 50:

The Nifty 50 is a flagship index of the National Stock Exchange (NSE) of India, comprising the 50 most actively traded stocks across various sectors. Designed to reflect the performance of the Indian equity market, Nifty 50 serves as a key indicator for investors, analysts, and policymakers. Its constituents represent a diverse range of industries, making it a robust benchmark for gauging the overall health and trends of the Indian stock market. Investors often use the Nifty 50 as a standard for assessing market performance, tracking trends, and making informed decisions based on the index's movements.

Mutual Funds:

Mutual funds are investment vehicles that pool money from multiple investors to invest in a diversified portfolio of stocks, bonds, or other securities. They are managed by professional fund managers, who make investment decisions on behalf of the investors. Mutual funds provide a convenient and accessible way for individuals to participate in the financial markets, offering diversification and professional management. The appeal of mutual funds lies in their ability to cater to various risk appetites and investment objectives, making them a popular choice for both novice and experienced investors. The transactional nature of mutual funds, involving buying and selling of units, provides flexibility and liquidity to investors.

Importance of Nifty 50 and Mutual Funds:

- **Nifty 50:** As a widely followed market index, Nifty 50 serves as a barometer for the overall performance of the Indian stock market. Investors use it to assess market trends, benchmark their portfolio returns, and make strategic investment decisions. The index's inclusivity of diverse sectors provides a comprehensive view of market movements.
- **Mutual Funds:** Mutual funds play a crucial role in investment portfolios by offering diversification, professional management, and accessibility to a wide range of investors. They allow individuals to invest in a broad array of assets without the need for substantial capital. Mutual funds cater to various risk profiles, making them a versatile tool for building well-rounded and risk-managed investment portfolios.

In combination, the Nifty 50 and mutual funds form integral components of an investor's toolkit, providing insights into market dynamics and offering avenues for diversified and strategic investments. Understanding these elements is fundamental to making informed financial decisions and optimizing investment portfolios**.**

3. Data Description:

The dataset under scrutiny comprises two key components: the Nifty 50 index and a diversified set of mutual funds. Nifty 50, often considered a bellwether for the Indian stock market, encapsulates the performance of the top 50 companies listed on the National Stock Exchange (NSE). Its significance lies in its representation of the broader market trends, making it a standard for evaluating Indian market performance.

Nifty 50 Metrics:

● Price-to-Earnings (P/E) Ratio: A valuation ratio indicating the market's expectations for a company's future earnings. It is calculated as the ratio of stock price to the company's earnings per share.

● Price-to-Book (P/B) Ratio: A financial metric representing the market's valuation of a company's assets relative to its book value. It is calculated as the ratio of stock price to the company's book value per share.

● Dividend Yield: This percentage reflects the annual dividend income of a stock relative to its market price. It provides insights into the income-generating potential of an investment.

Mutual Funds Dataset Headers:

● Transaction Date: Date of the transaction.
● Scheme Name: Name of the mutual fund scheme.
● Folio Number: Unique identifier for an investor's account.
● Transaction Type: Indicates whether the transaction involves buying or selling units.
● Price: Price per unit during the transaction.
● Units (Credits/Debits): Quantity of units credited or debited.
● Balance Units: Remaining units in the investor's account after the transaction.
● Amount (Credits/Debits): The monetary value of the transaction.
● Market Value: Current market value of the investor's holdings.

This background information sets the stage for a comprehensive exploration of the Nifty 50's role as a benchmark and the dynamics of mutual funds, forming the basis for the subsequent data visualizations and analyses within this report.

4. Visualization Design:

Visualization types:

- Line graph: The line graph in the top left corner is a good choice for showing trends over time. It is easy to see how the Nifty 50 index and the mutual funds have performed relative to each other over the past year.
- Bar chart: The bar chart in the top right corner is a good choice for showing the market value of each mutual fund. It is easy to see which funds are the largest and smallest.
- Pie charts: The pie charts in the bottom left and right corners are a good choice for showing the asset allocation and debt by security type of the portfolio. It is easy to see how the assets are distributed.

Color schemes:

- The color scheme used in the line graph is blue and green, which are both easy to see on a white background.
- The color scheme used in the bar chart is a gradient of blue from light to dark. This helps to distinguish between the different funds.
- The color scheme used in the pie charts is a variety of colors, which helps to distinguish between the different asset classes and security types.

Interactivity:

Slicer:

- Type: Slider is a good choice for numerical data as it allows users to choose a specific range or value with ease.
- Impact: This interactivity significantly enhances the usability and value of the dashboards. Users can explore different categories or values within the data and see how the other visualizations (line graph, bar chart, pie charts) update accordingly. This facilitates deeper analysis and understanding of the relationships between different aspects of the data.

Overall impact:

- The dashboards are well-organized and easy to navigate.
- The charts and graphs are well-labeled and easy to understand.
- The dashboards use a consistent color scheme throughout.
- Flexibility: The combination of slicer and dynamic visualizations empowers users to gain personalized insights from the data. They can focus on their areas of interest and see how various factors influence the performance or composition of the mutual funds, asset allocation, or debt holdings.
- Improved decision-making: This interactive approach provides valuable information to guide investment decisions or portfolio adjustments. Users can see the immediate impact of their choices on relevant aspects, aiding in informed analysis and planning.

The design choices made in creating the visualizations in these dashboards are effective in communicating the information they are intended to convey. The use of simple and easy-to-understand visualizations, color schemes, and chart types makes it easy for users to understand the data.

5. Implementation:

Power BI Overview:

Power BI is a business analytics service by Microsoft that enables users to visualize and share insights from their data. It offers a suite of tools for data preparation, analysis, and visualization, making it a powerful solution for creating interactive and dynamic dashboards. Power BI allows users to connect to various data sources, transform raw data into meaningful insights, and present them through compelling visualizations.

Tools in Power BI for Dashboard Creation:

1. **Power Query:** Used for data extraction, transformation, and loading (ETL) processes.
2. **Power Pivot:** Enables the creation of data models with relationships and calculations.
3. **Power View:** Facilitates the design of interactive and visually appealing reports and dashboards.
4. **Power Map:** Provides 3D geographical and time-based data visualizations.
5. **Power Q&A:** Allows users to query data using natural language.
6. **Index Cards:** Provides space for adding text, images, or contextual information.
7. **Slider:** Enables dynamic filtering of data by adjusting ranges or values in dashboards.
8. **KPI (Key Performance Indicator):** KPIs in Power BI are visual elements that highlight key metrics, providing a quick overview of performance against set targets.
9. **Pie Chart**: Pie charts visually represent data distribution in a circular graph, making it easy to compare proportions of different categories within a dataset.
10. **Line and Bar Clustered Chart:** This chart type in Power BI allows the simultaneous visualization of line and clustered bar data, enabling users to compare trends and values across multiple dimensions.
11. **Line Chart:** Line charts illustrate trends in data over a continuous interval or time period, helping users identify patterns and variations in numerical values.
12. **Decomposition Tree:** The Decomposition Tree in Power BI assists in breaking down complex data into hierarchical structures, providing an interactive way to explore and analyze relationships within the dataset.

6. Analysis and Insights:

1. Sector Weightage of Nifty
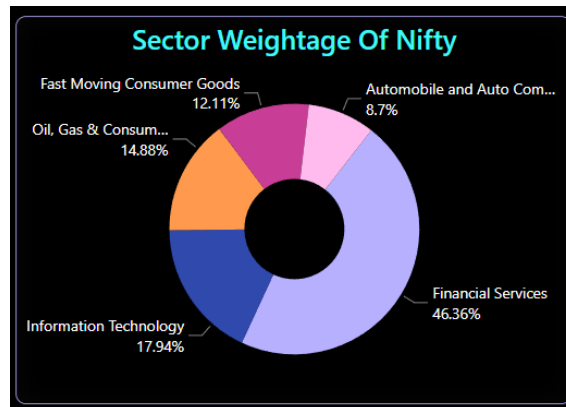
- Financial Services is the dominant sector in Nifty, accounting for nearly half (46.36%) of its weight. This suggests that the Nifty index is heavily influenced by the performance of financial companies.
- The next largest sector is Oil, Gas & Consumables, with a weight of 14.88%. This indicates that energy companies also play a significant role in Nifty's performance.
- Fast Moving Consumer Goods (FMCG) and Information Technology (IT) are also important sectors, but with smaller weights of 12.11% and 17.94%, respectively. This suggests that the Nifty is diversified across a range of sectors, but with a tilt towards financials and energy.

Overall, the pie chart suggests that Nifty is a benchmark index that is heavily influenced by the performance of a few large sectors, particularly financials and energy.

### 2. Average of Div Yield % and Average of P/E by Year
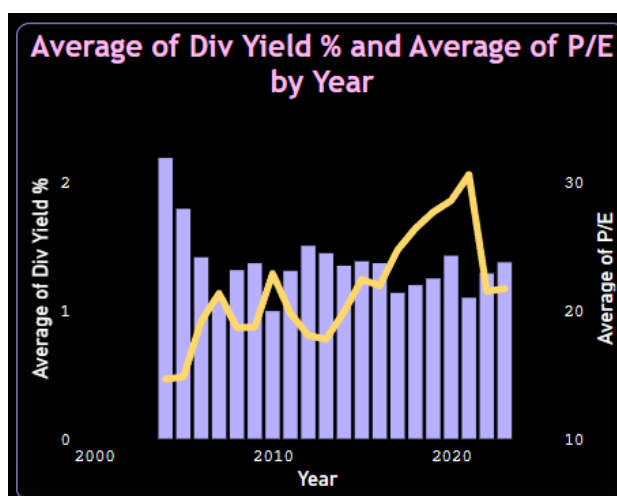
- The average dividend yield has trended downwards over the past ten years, while the average P/E ratio has trended upwards. This suggests that investors are willing to pay more for each unit of earnings, despite receiving a lower dividend payout.
- There is a potential negative correlation between dividend yield and P/E ratio. This means that when one goes up, the other tends to go down.

3. **Closing Chart of Nifty**
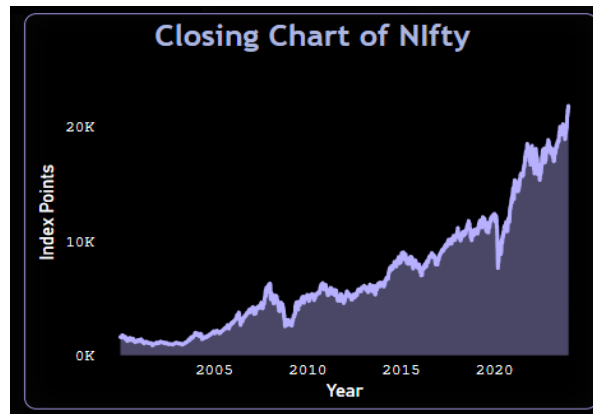
- The sum of close values for each year appears to be roughly equal, with some variation within each year.
- There is a slight upward trend in the sum of close values over time.
- The year 2008 appears to have had a lower sum of close values than the other years.
- The data for each year appears to be somewhat seasonal, with higher values in the later months of the year.

4. **Long Term Trend Month Wise**
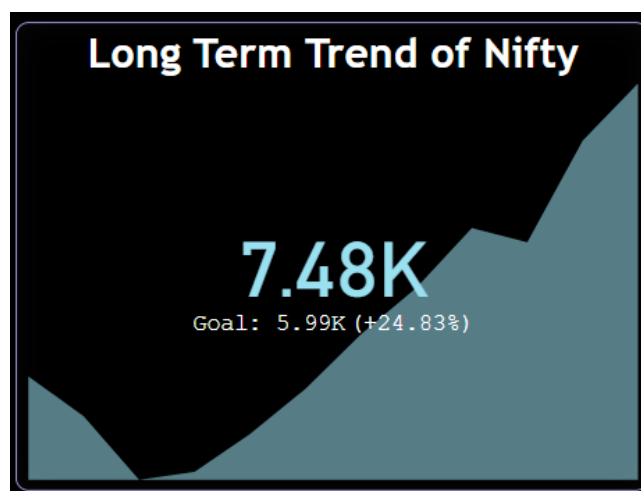
- The long-term trend appears to be positive, exceeding the goal by a significant margin.
- The graph shows a steady upward trajectory, with the actual value consistently above the target goal line. This suggests that the KPI is performing well and exceeding expectations.

5. **Main Observations**

- The Nifty 50 has reached an all-time high of 21,830.10. This is a significant increase from the previous all-time high of 18,604.45, which was reached on October 24, 2021.
- The price-to-book ratio is 6.55. This is a relatively high ratio, which suggests that investors are willing to pay a premium for stocks in the Nifty 50.
- The dividend yield is 2.59%. This is a relatively low yield, which suggests that investors are more focused on capital appreciation than income from dividends.

6. **Sum of Balance Units By Year**
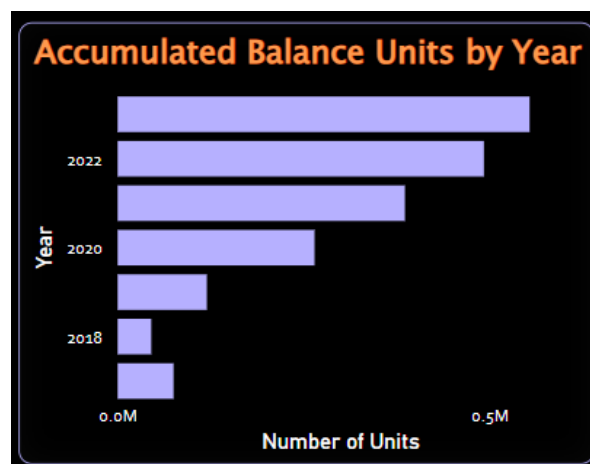
- The sum of balance units has increased steadily over the years, with 2022 showing the highest total balance.

7. **Average of different Scheme Market Value by Year**
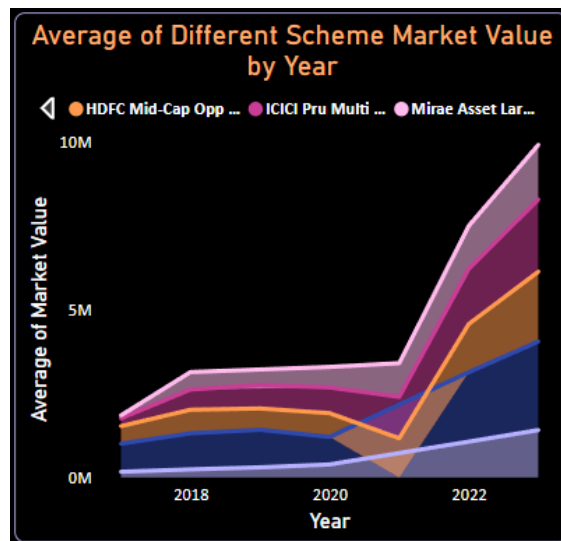
- Average market value for Franklin India Smaller Companies Fund has grown steadily over the past five years, outperforming HDFC Small Cap Fund and ICICI Prudential Value Discovery Fund.
- Franklin India Smaller Companies Fund's average market value surpassed both HDFC Small Cap Fund and ICICI Prudential Value Discovery Fund in 2020 and has maintained a significant lead since.
- All three funds experienced a dip in average market value in 2018, but have since recovered and continued to grow.
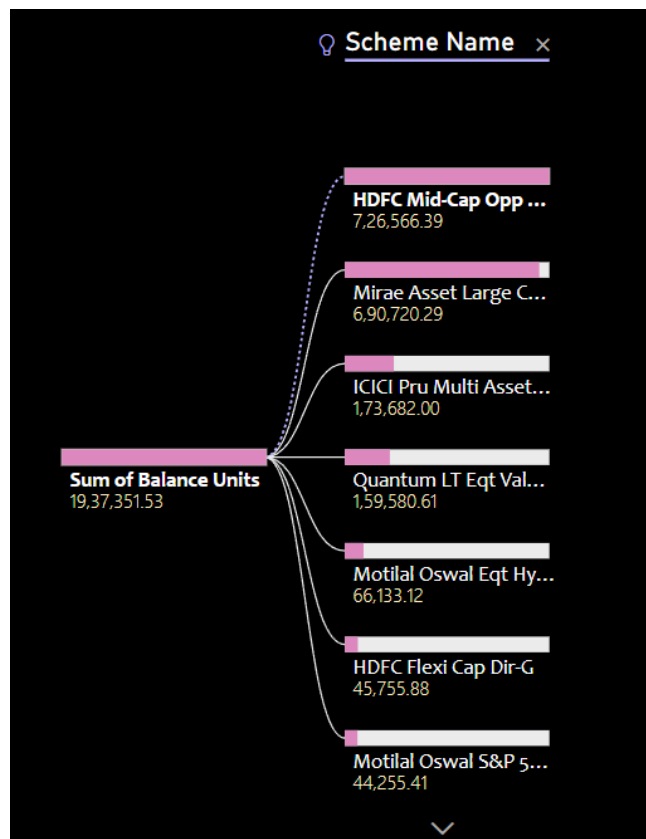
8. **% depth by Security Type**
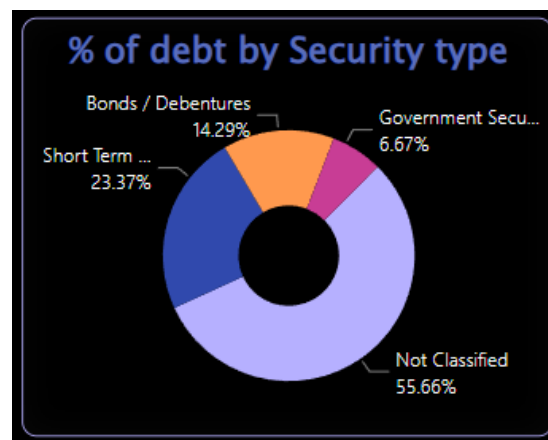
- Not classified debt makes up the majority (55.66%) of the debt by security type.

9. **% of Equity by Capitalization**
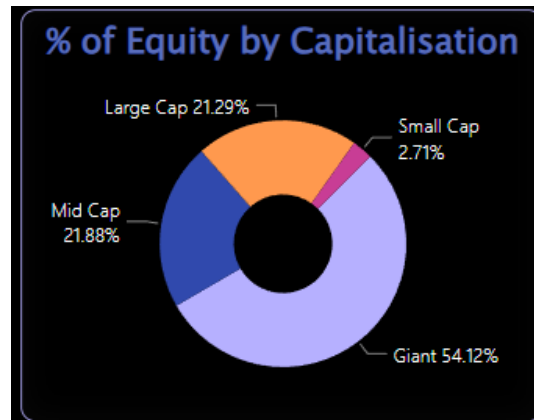
- Giant capitalization dominates the market share, holding over half (54.12%) of the total value.

10. **Clustered tree for the accumulated units distribution in different schemes**

- Majority of units belong to HDFC mid cap and Mirae Asset large cap
- Motilal Oswal S&P units depict units corresponding to the US index further diversifying our assets class
- Here we can see how giant and large cap units compose majority of our portfolio

11. Market value by MF Scheme
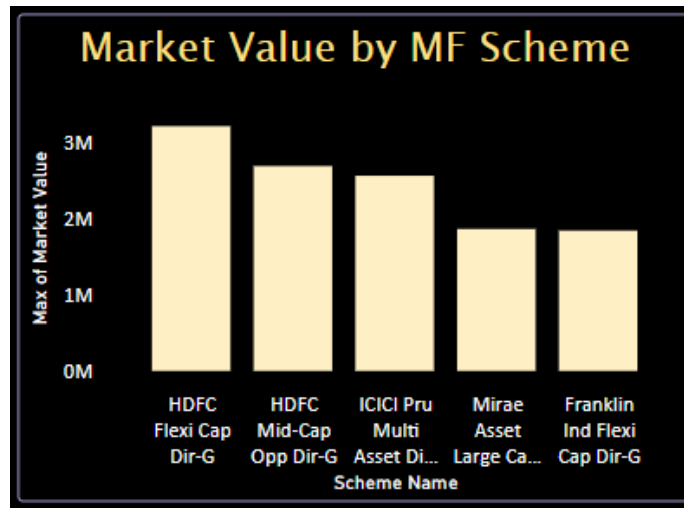
- HDFC Flexi Cap and HDFC Mid-Cap have seen the most significant growth in market value over the three-year period.
- ICICI Pru Value Discovery and Mirae Asset Large Cap have seen more modest growth.
- The market value of all four schemes appears to have increased sharply in 2021.

12. Compound Growth
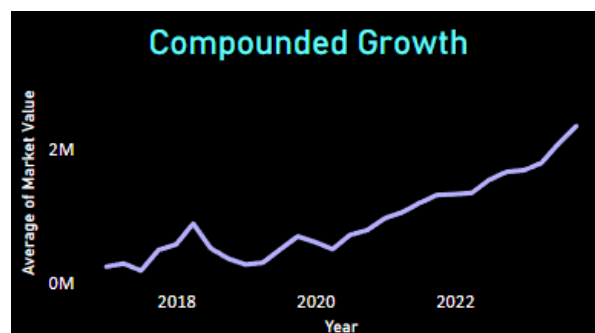
- Average market value has increased steadily over the past three years

13. Nifty Index
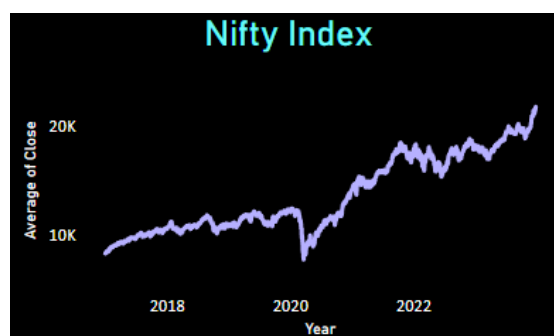
- The graph shows the Nifty 50 index, a benchmark index for the Indian stock market, over the past three years. The index has risen steadily over this period, from around 10,000 in 2018 to over 20,000 in 2022. This suggests that the Indian stock market has performed well over the past three years.

7. Impact and Value:

Dashboard 1:
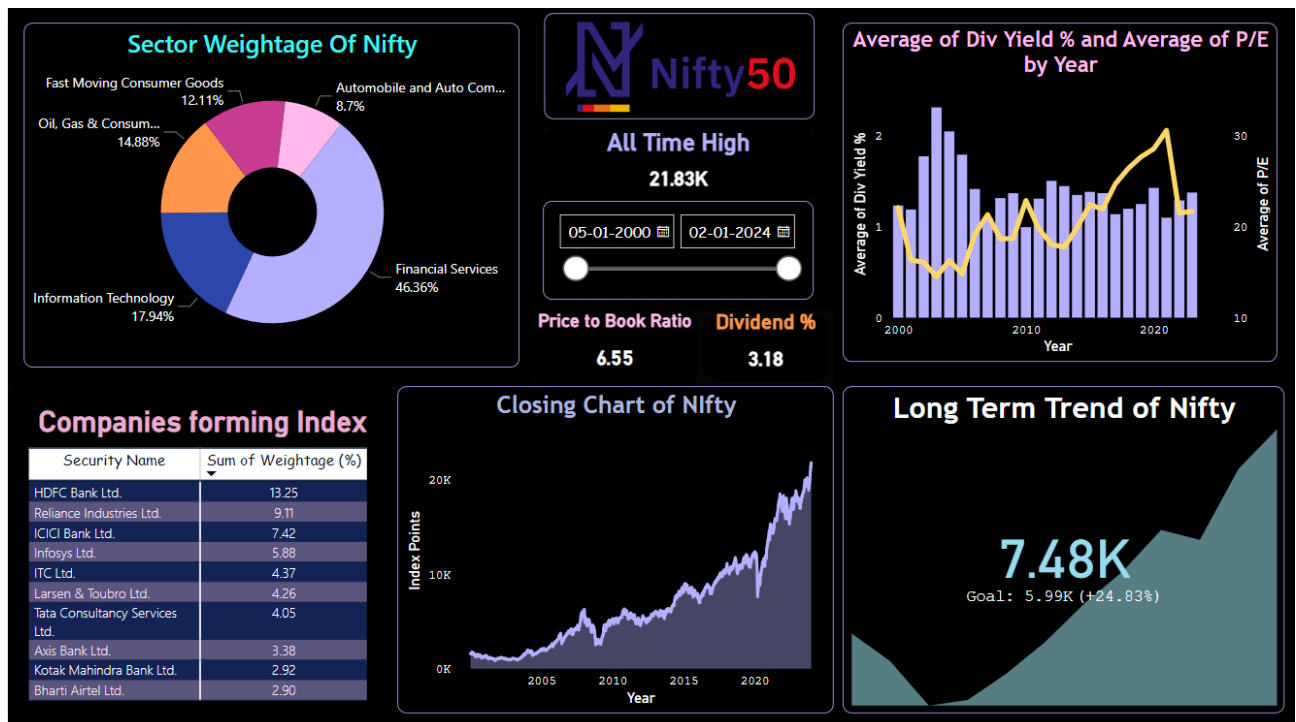
The Dashboard shows a collection of charts and graphs that appear to be tracking the performance of the Nifty 50 index, a benchmark index of the Indian stock market. The visualizations include:

- A pie chart showing the sector weightage of the Nifty 50 as of January 2, 2024. The financial services sector has the largest weightage (46.36%), followed by oil, gas & consumables (14.88%) and fast moving consumer goods (12.11%).
- A line graph showing the average dividend yield and average price-to-earnings ratio of the Nifty 50 over time. The dividend yield has been trending downwards since 2010, while the price-to-earnings ratio has been trending upwards.
- A bar chart showing the closing price of the Nifty 50 on each day from January 5, 2000 to January 2, 2024.
- A table showing the companies that make up the Nifty 50 index, along with their weightings in the index.

These visualizations provide a number of insights into the performance of the Nifty 50 index. For example, they show that the index is heavily weighted towards the financial services sector, and that the average dividend yield has been declining in recent years. They also show that the index has generally trended upwards over the long term, although there have been

periods of significant volatility.

They can be used by investors to make decisions about which stocks to buy or sell. For example, an investor who is looking for high dividend yields might be more likely to invest in stocks in the oil, gas & consumables sector, which has a higher average dividend yield than the Nifty 50 as a whole.

Overall, the visualizations in the image provide a valuable overview of the performance of the Nifty 50 index. They can be used by investors to gain insights into the index and make informed investment decisions.

It is important to note that past performance is not necessarily indicative of future results. The Nifty 50 index could decline in value in the future, even if it has performed well in the past. Investors should always carefully consider their own investment goals and risk tolerance before making any investment decisions.

Dashboard 2:
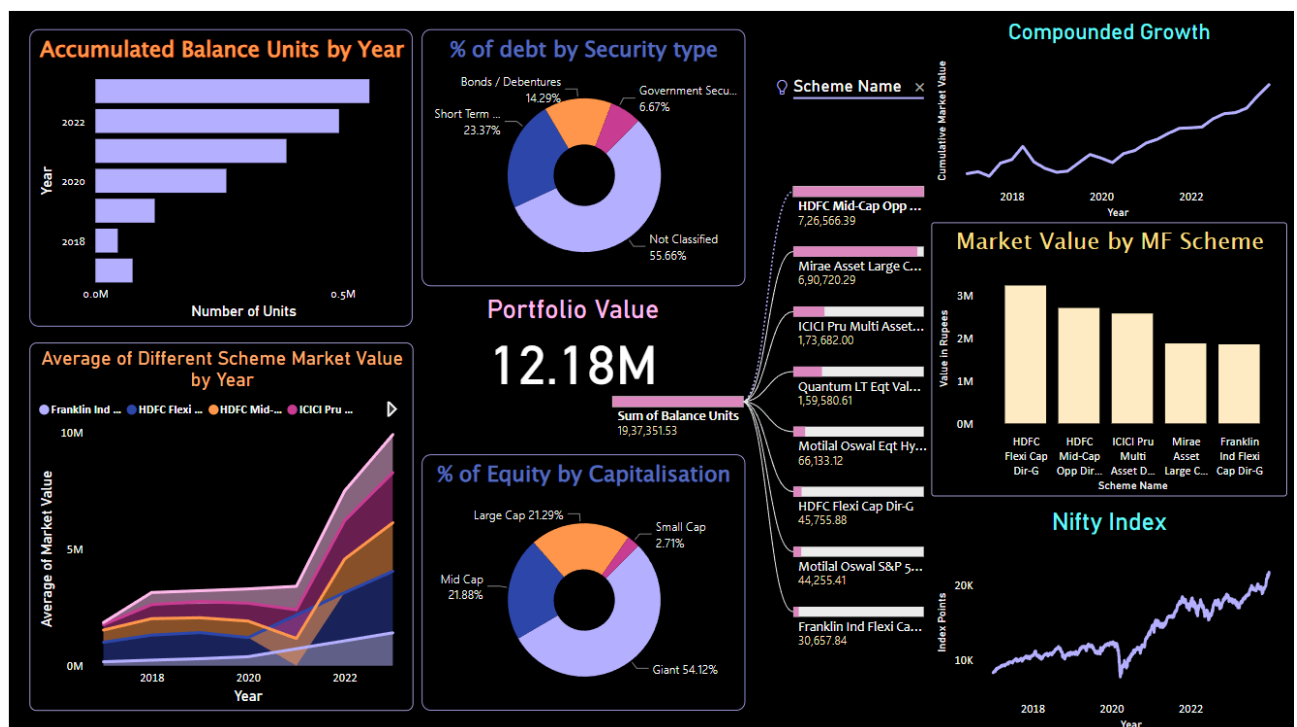
The second Dashboard is Analysis of Personal Portfolio Performance compared to the Indian Stock Market. The following are observations from the Dashboard -

- **Performance:** The dashboard shows the performance of several mutual funds over time. The line graph in the right bottom corner shows that the Nifty 50 index has performed. Seeing the top right corner we can conclude all of the mutual funds have remained consistent with their returns and are not as deviative as Nifty allowing compounding growth annually. However, the bar chart in the top right corner shows that the HDFC Flexi-Dir Fund has the highest market value of all the funds listed. This suggests that while the HDFC Flexi Dir-G Fund may be a bigger percentage wise instrument, the other funds also provide value to the portfolio.

- **Asset allocation:** The pie chart in the bottom corner shows the asset allocation of the portfolio. The majority of the assets are invested in Giant-Cap stocks(54.12%), large-cap stocks (21.29%), followed by mid-cap stocks (21.88%) and small-cap stocks (2.71%). This suggests that the portfolio is relatively aggressive while keeping conservative nature, as it is not heavily invested in riskier assets such as small-cap stocks but also holds risky mid-cap stocks.

- **Debt by security type:** The pie chart in the top shows the debt by security type. The majority of the debt is invested in unclassified treasury bonds(55.66%), short term debt(23.37%) followed by bonds/debentures (14.29%). This suggests that the portfolio is also relatively conservative on the debt side, as it is not heavily invested in riskier corporate bonds.

Overall, the dashboard suggests that the portfolio is a relatively diverse one that is invested in a mix of giant-cap, large-cap, mid-cap, and small-cap stocks, as well as bonds and government securities.

The Nifty 50 index has been highly volatile in the past few years especially in the pandemic whilst the mutual funds in the same time frame have kept steady incremental value owing to the aggressive nature of equity and conservative debt allocations.

8. Conclusion:

In this case study, the data visualizations across two dashboards effectively provide key insights into the performance and composition of the Nifty 50 index and a diversified mutual funds portfolio. The first dashboard sheds light on the Nifty 50's sector weightage, historical trends in dividend yield and price-to-earnings ratio, daily closing prices, and constituent companies with their weightings. Notably, it highlights the heavy weightage of the financial services sector and a declining trend in average dividend yield over time.

The second dashboard analyzes the performance of various mutual funds, revealing that despite the volatility of Nifty, they have performed consistently in the past few years. However, it also identifies opportunities and suggests a potential long-term investment opportunity. The asset allocation and debt analysis further characterize the portfolio as an aggressive and conservative approach . Overall, these visualizations empower investors to make informed decisions regarding fund selection, asset allocation, and risk management, aligning with the project's objectives of comparing market performance, mitigating investment risks, and advocating for diversified asset classes. The data visualizations not only capture historical trends but serve as valuable tools for strategic decision-making in the dynamic financial landscape.

9. References:

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