2024

INTERNSHIP

MBA BA

II Year I Trimester-Project

[ANALYSIS OF INDICES ON NSE]

The project aims to analyse the performance, factors, volatility and perform predictions and forecasting of NSE indices to provide actionable insights.

Contents

Internship certificate

INFORMACHINES

Date: 30-12-2024
Bengaluru, KA, Bharat.

To,
Anurag School of Management,
Anurag University,
Hyderabad

Subject: Confirmation of Internship Project

Respected Faculty,

I, MVR Murty, formally declare and confirm that student from Anurag University, under the supervision of her internal faculty Mr. Rafi, have successfully completed a project internship titled as "Analysis of Indices on NSE" under my supervision and guidance for a duration of ten (10) weeks.

The details of student involved in this internship is as follows:

SNO	Name	Roll Number
1.	K. Ajitha Reddy	23MG202A19

During the internship, she analysed data spanning six years across nine NSE indices, which involves analytical reasoning and factor analysis for various trends and patterns of data in delivering insights as part of her internship deliverables.

Her work was satisfactory and met the objectives set forth at the beginning of the internship.

I appreciate the efforts of Anurag University and Prof. E. L Sastry in enabling this collaboration and look forward to future engagements.

Yours sincerely

Signed by:
Metta Venkata Ramana Murty
1A0218306780485...

MVR Murty
INFORMACHINES

Project cover sheet

Course: MBA – BA II-I Trimester

Project Title	Analysis of Indicators on NSE	**SME**	Mr. MVR Murthy
Start Date	28-10-2024	**Supervisor**	Mr. Rafi
End Date	30-12-2024	**Student Name**	K. Ajitha Reddy

Team Members

SNO	Name	Roll Number
2.	K. Ajitha Reddy	23MG202A19

Signature:

Signed by:
Metta Venkata Ramana Murty
1A0218306780485...

Client Name: Mr. M. V. R. Murty

Date: 30-12-2024

Introduction

This project aims to analyze NSE indices, listed on NSE official website including Broad Market, Sectoral, and Thematic categories, over six years to uncover historical trends, predict future performance, and provide actionable insights. By addressing challenges such as understanding index performance, volatility, and interrelationships, the study leverages advanced data analytics and forecasting models to bridge gaps in decision-making. This approach empowers investors, analysts, and policymakers with reliable insights for crafting investment strategies and navigating market complexities.

Indices

Broad Market Indices: Represent the overall performance of a wide range of companies across different market capitalization segments.

1. **NIFTY 50:** A broad market index representing the performance of the top 50 large-cap companies listed on the NSE, covering major sectors of the Indian economy.
2. **NIFTY 100:** Tracks the performance of the top 100 companies based on market capitalization listed on the NSE.
3. **NIFTY 200:** Combines the top 200 companies from the large-cap and mid-cap segments listed on the NSE.

Sectoral Indices: Focus on specific industry sectors, showcasing the performance of companies within those sectors.

4. **NIFTY IT:** Captures the performance of the top IT sector companies listed on the NSE.
5. **NIFTY BANK:** Tracks the performance of the most liquid and large-cap banking stocks listed on the NSE.

Thematic Indices: Capture the performance of companies grouped by common investment themes or strategic focuses, irrespective of sectors.

6. **NIFTY INDIA CONSUMPTION:** Represents companies involved in consumption-driven sectors like FMCG, auto, and consumer goods.
7. **NIFTY CPSE:** Comprises Central Public Sector Enterprises (CPSEs) listed on the NSE, showcasing the performance of government-owned firms.

8. **NIFTY INFRASTRUCTURE:** Tracks the performance of companies from the infrastructure sector, including construction, energy, and transport.
9. **NIFTY COMMODITIES:** Reflects the performance of companies involved in commodity production like metals, energy, and agriculture.

Problem Definition

Addressing challenges in analyzing NSE indices to provide insights for data-driven investment decisions.

Executive Summary

The project, Analysis of Indices on NSE, aims to study the performance and relationships among NSE indices, including broad market, sectoral, and thematic indices. By analysing six years of historical data, the project provides insights into trends, risks, and correlations that can influence investment strategies. Employing various analytical and statistical techniques, predictive models will be developed to forecast market behaviour. These insights will be shared through interactive dashboards and comprehensive reporting, addressing challenges faced by financial analysts and decision-makers. The project emphasizes delivering:

- Actionable insights into index trends, risks, and interdependencies.
- Machine Learning models for real-time forecasting.
- Comprehensive dashboards and reports to aid stakeholders in decision-making.

Objectives

The project aims to analyse the performance, volatility, and interrelationships of NSE sectoral indices to provide actionable insights for investment strategies and decision-making.

- Performance and Trend Analysis:

  Analyse the performance, historical trends, and returns of NSE Sectoral, Thematic, and Broad market indices to understand long-term behaviour, identify market opportunities, and evaluate inter-index relationships.

- Volatility and Correlation Assessment:

Evaluate index stability and fluctuations to assess risk and return opportunities.

Study interdependencies among indices and their relationships with macroeconomic factors like inflation and interest rates.

- Predictive Modelling and Forecasting:

  To develop statistical and predictive models for accurate market behaviour forecasting.

- Factor Analysis:

  To analyse various factors that are responsible for the stock market price changes.

- Visualization and Reporting:

  Create interactive dashboards and reports with data-driven recommendations to enable real-time decision-making for better investment outcomes.

Scope

Focuses on the following nine indices:

Broad Market Indices:

NIFTY 50, NIFTY 100, NIFTY 200

Sectoral Indices:

NIFTY IT, NIFTY BANK

Thematic Indices:

NIFTY INDIA CONSUMPTION, NIFTY CPSE, NIFTY INFRASTRUCTURE, NIFTY COMMODITIES

Various Economical factors that influence the value of indices.

Project Lifecycle

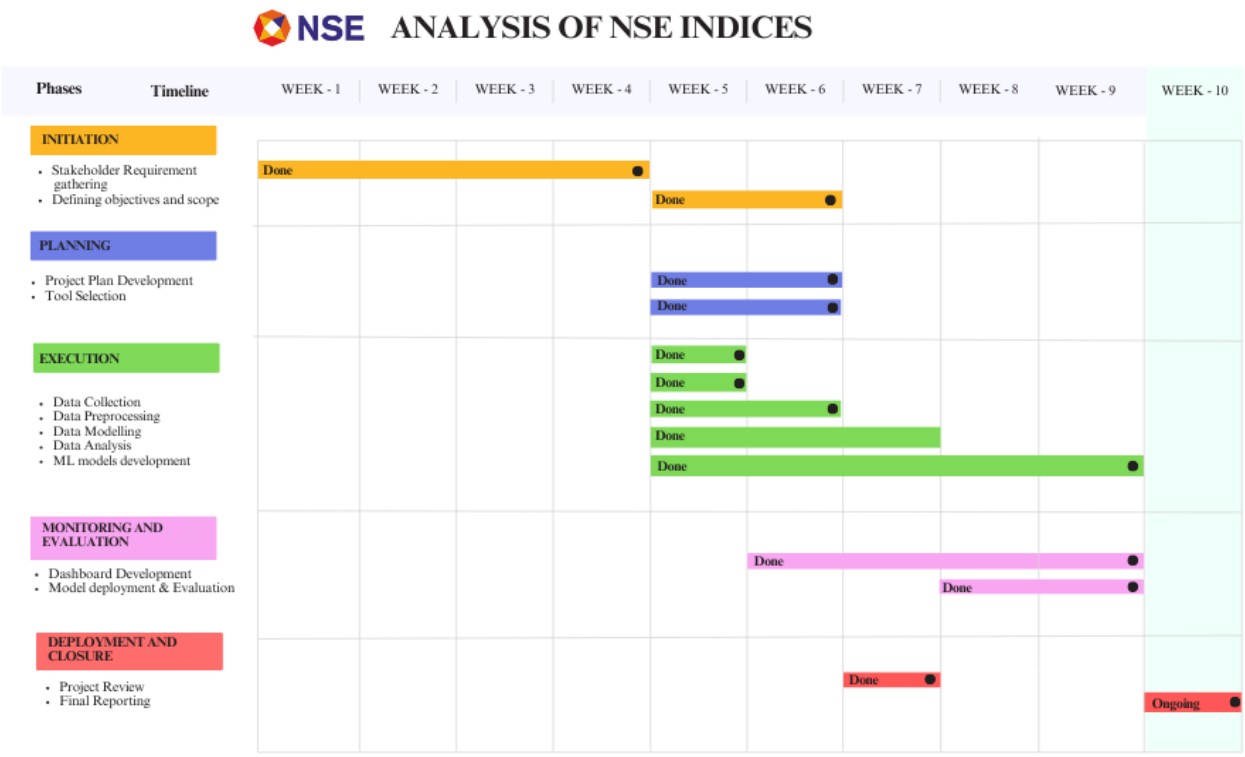


Fig: Gantt Chart representing various phases of project

1. **Initiation Phase**
    - Stakeholder communication: Identify key stakeholders such as analysts, investors, and organizational decision-makers.
    - Objective Definition: Define the purpose of analysing NSE sectoral indices and set clear goals.
    - Scope Definition: Outline the project scope, including indices to be analysed and key macroeconomic factors.
2. **Planning Phase**
    - Project Plan Development: Create a detailed project roadmap with milestones and timelines.
    - Data Requirements: Identify data sources (NSE, economic reports) and define data collection strategies.

- Tool Selection: Choose analytical tools and platforms for data processing and visualization.

3. **Execution Phase**
   - Data Collection: Gather historical data on indices and macroeconomic variables.
   - Data Cleaning and Preprocessing: Handle missing values, remove outliers, and transform data for analysis.
   - Exploratory Data Analysis (EDA): Visualize trends, correlations, and key patterns using statistical plots.
   - Feature Engineering: Create features such as moving averages, Bollinger Bands, and macroeconomic indicators.
   - Model Development: Train predictive models and fine-tune using hyperparameter tuning.
4. **Monitoring and Evaluation Phase**
   - Model Evaluation: Assess model performance using metrics like MAE, MSE, and RMSE.
   - Validation: Validate models using historical data and refine them for accuracy.
   - Dashboard Development: Build interactive dashboards for real-time visualization and insights.
   - Stakeholder Feedback: Gather feedback from stakeholders and incorporate it into the models and visualizations.
5. **Closure and Deployment Phase**
   - Model Deployment: Deploy predictive models for real-time index forecasting and monitoring.
   - Final Reporting: Generate comprehensive reports detailing insights, predictions, and recommendations.
   - Project Review: Conduct a post-project review to evaluate success, challenges, and opportunities for improvement.

Technologies used

The following is the technology stack of the project:

Task scheduling and Assessment:
Monday, Gantt charts

Data Collection:
NSE

Data Cleaning:
Excel, Python

Data Modelling:
Star UML, Draw.io, Canva

Data Analytics and Visualizations:
Python : Jupyter notebook,
Libraries: Numpy, Pandas, Matplotlib,
Scikit-learn, SciPy, Statsmodels

Dashboards:
Power BI

Documentation: Word
Presentation: Microsoft Power Point

Data Models

ER Diagram

The below is an ER diagram:

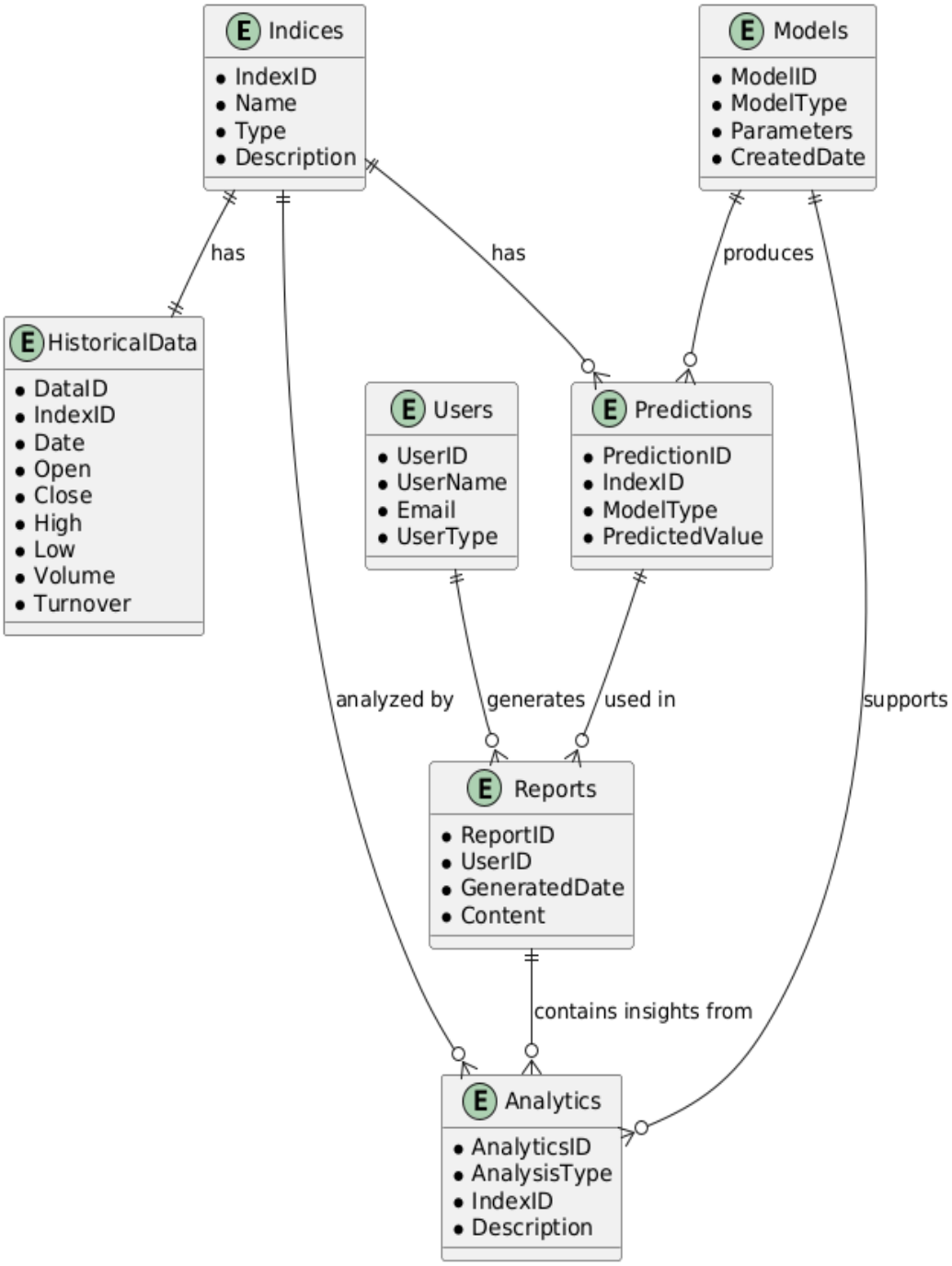


Fig: Activity diagram

Entities and Attributes

1. **Indices**
    - **Attributes:** Index ID, Name, Type, Description
    - Represents stock market indices like NIFTY 50 or sectoral indices.
    - Relationships:
        - Connected to **Historical Data** to associate stock index data.
        - Connected to **Analytics** to associate analysis on indices.
        - Connected to **Predictions** for model-based forecasts.
2. **Historical Data**
    - **Attributes:** DataID, IndexID, Date, Open, Close, High, Low, Volume, Turnover
    - Represents the historical stock market data for indices.
    - Relationships:
        - Linked to **Indices** through IndexID to specify the stock index it belongs to.
3. **Users**
    - **Attributes:** UserID, User Name, Email, User Type
    - Represents system users (e.g., analysts, administrators).
    - Relationships:
        - Generates **Reports**.
        - Analyzes **Analytics** insights.
4. **Models**
    - **Attributes:** ModelID, ModelType, Parameters, CreatedDate
    - Represents machine learning models used for stock market predictions.
    - Relationships:
        - Produces **Predictions**.

5. **Predictions**
    - **Attributes:** PredictionID, IndexID, ModelID, ModelType, PredictedValue
    - Stores predictions generated by models for stock indices.
    - Relationships:
        - Connected to **Indices** through IndexID.
        - Linked to **Models** for information about the prediction's source.
6. **Reports**
    - **Attributes:** ReportID, UserID, GeneratedDate, Content
    - Represents analysis reports generated by users.
    - Relationships:
        - Analyzed by **Users**.
        - Contains insights from **Analytics**.
7. **Analytics**
    - **Attributes:** AnalyticsID, AnalysisType, IndexID, Description
    - Represents detailed analysis results on stock indices.
    - Relationships:
        - Associated with **Indices** through IndexID.
        - Supports **Reports** with insights.

Relationships

1. **Indices ↔ HistoricalData**
    - Represents the association of stock indices with their historical data.
2. **Users ↔ Reports**
    - Indicates that users generate reports based on stock market data or analytics.
3. **Models ↔ Predictions**
    - Specifies that predictions are made using particular machine learning models.

4. **Analytics ↔ Reports**
    - Shows that reports contain insights from detailed analysis.
5. **Analytics ↔ Indices**
    - Represents the indices analyzed within the analytics process.
6. **Predictions ↔ Indices**
    - Indicates that predictions are made for specific indices.
7. **Reports ↔ Analytics**
    - Highlights that reports are based on insights derived from analytics.

Use Case

This diagram structures data for a system that:

1. Collects and stores stock market index data (Historical Data).
2. Allows analysts to perform predictive analysis using models.
3. Supports generating detailed analytics and reports for decision-making.
4. Offers insights to users for better stock market forecasting and evaluation.

Activity Diagram

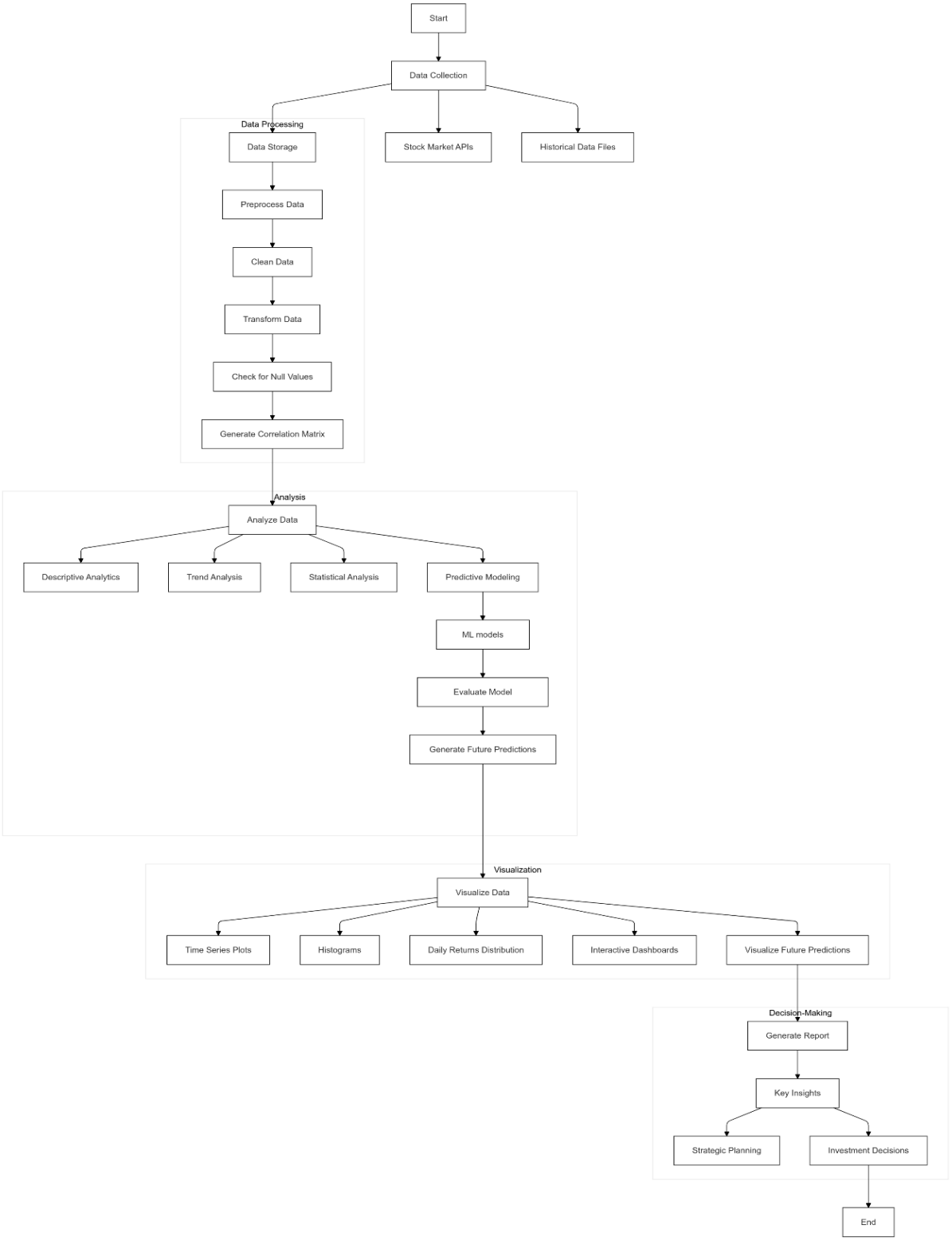


Fig: Activity diagram

The above diagram represents the Activity Diagram for NSE Indices analysis project. The below is a breakdown of the diagram:

- **Data Collection**

- Stock Market APIs: The project starts by obtaining real-time or historical data from Stock Market APIs such as NSE's official API.
- Historical Data Files: Additionally, you can use historical data files from various sources to expand your dataset.

- **Data Processing**

- Data Storage: Data is stored in a suitable format for efficient analysis and manipulation.
- Preprocess Data: The raw data undergoes preprocessing steps like cleaning, normalization, and transformation to ensure consistency and accuracy.
- Clean Data: This involves handling missing values, outliers, and inconsistencies in the data.
- Transform Data: Depending on the analysis requirements, you may need to transform data into different formats or representations.
- Check for Null Values: Identify and handle any missing data points.
- Perform EDA
- Generate Correlation Matrix: Calculate the correlation between different indices to understand their relationships.

- **Analysis**

- Analyse Data: The processed data is analysed to extract valuable insights.
- Descriptive Analytics: This involves summarizing data using measures like mean, median, standard deviation, etc.
- Trend Analysis: Identifying patterns and trends in the data, such as long-term growth, seasonality, or cyclical movements.
- Statistical Analysis: Performing statistical tests to identify relationships, correlations, and significances between various variables.

- Feature Engineering (Moving averages, RSI, Bollingers bands, etc. with visualizations to understand relationship between variables).
- Predictive Modelling: Developing predictive models to forecast future index movements.
- ML model selection and training: This involves using machine learning models and algorithms to train predictive models.
- Evaluate Model: Evaluating the performance of the model using suitable metrics to assess its accuracy and reliability.
- Generate Future Predictions: Using the trained model to predict future index movements.
- Hyperparameter Tuning and Forecasting.
- Model deployment

➢ **Visualization**

- Visualize Data: Presenting the analysis findings and predictions in a clear and understandable way through visualizations.
- Time Series Plots: Visualizing the historical data to show trends and patterns.
- Histograms: Representing the distribution of various data variables.
- Daily Returns Distribution: Visualizing the distribution of daily returns to understand volatility.
- Interactive Dashboards: Creating interactive dashboards for dynamic exploration of the data and analysis results.
- Visualize Future Predictions: Generating visualizations to predicted future movements of the indices to provide stakeholders with insights into potential market trends.

➢ **Decision Making**

- Generate Reports: Compiling the analysis results, visualizations, and predictions into comprehensive reports for stakeholders.
- Key Insights: Providing actionable insights based on the analysis to help stakeholders make informed investment decisions.
- Strategic Planning: Utilizing the insights to make informed decisions about future investments.

- Investment Decisions: Implementing investment strategies based on the analysis. Utilizing the insights to make informed decisions about future investments.

Use Case diagram

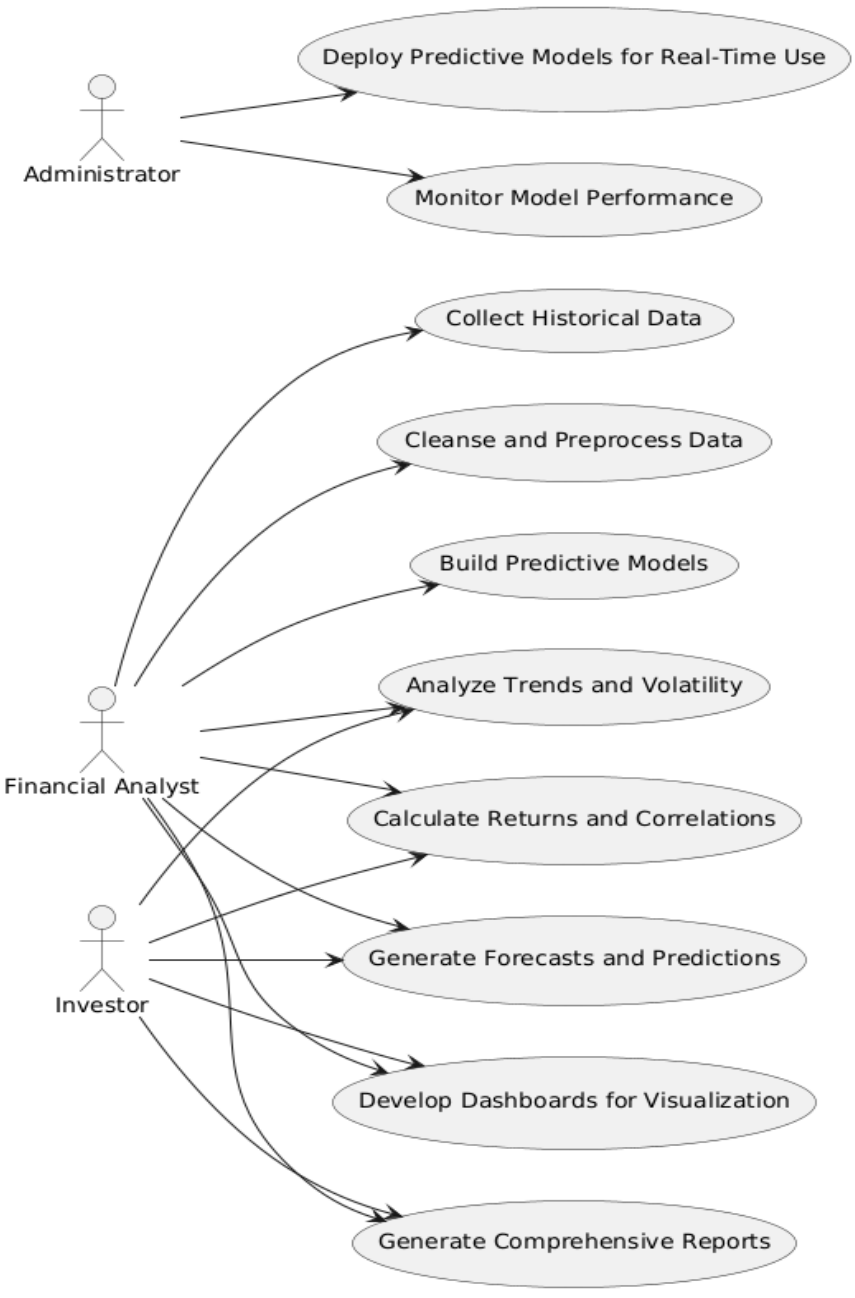


Fig: Use Case diagram

The above Use Case diagram for NSE indices analysis illustrates interactions between three key actors: Administrator, Financial Analyst, Investor and the corresponding system functionalities.

Actors and Their Roles:

1. **Administrator**:
    - **Deploy Predictive Models for Real-Time Use**: The administrator is responsible for deploying models to analyse NSE indices in real-time, ensuring seamless operation.
    - **Monitor Model Performance**: They monitor the performance and accuracy of models, adjusting parameters or retraining as needed.
2. **Financial Analyst**:
    - **Collect Historical Data**: Analysts retrieve past stock data to perform analysis and build trends.
    - **Cleanse and Preprocess Data**: They prepare data by removing outliers or handling missing values for accurate modelling.
    - **Build Predictive Models**: Analysts create models to predict future market trends based on historical data.
    - **Analyse Trends and Volatility**: They evaluate stock performance and volatility to provide actionable insights.
    - **Calculate Returns and Correlations**: They compute metrics like returns and correlations between indices to guide investment strategies.
3. **Investor**:
    - **Generate Forecasts and Predictions**: Investors use system-generated forecasts to make informed decisions.
    - **Develop Dashboards for Visualization**: They access interactive dashboards that visualize stock trends and market behaviour.
    - **Generate Comprehensive Reports**: Reports are generated to summarize analysis, aiding in decision-making.

System Functions:

- **Core Data Processing**:
    - Historical data collection, cleaning, and preprocessing enable accurate insights.
    - Predictive models analyse patterns, aiding trend and volatility studies.

- **Visualization and Reporting**:
    - Dashboards and reports help investors understand market dynamics effectively.
- **Real-Time Decision Making**:
    - Predictive models deployed by administrators provide insights in real-time, crucial for dynamic markets like NSE.

Process Flows

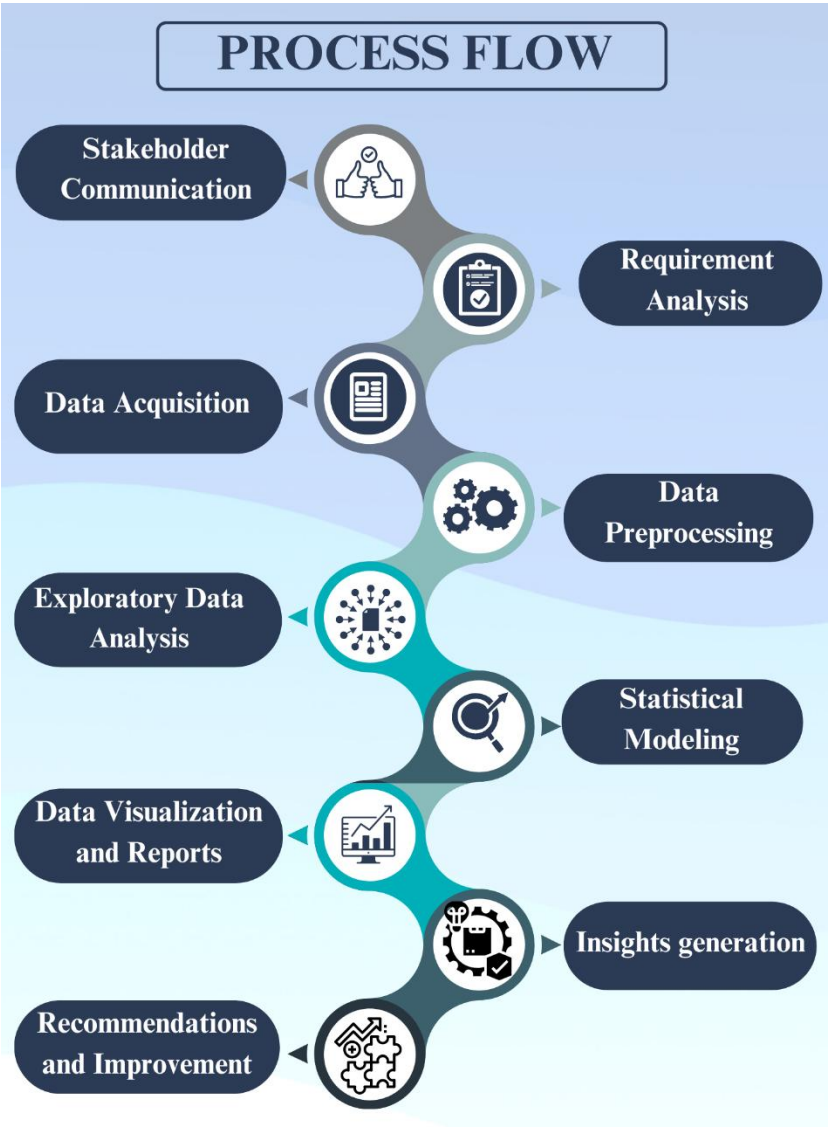


Fig: Process flow diagram

Stakeholder Communication

- Engaging with stakeholders to understand project objectives, requirements, and constraints.
- Ensures alignment between the project team and stakeholders for clear expectations and priorities.

Requirement Analysis

- Gathering and analysing the specific requirements for the analysis or solution to be developed.

Data Acquisition

- Collecting data from various sources, including data from websites, APIs, and reports.
- Lays the foundation for analysis by ensuring the availability of relevant and sufficient data.

Data Preprocessing

- Cleaning, transforming, and organizing raw data into a usable format.
- Improves data quality by handling missing values, duplicates, and inconsistencies, making it ready for analysis.

Exploratory Data Analysis (EDA)

- Conducting preliminary analyses to uncover patterns, trends, and insights.
- Provides a deeper understanding of the data, enabling informed decisions for statistical modelling.

Statistical Modelling

- Applying statistical methods and algorithms to model the data and identify relationships.
- Builds a foundation for predictions, forecasts, and generating actionable insights.

Data Visualization and Reports

- Creating graphs, charts, and dashboards to represent data findings visually.
- Enhances understanding and communication of insights to stakeholders, enabling data-driven decisions.

Insights Generation

- Deriving actionable conclusions from the analysis and visualizations.
- Translates raw data and models into meaningful information for strategic planning.

Recommendations and Improvement

- Providing actionable recommendations based on the insights and identifying areas for improvement.
- Drives continuous improvement, helping stakeholders make informed, strategic decisions for future success.

System Architecture

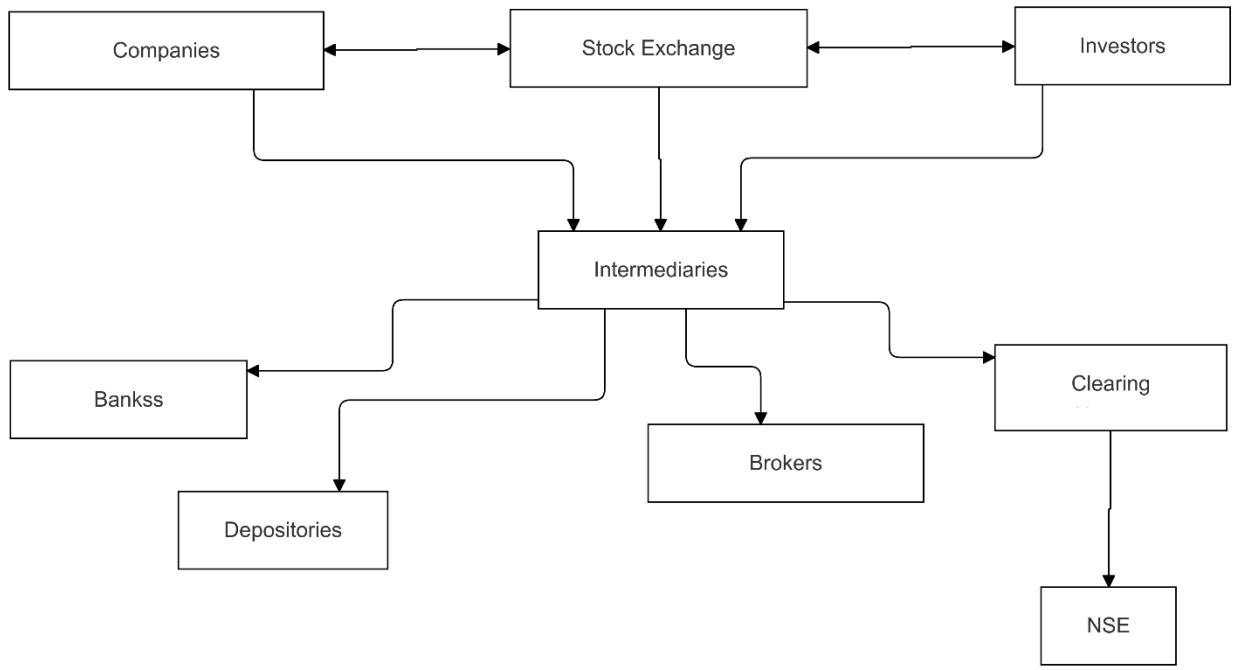


Fig: System Architecture

This diagram demonstrates the complex network of participants and processes involved in a stock exchange.

Participants:

- **Companies:** Issue stocks to raise capital.
- **Investors:** Purchase stocks for investment purposes.
- **Stock Exchange:** A platform where stocks are traded.
- **Intermediaries:** Facilitate transactions between buyers and sellers.
- **Brokers:** Act as agents for investors, executing trades.
- **Banks:** Provide financial services to companies and investors.
- **Depositories:** Hold and manage stocks for investors.
- **Clearing:** Ensures the settlement of trades.
- **NSE:** National Stock Exchange of India.

Flow of transactions:

1. **Companies** issue stocks to raise capital.
2. **Investors** purchase these stocks through **brokers**.
3. **Brokers** execute trades on the **Stock Exchange** through **intermediaries**.
4. **Clearing** ensures the settlement of trades, and **depositories** hold the stocks.
5. **NSE** acts as the central clearinghouse for transactions.

Dataset

For the project we collected data of 6 years for all the 9 indices from the NSE official website.

The historical data for the years 01-11-2018-to-31-10-2024 is collected on 25-10-2024.

The dataset contains the following columns for all the 9 indices dataset:

1. **Date**: The trading date for the index values.
2. **Open**: The opening value of the index on that date.
3. **High**: The highest value the index reached on that date.
4. **Low**: The lowest value the index dropped to on that date.

5. **Close**: The closing value of the index on that date.
6. **Shares Traded**: The total number of shares traded on that date (possibly across all constituents of the index).
7. **Turnover (₹ Cr)**: The total monetary value of shares traded on that date, expressed in crores of Indian Rupees.

Data Preprocessing

Data preprocessing is a critical step in the data analysis that ensures raw data is transformed into a usable format. It typically involves:

- **Handling Missing Values**:

  Imputed missing data using forward/backward filling for time-series continuity or replaced with mean/median values where appropriate to ensure completeness.

- **Data Transformation**:

  Applied scaling techniques (normalization/standardization) to bring features like prices, turnover, and shares traded to a comparable scale for analysis.

- **Data Integration**:

  Merged datasets for nine indices over six years into a unified structure, ensuring consistency across columns like Date, Open, High, Low, Close, Shares Traded, and Turnover for comprehensive analysis.

Data Cleaning

Data cleaning focuses on identifying and correcting inaccuracies or inconsistencies in the dataset. Key steps include:

- **Removing Duplicates**:

  Eliminated duplicate rows based on key columns (Date, Index Name) to maintain data accuracy and avoid inflated metrics.

- **Fixing Errors**:

  Corrected inconsistencies in prices (e.g., Close > High) and resolved missing or invalid entries for key columns like turnover and shares traded.

- **Standardizing Formats (Date: DD-MM-YYYY)**:

  Converted all dates to a uniform DD-MM-YYYY format for consistency and proper chronological sorting in time-series analysis.

Exploratory Data Analysis (EDA)

- ### Summary statistics

Summary statistics provide overview of the data, offering insights into its central tendency, dispersion, and distribution. These metrics are essential for understanding the characteristics of the indices before conducting analysis.

Central Tendency: Compute mean, median, and mode of metrics like index prices, shares traded, and turnover to understand typical values.

Dispersion: Analyze standard deviation, variance, and range to assess the volatility and variability of the indices.

Distribution: Check for skewness and kurtosis to evaluate the symmetry and peakedness of the data distribution.

Calculate the average daily closing price of NIFTY 50 over six years.

- ### Feature Engineering

Feature Engineering (Scaling)

Purpose: Prepares data for unbiased analysis by normalizing differences in scale.

Scaling Techniques Used:

Normalization (Min-Max Scaling): Scales values between 0 and 1 (e.g., index prices).

Application in Project:

Scaled index prices, trading volumes, and turnovers to ensure comparability.

Enabled accurate correlation analysis and preparation for modelling.

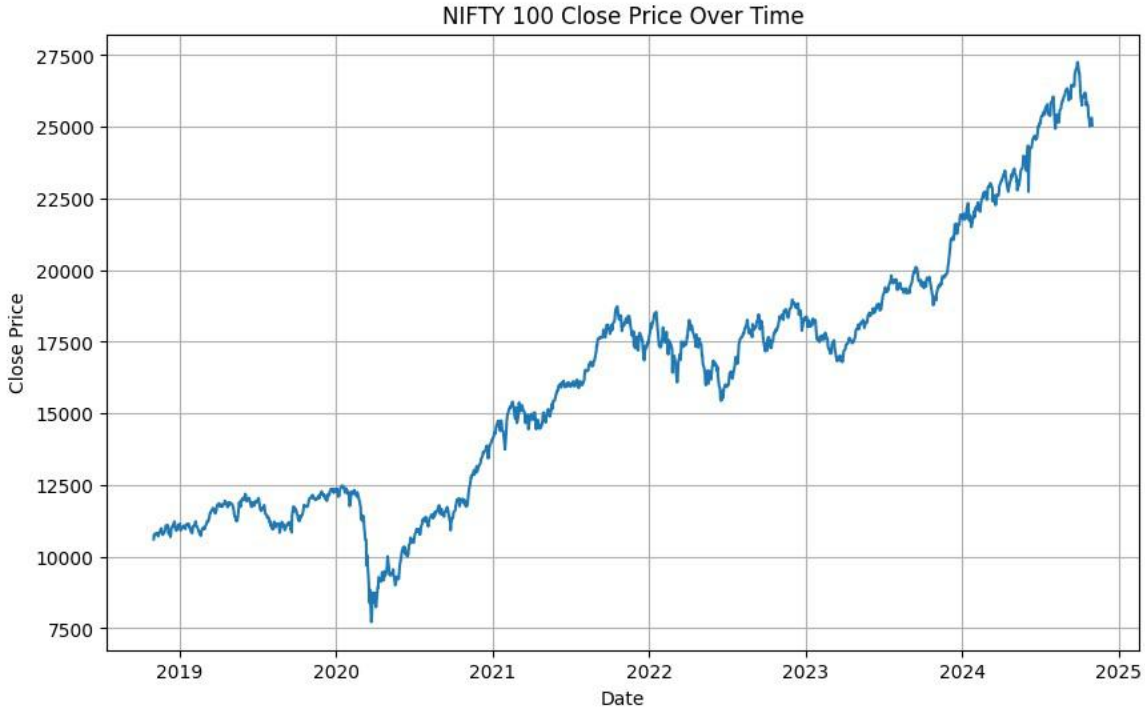
Importance

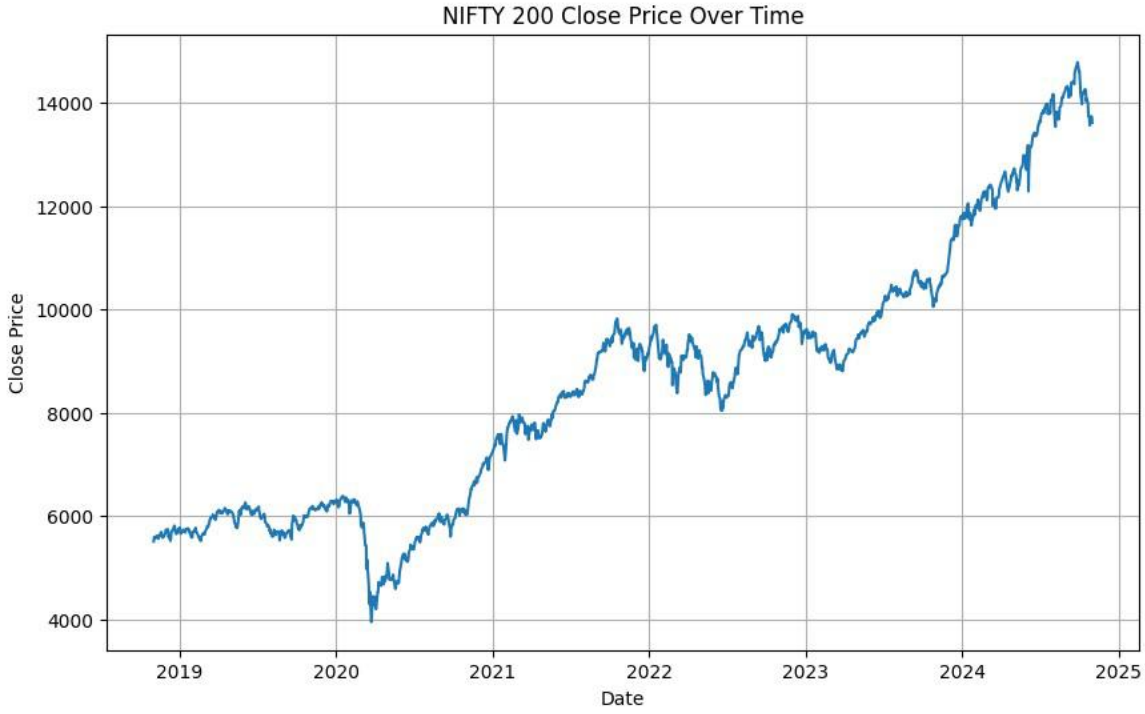
Summary statistics identified trends and outliers in index performance.

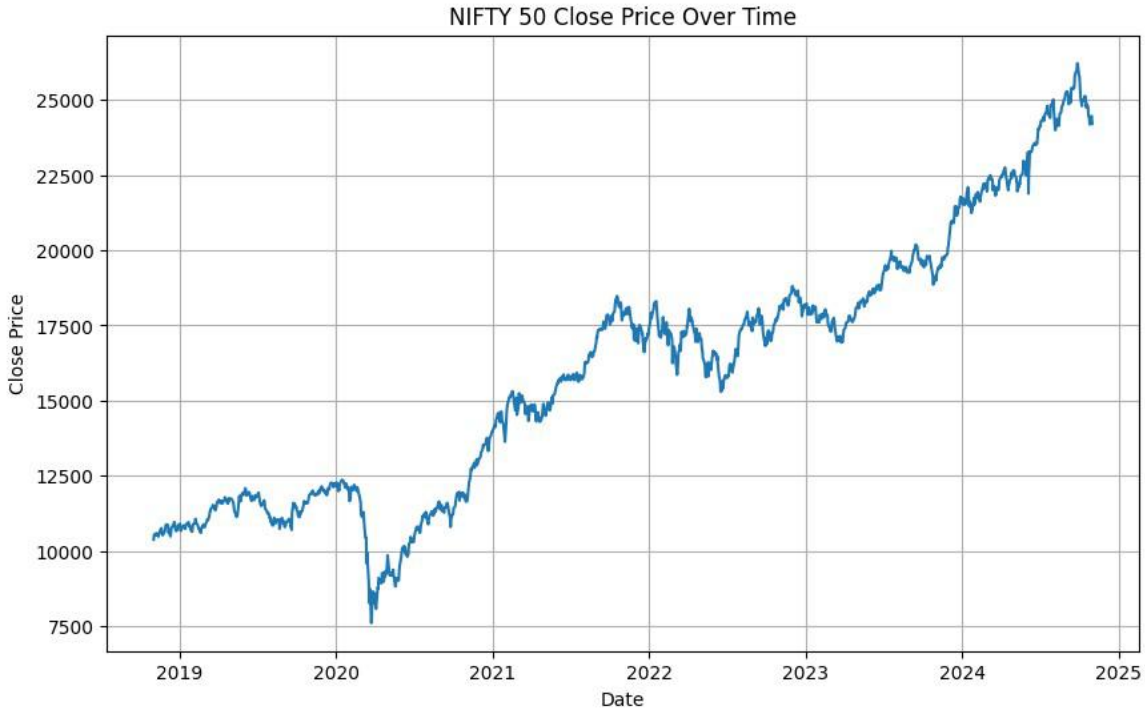
Scaling ensured data consistency for inter-index correlation analysis and modelling.

- **Identifying Trends in Close Price Column**

The following are the Close Price column trends for 9 indices






NIFTY 50 Close Price Over Time
Close Price
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15000
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2019
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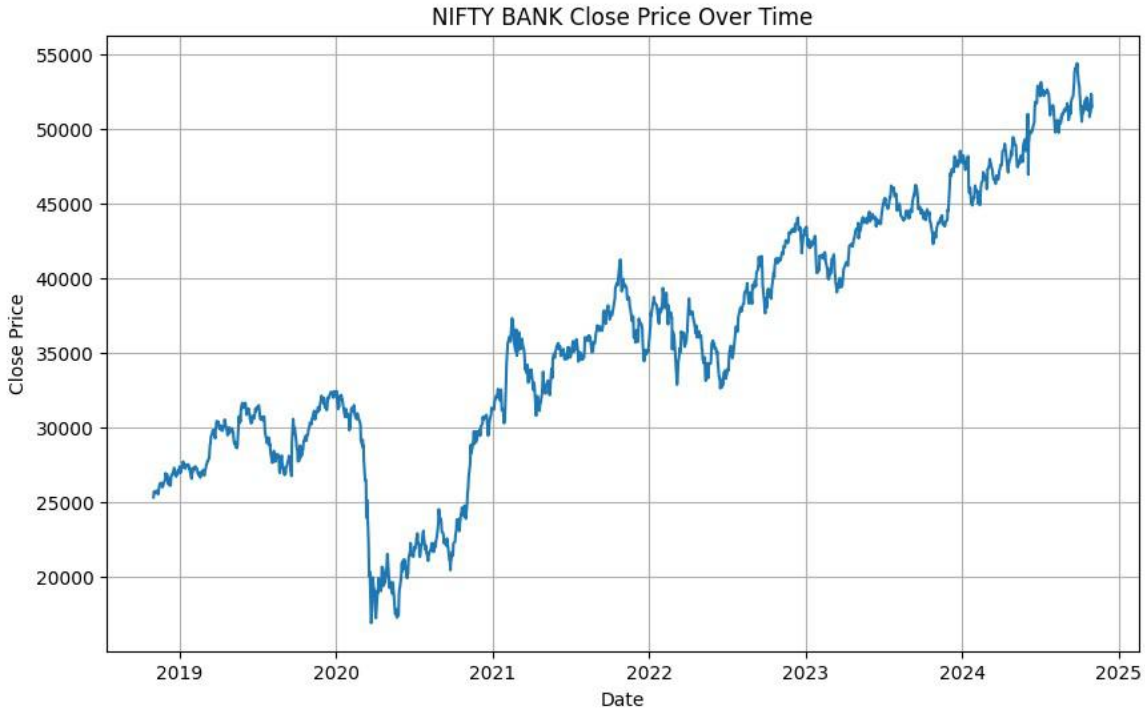
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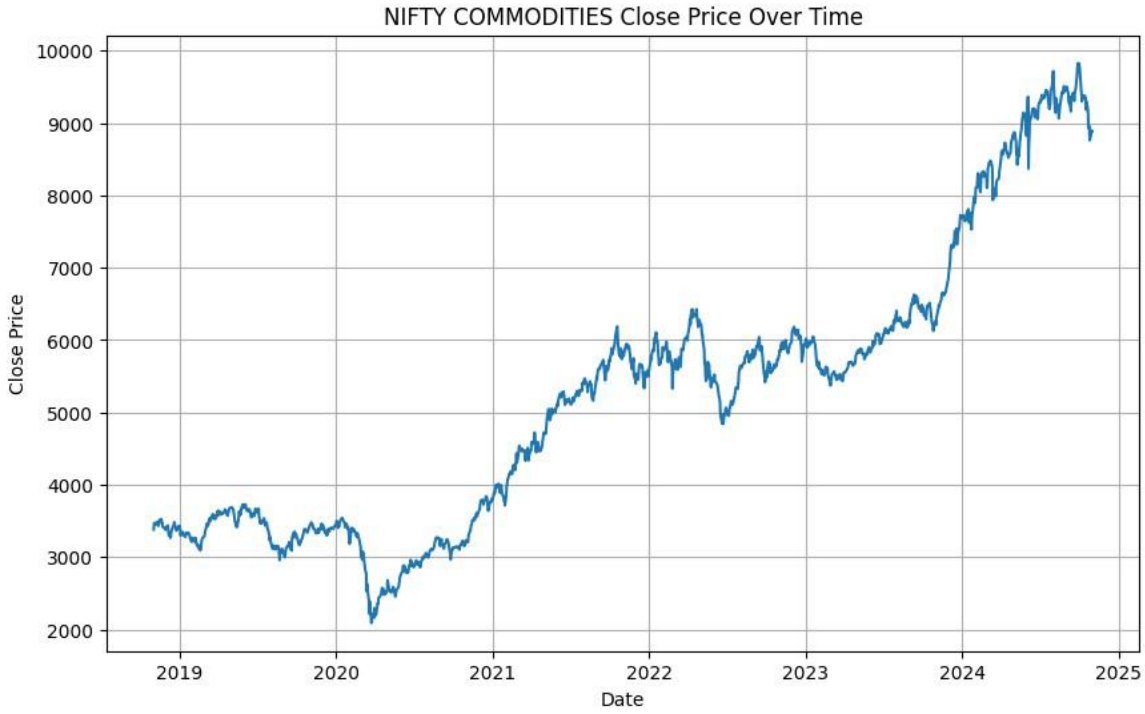
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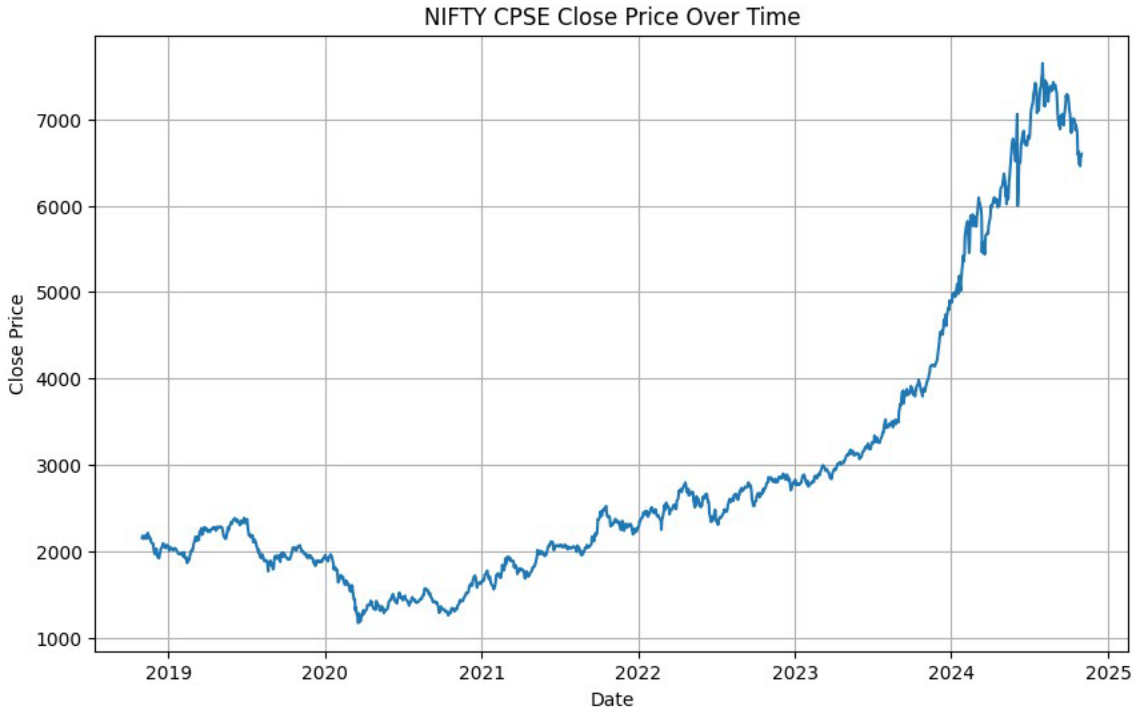
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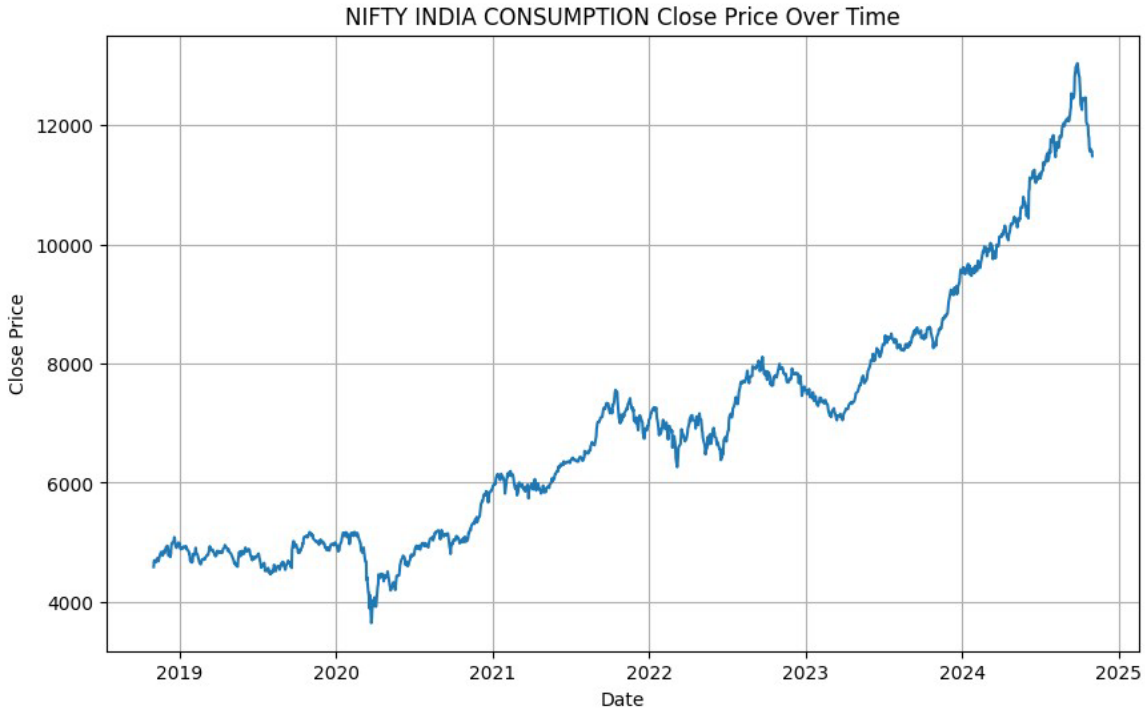
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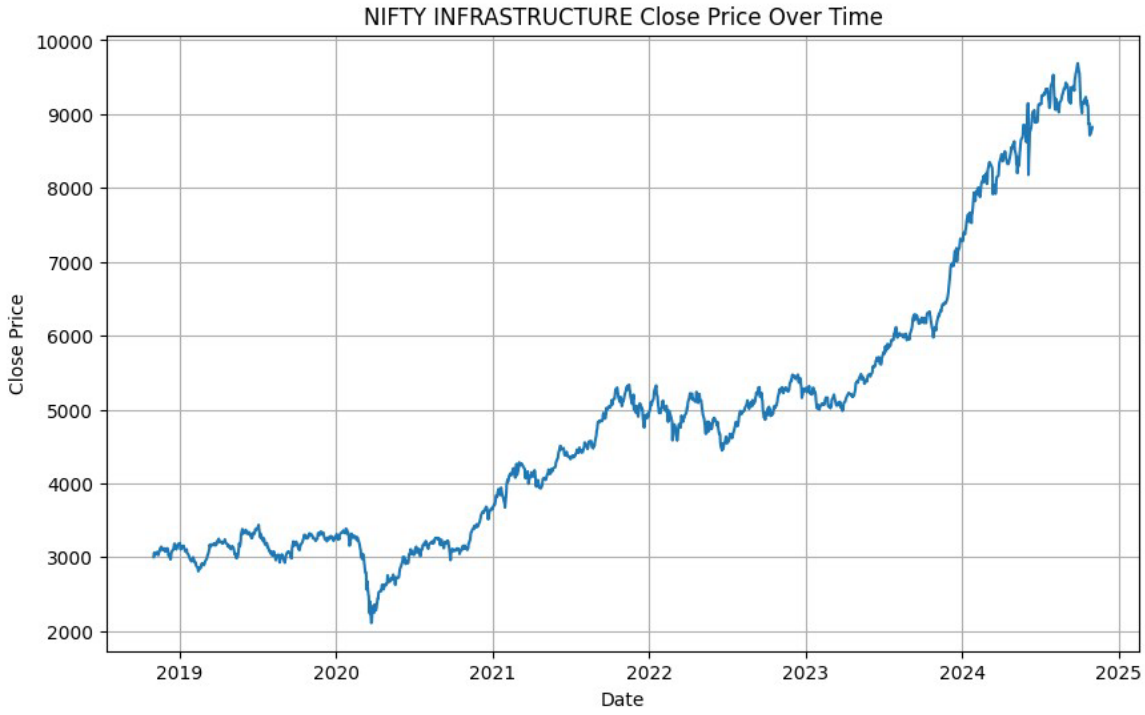
NIFTY INFRASTRUCTURE Close Price Over Time
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10000
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2019
2020
2021
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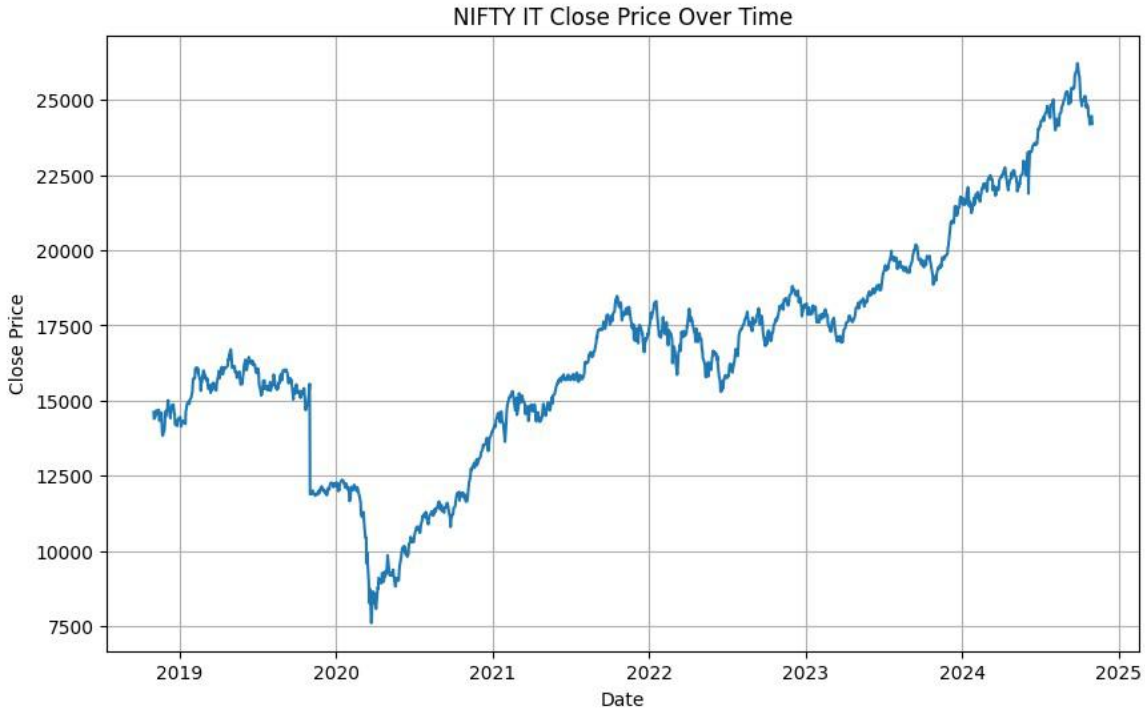
Date



Considering all the graphs collectively, the overall interpretation is that the indices exhibit cyclical trends with alternating periods of growth (peaks) and decline (troughs). The peaks represent moments of maximum performance or upward momentum, while the troughs indicate periods of contraction or reduced performance.

This cyclical pattern suggests that the indices are influenced by recurring phases of expansion and contraction, which could be driven by internal market dynamics, investor sentiment, or natural market corrections. The consistent presence of peaks and troughs across all graphs implies that no index is in a perpetual state of growth or decline, and each follows a wave-like pattern over time.

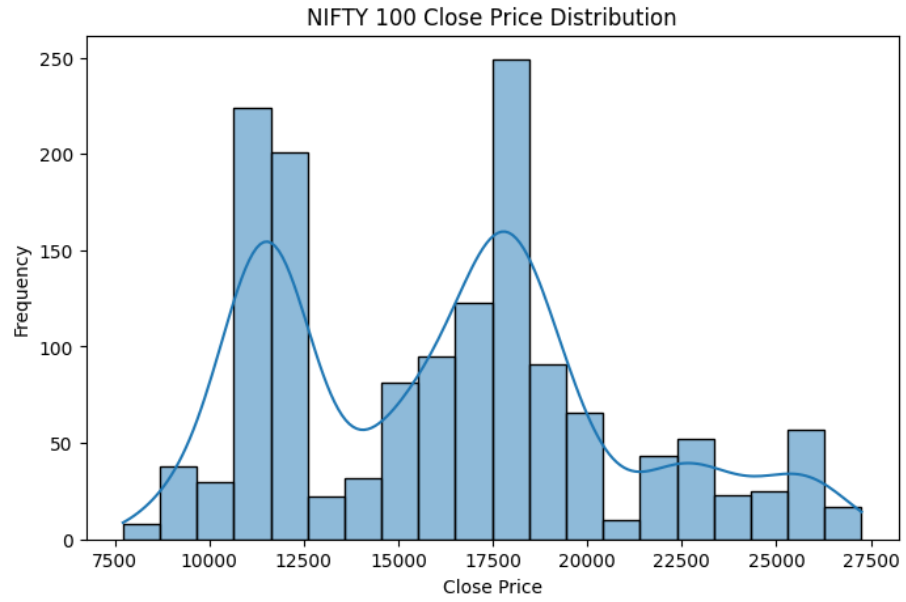
In summary, the graphs collectively depict a wave-like cyclical behavior, where periods of growth are followed by declines, and vice versa, reflecting the inherent volatility and dynamic nature of the indices.

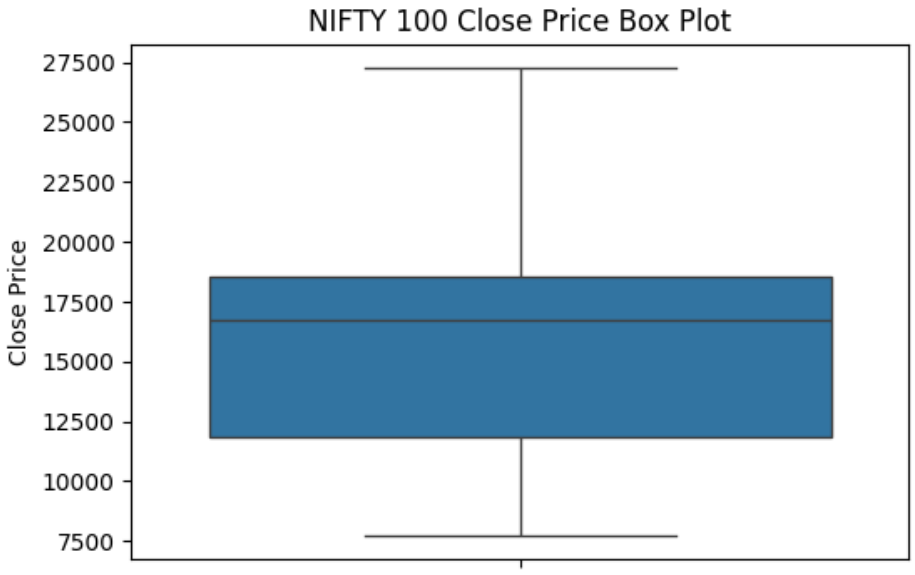
Real-World Considerations:

1. **Economic Growth and Market Performance**: Peaks in the indices may correspond to periods of economic expansion, increased investor confidence, or favourable market conditions. For example, a peak in a stock market index could reflect a bull market, driven by strong corporate earnings, low interest rates, or positive economic indicators like GDP growth.
2. **Sector-Specific Trends**: Different indices may represent different sectors (e.g., technology, healthcare, energy). Peaks in these graphs could indicate sector-specific booms, such as a surge in technology stocks due to innovation or increased demand for healthcare services during a pandemic.
3. **Global Events**: Peaks and troughs can also be influenced by global events. For instance, a peak might coincide with a period of geopolitical stability or a major technological breakthrough, while a trough could reflect economic recessions, political instability, or global crises like the COVID-19 pandemic.
4. **Investor Behaviour**: Market sentiment and investor behaviour play a crucial role in index performance. Peaks may result from speculative buying or herd behaviour, while troughs could be caused by panic selling or risk aversion.
5. **Policy Changes**: Government policies, such as changes in interest rates, tax reforms, or stimulus packages, can significantly impact index performance. A peak might follow a favourable policy announcement, while a trough could result from restrictive measures.

Visualizing and detecting outliers

NIFTY 100



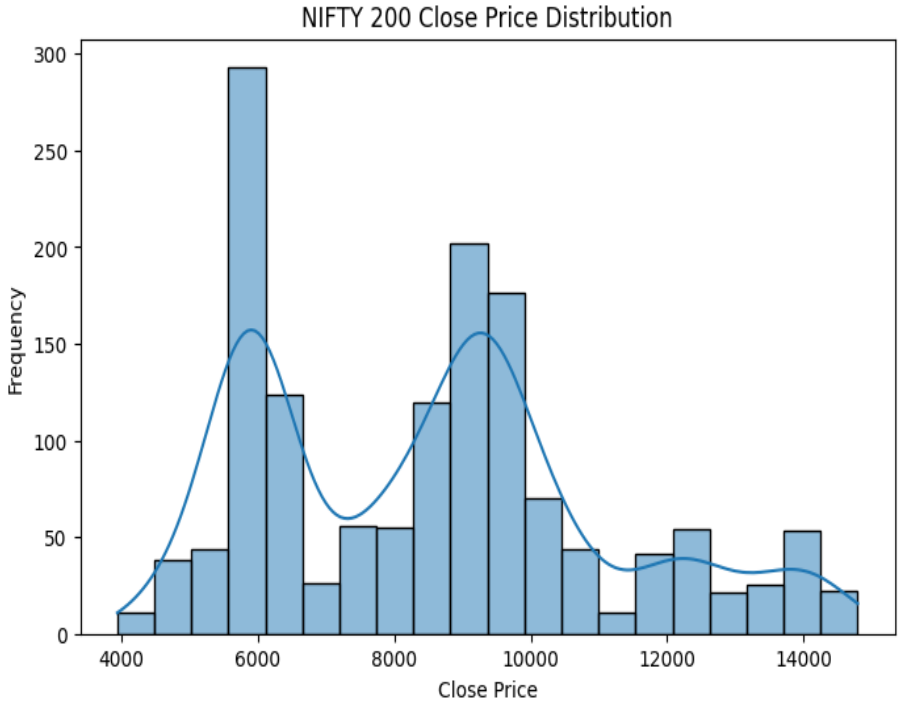


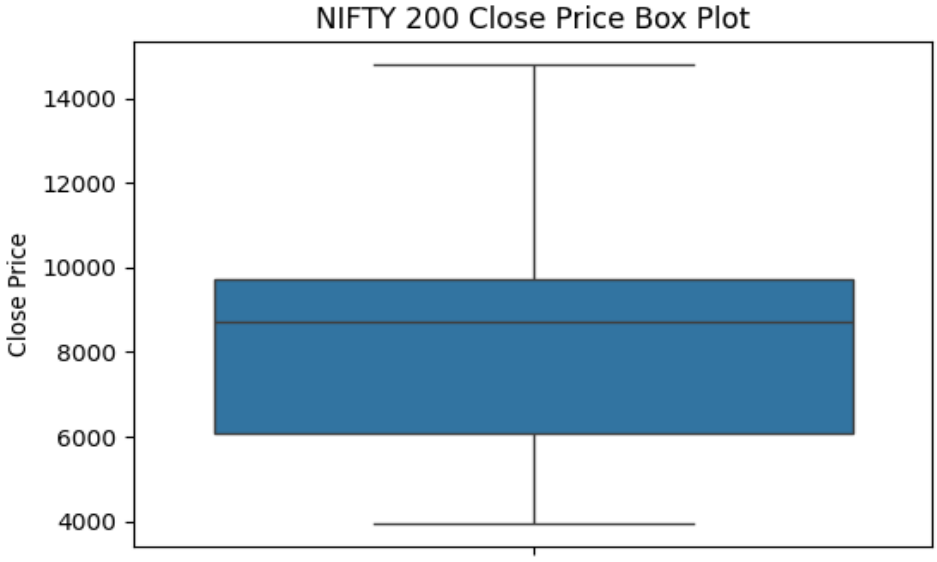
INTERPRETATION

Histogram: The histogram shows the distribution of NIFTY 100 values, with most data points clustered around the mean, indicating a normal distribution with some skewness.

Boxplot: The boxplot reveals potential outliers, represented by points outside the whiskers, suggesting extreme values or anomalies in the index performance.

NIFTY 200



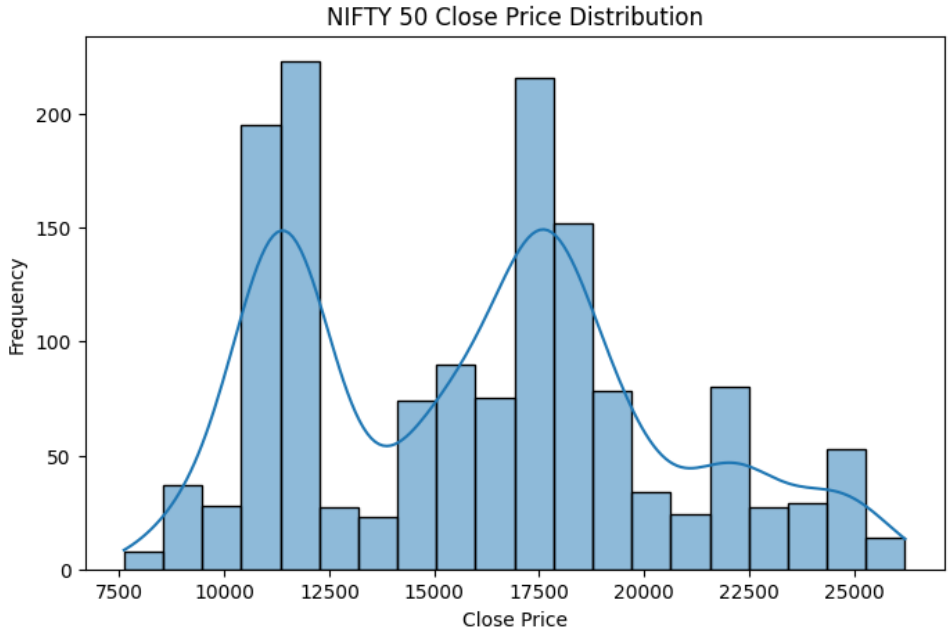


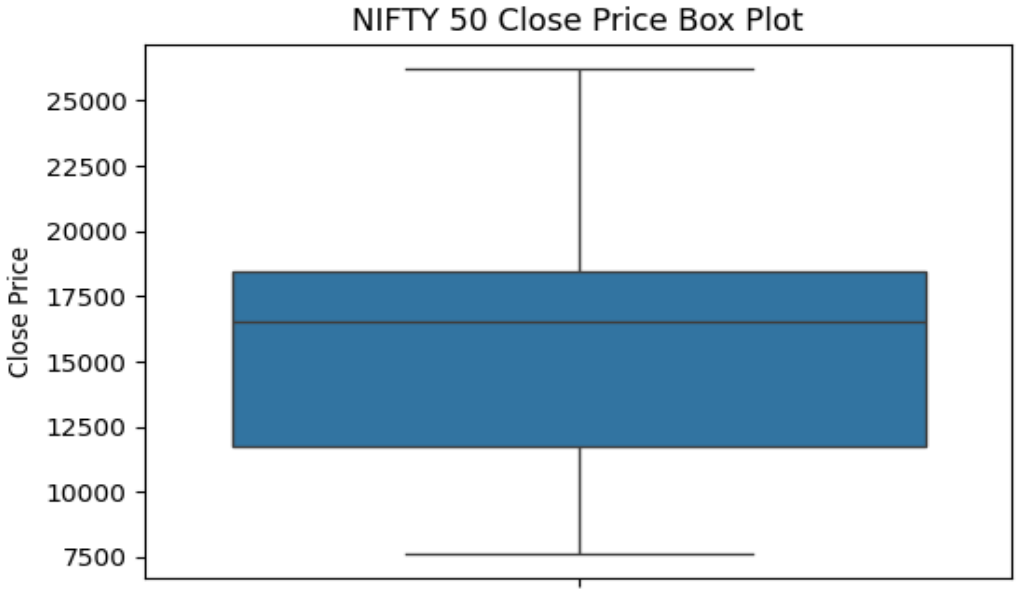
INTERPRETATION

Histogram: The histogram displays a slightly skewed distribution, with a concentration of values on one side, indicating periods of consistent performance.

Boxplot: The boxplot highlights a few outliers, which could represent unusual market movements or external shocks affecting the index.

NIFTY 50



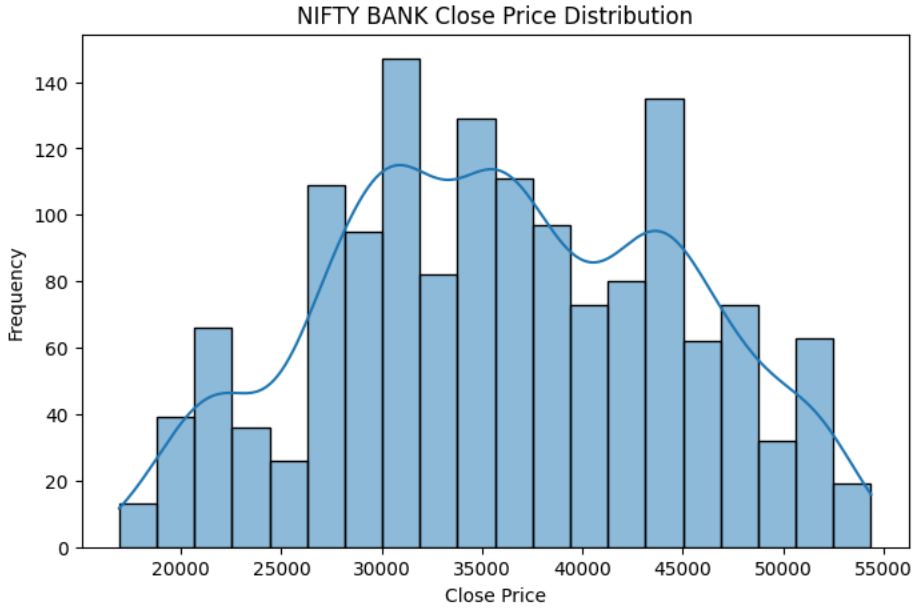


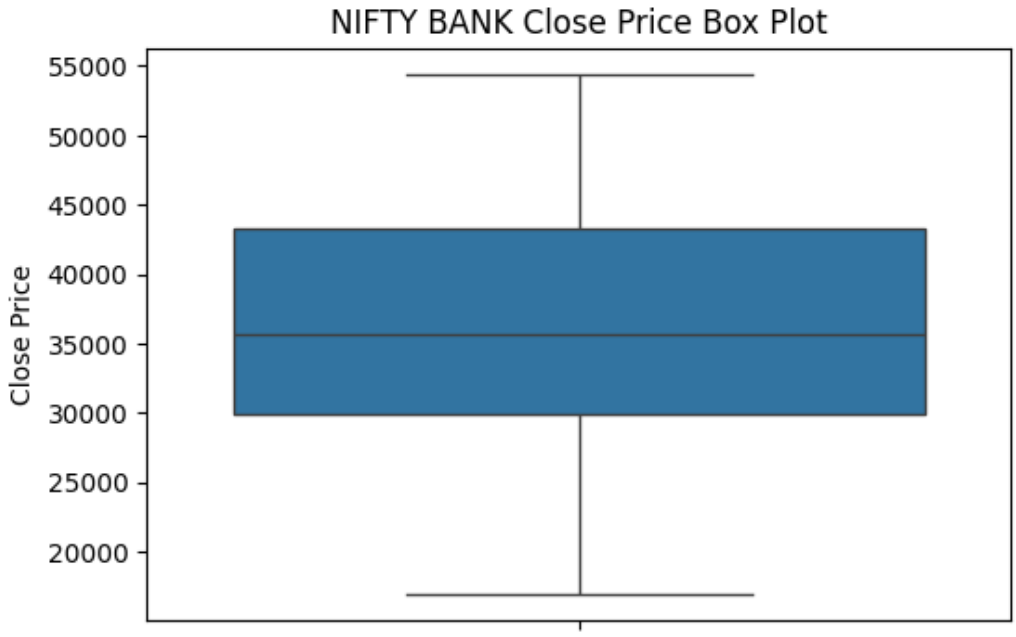
INTERPRETATION

Histogram: The histogram shows a relatively symmetric distribution, suggesting stable performance with occasional deviations.

Boxplot: The boxplot identifies outliers, which may correspond to extreme market events or sudden shifts in investor sentiment.

NIFTY BANK



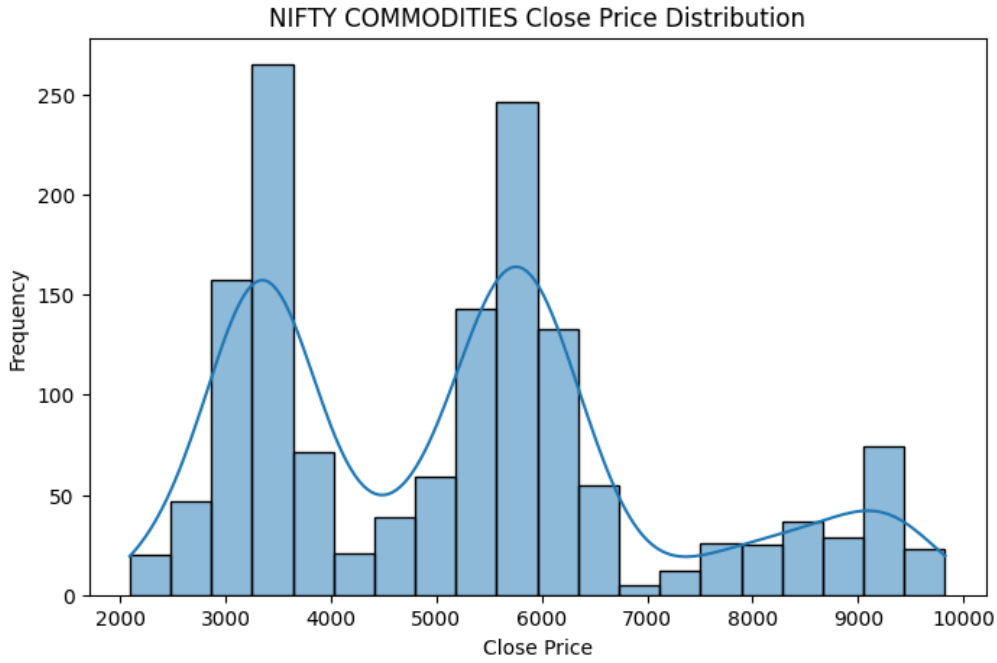


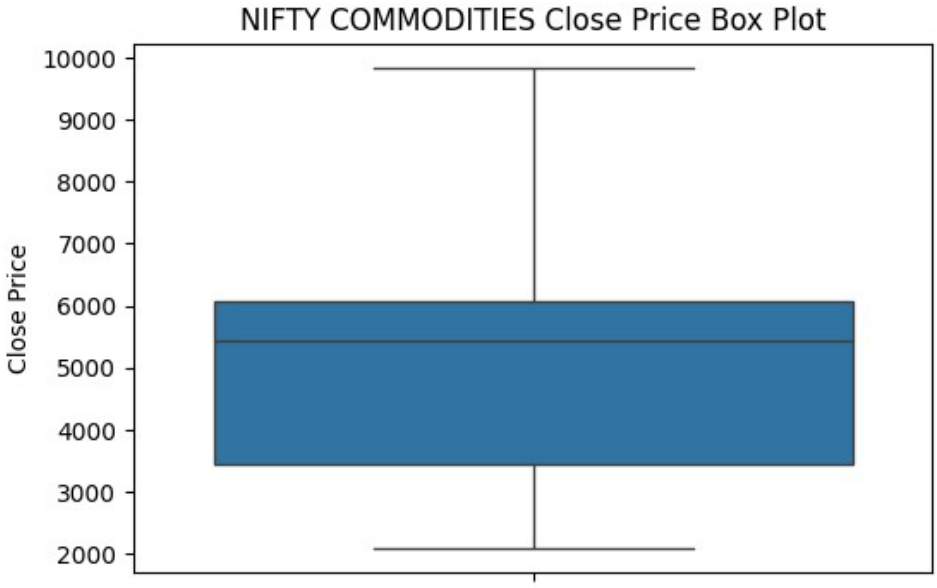
INTERPRETATION

Histogram: The histogram reveals a right-skewed distribution, indicating more frequent lower values with occasional high peaks.

Boxplot: The boxplot shows outliers on the higher end, reflecting periods of exceptional performance or volatility in the banking sector.

NIFTY COMMODITIES



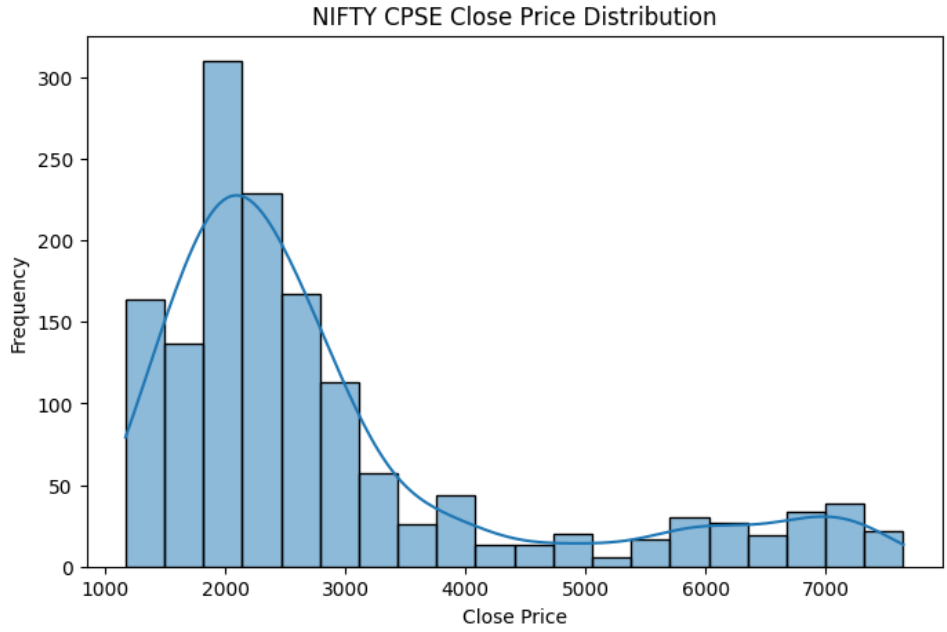


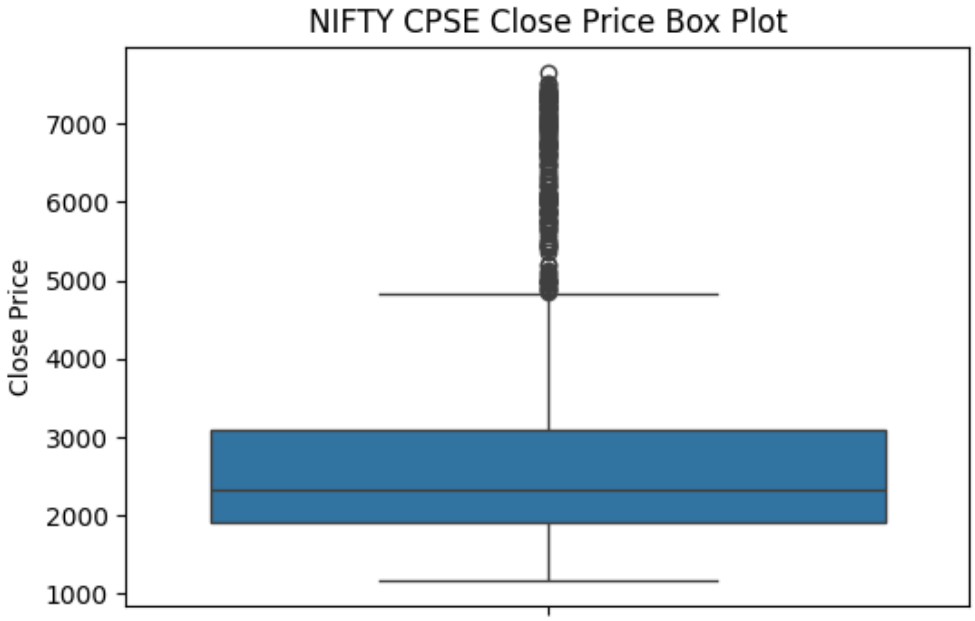
INTERPRETATION

Histogram: The histogram displays a wide spread of values, suggesting high variability in commodity prices over time.

Boxplot: The boxplot identifies several outliers, likely due to sharp price fluctuations in the commodities market.

NIFTY CPSE



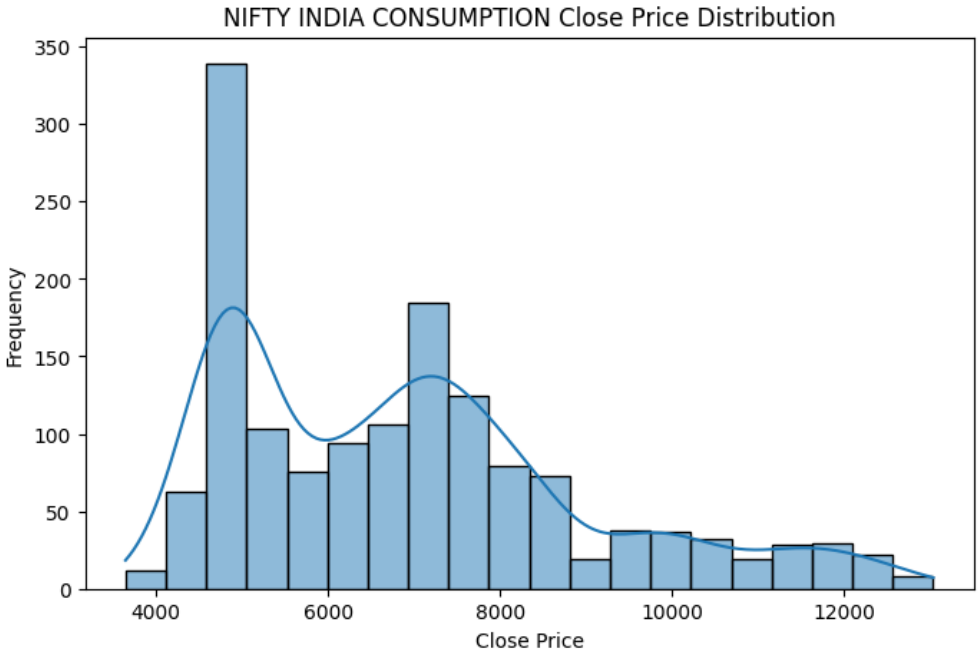


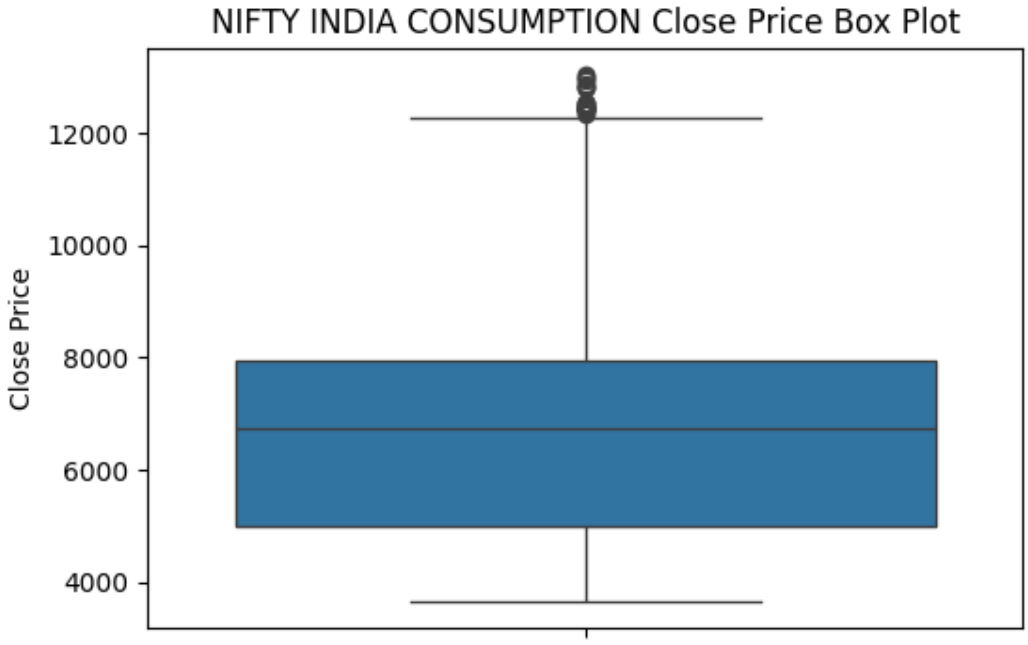
INTERPRETATION

Histogram: The histogram shows a left-skewed distribution, with most values concentrated on the higher side, indicating stable performance with occasional dips.

Boxplot: The boxplot reveals outliers on the lower end, possibly reflecting underperformance or external pressures on public sector enterprises.

NIFTY INDIA CONSUMPTION



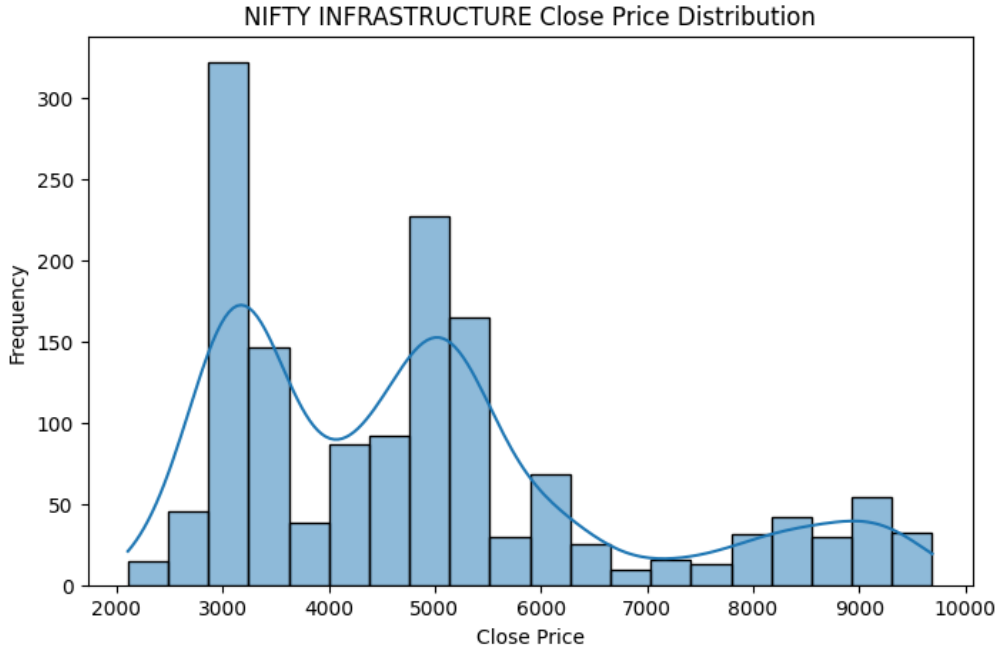


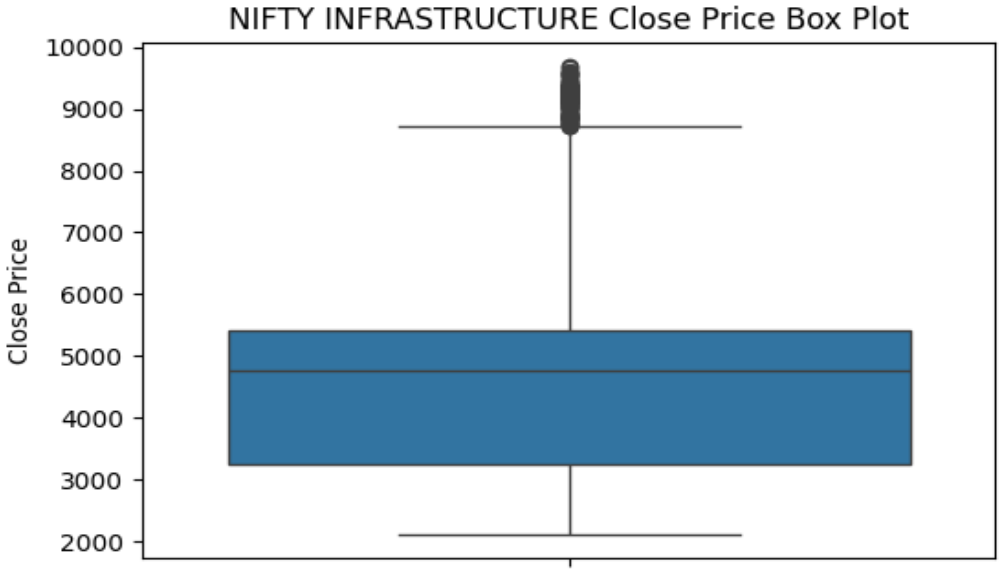
INTERPRETATION

Histogram: The histogram indicates a normal distribution with a slight skew, reflecting steady consumption trends with occasional spikes.

Boxplot: The boxplot shows a few outliers, which may correspond to periods of heightened consumer activity or economic shifts.

NIFTY INFRASTRUCTURE



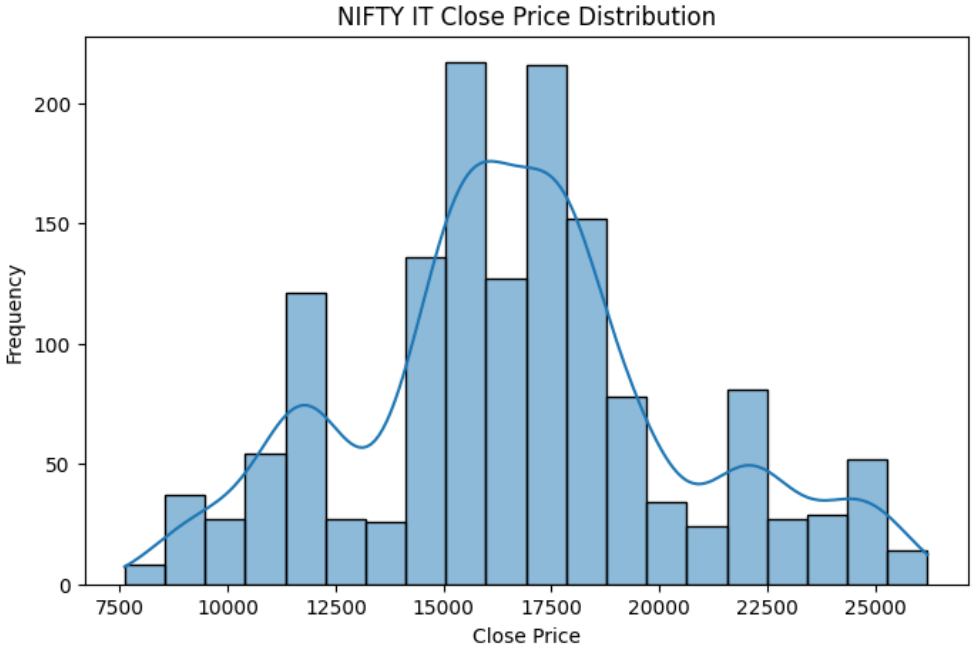


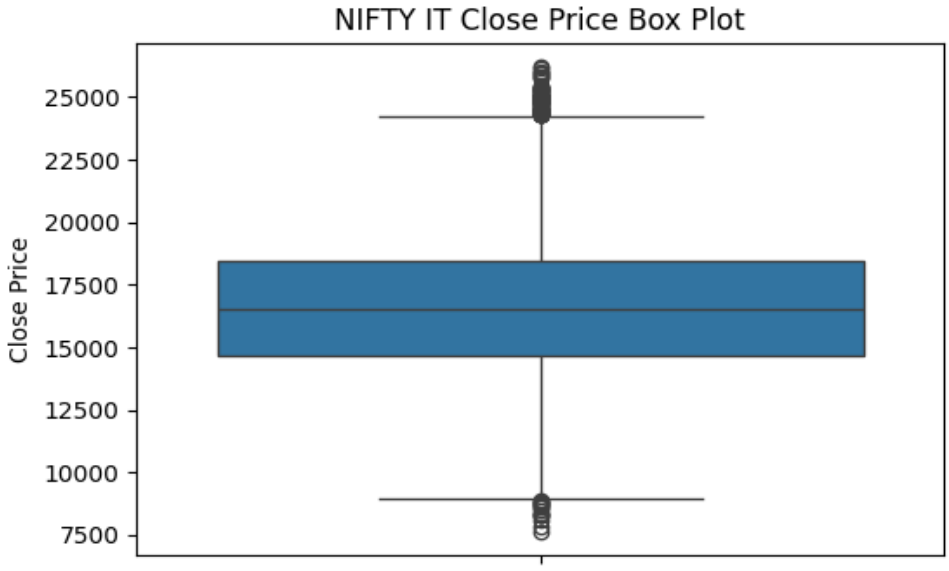
INTERPRETATION

Histogram: The histogram displays a bimodal distribution, suggesting two distinct phases of performance in the infrastructure sector.

Boxplot: The boxplot identifies outliers, likely due to significant policy changes or large-scale projects impacting the sector.

NIFTY IT



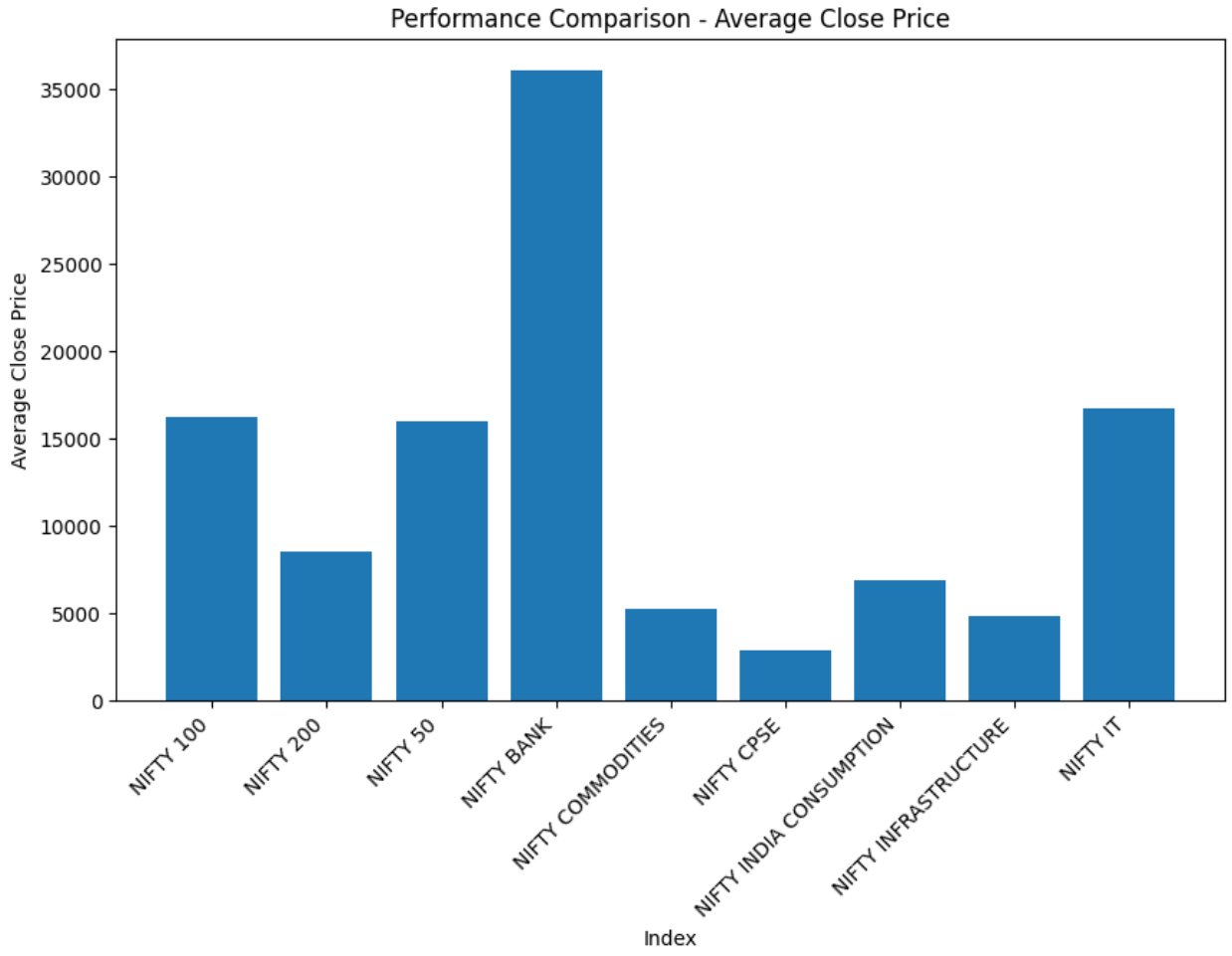


INTERPRETATION

Histogram: The histogram shows a right-skewed distribution, indicating frequent moderate performance with occasional high-growth periods.

Boxplot: The boxplot reveals outliers on the higher end, reflecting exceptional growth or volatility in the IT sector.

PERFORMANCE COMPARISION OF AVERAGE CLOSE PRICE



Key Observations:

1. **NIFTY Bank**:
   - Clearly outperforms other indices with the highest average closing price, indicating its dominant performance in terms of value.
   - Reflects the strong valuation and activity within the banking sector.
2. **NIFTY IT**:
   - Positioned as the second-highest, showing consistent growth in the IT sector and its contribution to the market.
3. **NIFTY 50 and NIFTY 100**:
   - These broad market indices have moderate average closing prices, indicating their balanced representation of large-cap companies.
4. **Sectoral Indices (e.g., NIFTY CPSE, NIFTY India Consumption, NIFTY Commodities)**:
   - Comparatively lower average closing prices, suggesting lower valuation or representation of stocks in these sectors during the observed period.

Correlation plots

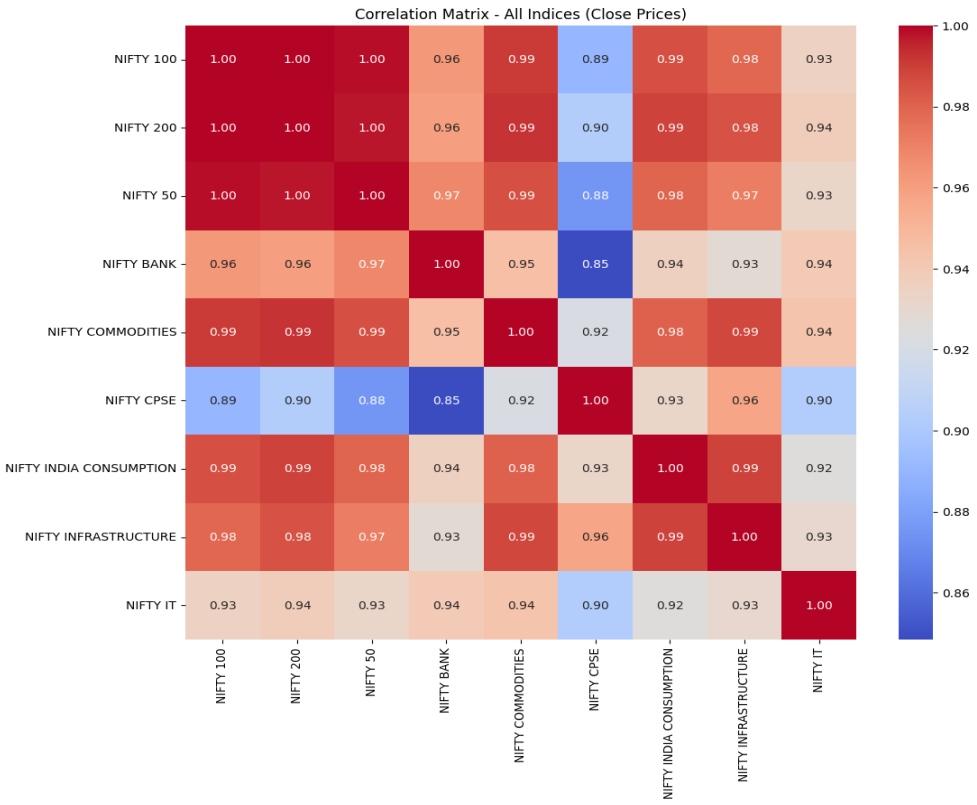


Fig: Indices Correlation Matrix

Strong Market Dependency:

- NIFTY 100, NIFTY 200, and NIFTY 50 are highly correlated (~1.00), reflecting their similar market trends and broad market representation.
- NIFTY INFRASTRUCTURE and NIFTY INDIA CONSUMPTION exhibit a strong correlation (0.99), showing their interdependence.

Distinct Behavior of CPSE:

- NIFTY CPSE shows lower correlations with other indices, such as NIFTY BANK (0.85) and NIFTY IT (0.90), suggesting unique sectoral drivers like government policies and public-sector dynamics.

Sector-Specific Behavior of IT:

- NIFTY IT has relatively weaker correlations with indices like NIFTY CPSE (0.90) and NIFTY BANK (0.94), highlighting its independence and susceptibility to global tech trends and foreign exchange rates.

General Market Trends:

- High correlations among most indices indicate that the Indian stock market generally moves in unison, influenced by macroeconomic factors such as GDP growth and inflation.

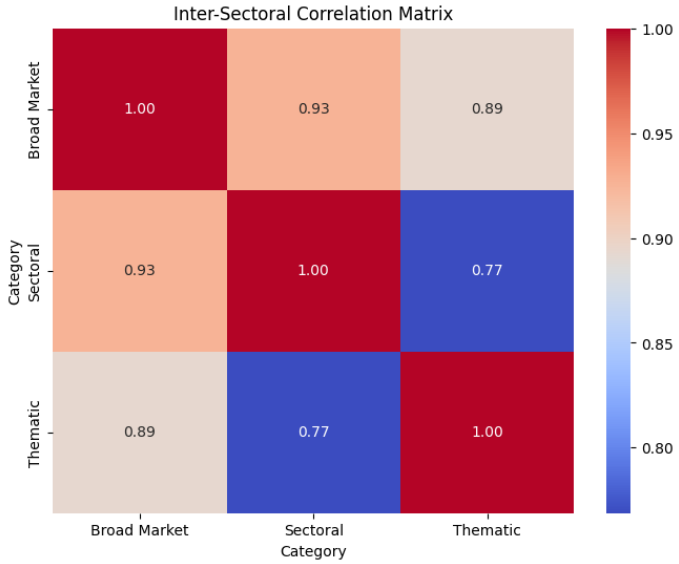


Fig: Inter Indices Correlation Matrix

Strong Dependency Between Broad Market and Sectoral Indices (0.93):

- Broad market indices (e.g., NIFTY 50, NIFTY 100) significantly influence sectoral indices, highlighting their role as comprehensive market indicators.

Thematic indices exhibit:

- Moderate correlation with **Broad Market** (0.89).
- Lower correlation with **Sectoral indices** (0.77).

Sectoral and Thematic Linkage (0.77):

- Sectoral indices show some influence on thematic indices but retain distinct drivers, reflecting sector-specific trends.

Analysis and Visualizations

Various analysis with explanations and models with their performance and dashboards are shown below.

Cumulative returns for each index

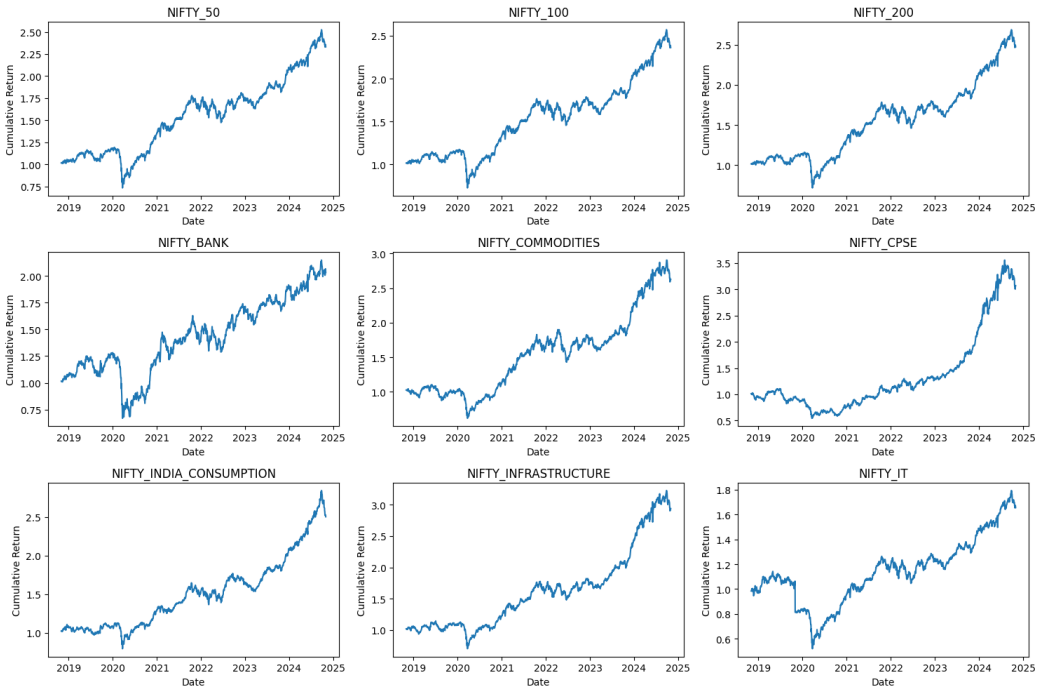


Fig: Daily Cumulative returns for each Index graph

Description: This graph is a time series plot that displays cumulative returns for each index, illustrating growth over time. It provides essential insights into long-term investment performance, which is crucial for evaluating investment strategies.

Dimensions and Measures:

- **X-Axis:** Date (from 2019 to October 2024).
- **Y-Axis:** Cumulative Return (growth multipliers, e.g., 2.0 indicates 100% growth).

Volatility

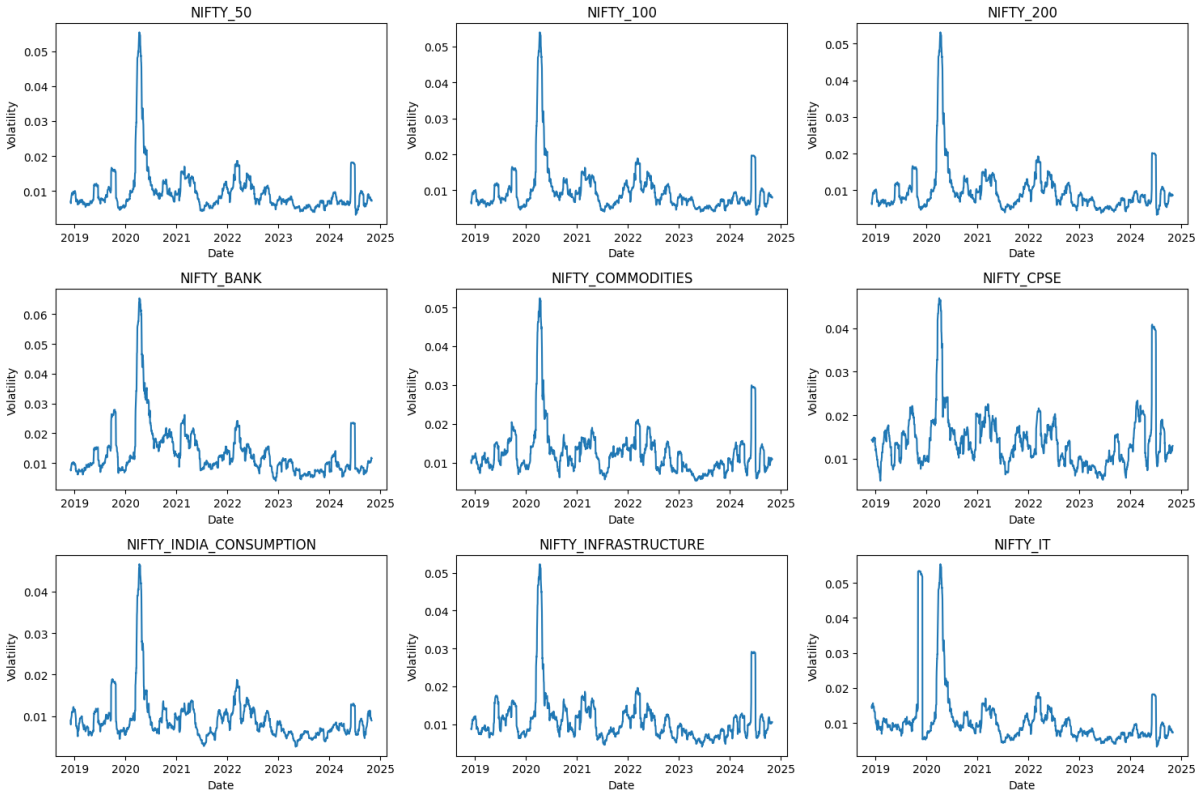


Fig: Volatility plot

Description: The graph depicting volatility levels of indices over time illustrates fluctuations in market risk. This time series plot is essential for helping investors assess the risk associated with different indices, enabling informed decisions regarding investment strategies.

Dimensions and Measures:

- **X-Axis**: Date (from 2019 to October 2024).
- **Y-Axis**: Volatility (higher values indicate greater risk).

Trend Analysis of close price of Indices

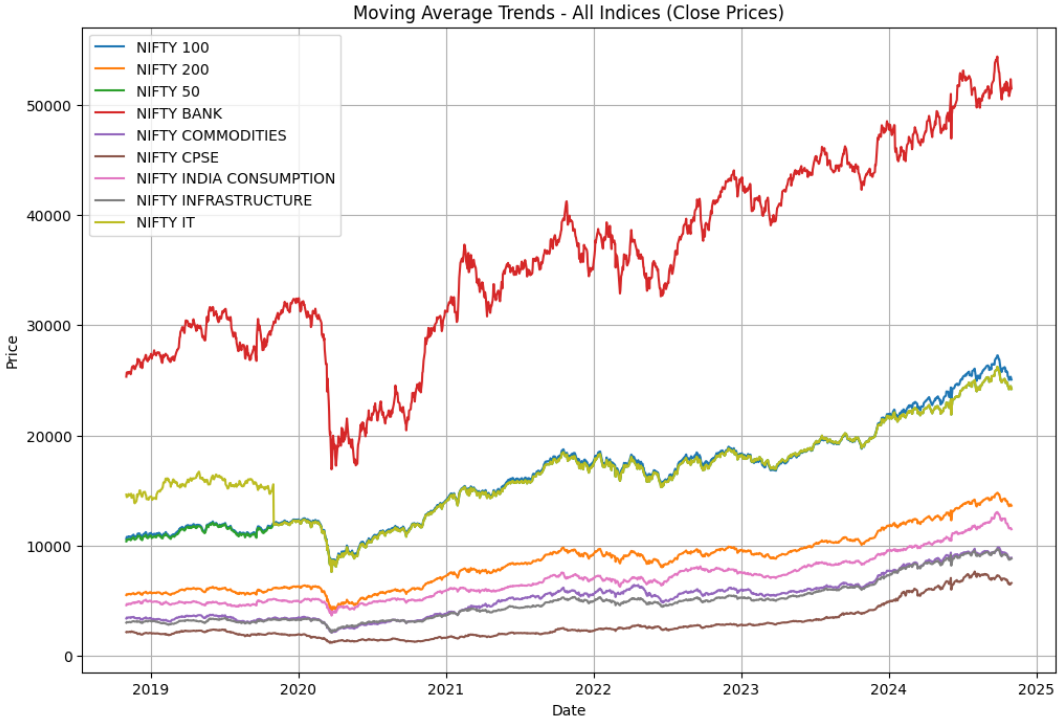


Fig: Trend Analysis of 9 indices close price

NIFTY BANK (Red Line)

- **2019**: Stable growth due to steady banking reforms and increased lending activity.
- **2020 (Dip)**: Impact of COVID-19 lockdowns, reduced loan repayments, and a liquidity crunch.
- **2020 (Recovery)**: RBI's liquidity infusion and loan restructuring schemes.
- **2021 (Spike)**: Resurgence in banking credit growth and robust performance by major banks.
- **2022**: Volatility due to inflation fears and monetary tightening.
- **2023**: Increased NPAs moderated the growth trend.
- **Late 2023**: Growth driven by digital banking initiatives.
- **2024**: Market resilience amid global interest rate stabilization.
- **2024 (Spike)**: Strong quarterly earnings by major banking institutions.
- **Fluctuations**: High dependency on economic policies and global banking trends.

NIFTY IT (Yellow Line)

- **2019**: Consistent demand for IT services globally.
- **2020 (Spike)**: Surge in demand for cloud and digital transformation due to remote working trends.
- **2021**: Sustained growth as companies invested heavily in technology post-COVID.
- **2022**: Revenue growth dampened by global economic slowdown.
- **Mid-2022 (Dip)**: Impact of layoffs and cost-cutting measures in IT firms.
- **2023**: Improved growth by AI and automation investments.
- **Late 2023**: Currency fluctuations impacted export-oriented IT firms.
- **2024 (Fluctuations)**: Dependency on global IT spending trends and geopolitical tensions.
- **Spikes**: Accelerated adoption of advanced analytics and cloud platforms.
- **Fluctuations**: Impact of global economic cycles and U.S. IT spending trends.

NIFTY INFRASTRUCTURE (Black Line)

- **2019**: Stable growth due to investments in infrastructure projects.
- **2020 (Dip)**: Slowdown in construction and project execution due to lockdowns.
- **2021 (Recovery)**: Revival with increased government spending on infrastructure.
- **2022**: Higher input costs (cement, steel) moderated growth.
- **2023**: Improved private sector investment in green energy projects.
- **Fluctuations**: Global supply chain disruptions impacted project timelines.
- **Late 2023**: Growth driven by public-private partnerships.
- **2024**: Increased focus on sustainable infrastructure initiatives.
- **Spike**: Urbanization and government emphasis on smart cities.
- **Fluctuations**: High correlation with GDP growth and fiscal policies.

NIFTY INDIA CONSUMPTION (Purple Line)

- **2019**: Steady growth due to rising disposable incomes and consumer spending.
- **2020 (Dip)**: Decline in consumption amid pandemic uncertainties.
- **2021**: Revival with increased demand for consumer durables.
- **2022**: Rural consumption slowed due to inflation and reduced income growth.
- **2023**: Recovery driven by festive spending and urban demand.
- **Fluctuations**: Impact of monsoon on rural consumption.
- **Late 2023**: E-commerce growth contributed to demand.
- **2024**: Increased demand for discretionary products.
- **Spike**: Benefits from direct cash transfers and government schemes.
- **Fluctuations**: Dependency on income distribution and inflation.

NIFTY COMMODITIES (Brown Line)

- **2019**: Stable commodity prices due to balanced demand-supply.
- **2020 (Dip)**: Decline in global trade during COVID-19.
- **2021 (Spike)**: Commodity price surge driven by supply chain disruptions.
- **2022**: Volatility due to geopolitical tensions impacting crude oil and metals.
- **Mid-2022 (Dip)**: Corrections as supply normalized post-pandemic.
- **2023**: Steady growth fueled by infrastructure projects.
- **Late 2023**: Growth supported by demand for base metals and energy commodities.
- **2024**: Dependence on global commodity market conditions.
- **Spike**: Rise in crude oil prices amid geopolitical instability.
- **Fluctuations**: Correlation with global demand and policy changes.

NIFTY CPSE (Magenta Line)

- **2019**: Performance driven by stable public sector enterprises.
- **2020 (Dip)**: Weak performance due to reduced state-owned enterprise revenues.
- **2021**: Revival with disinvestment policies and improved governance.
- **2022 (Fluctuations)**: Impact of global market volatility on CPSE-heavy sectors.
- **2023**: Steady growth due to robust energy and resource sector performance.
- **Late 2023**: Boost from increased government spending on PSUs.
- **2024**: Improved performance from divestment and privatization.
- **Spike**: Gains in energy and heavy industries.
- **Fluctuations**: Impact of government reforms and fiscal strategies.
- **Stability**: Dependency on government policy initiatives.

NIFTY 50 (Green Line), NIFTY 100 (Blue Line), NIFTY 200 (Orange Line)

- **2019-2024**: Represent aggregate market trends and overall economic health.
- **2020 (Dip)**: Reflect the COVID-19 market crash across all indices.
- **2021 (Spike)**: Strong post-pandemic recovery driven by stimulus packages.
- **2022 (Volatility)**: Geopolitical tensions and inflation concerns.
- **2023**: Steady upward trend as markets stabilized.
- **2024**: Growth supported by long-term economic prospects.
- **Fluctuations**: Driven by sectoral performance and global market trends.
- **Spike**: Bullish sentiment due to positive macroeconomic data.
- **Dip**: Corrections following policy changes or external shocks.
- **Aggregate Reflection**: Represent overall investor sentiment and economic dynamics.

Machine Learning

Machine learning models are used in this project to analyze complex patterns in NIFTY historical data and provide future forecasts. They handle non-linear relationships, seasonality, and market fluctuations effectively than traditional statistical methods.

POLYNOMIAL REGRESSION

Polynomial regression models the relationship between an independent variable (e.g., time) and a dependent variable (e.g., closing price) using a polynomial equation, allowing it to capture non-linear trends. It is useful for identifying complex patterns in data, such as market fluctuations and long-term trends.

X-Axis (Days Since Earliest Date): Represents the time in days, starting from the earliest date in the dataset.

Y-Axis (Price): Represents the closing price of the NIFTY index.

Data Components:

Historical Price (Blue Dots): The actual observed closing prices of the NIFTY index over time, showing fluctuations and trends.

Polynomial Regression Fit (Red Line): A curve fitted to the historical data using a polynomial regression model, capturing the overall trend in the data.

Predicted Prices (Green Dots): Forecasted closing prices extending into the future, based on the polynomial model.

Description:

The red curve provides a smooth representation of the historical data trend, accounting for its nonlinear growth pattern.

The green dots show predicted prices that follow the established trend, suggesting a steady upward movement in the NIFTY index.

The following are the visualizations depicting Polynomial Regression model for the 9 indices: NIFTY 50, NIFTY 100, NIFTY 200, NIFTY IT, NIFTY BANK, NIFTY CPSE, NIFTY COMMODITIES, NIFTY INDIA CONSUMPTION, NIFTY INFRASTRUCTURE respectively.

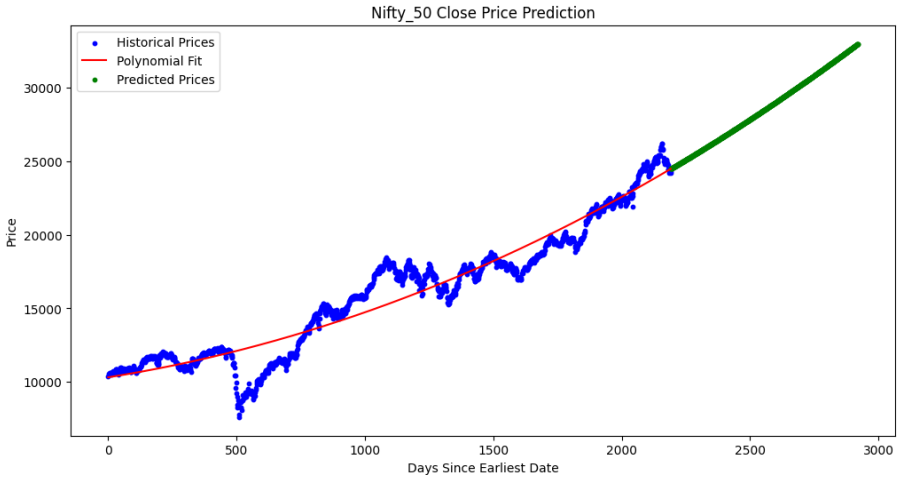


Fig: NIFTY 50 Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	24304.35	24490.31	-185.96
04-Nov-24	23995.35	24521.29	-525.94
05-Nov-24	24213.3	24531.62	-318.32
06-Nov-24	24484.05	24541.96	-57.91
07-Nov-24	24199.35	24552.3	-352.95

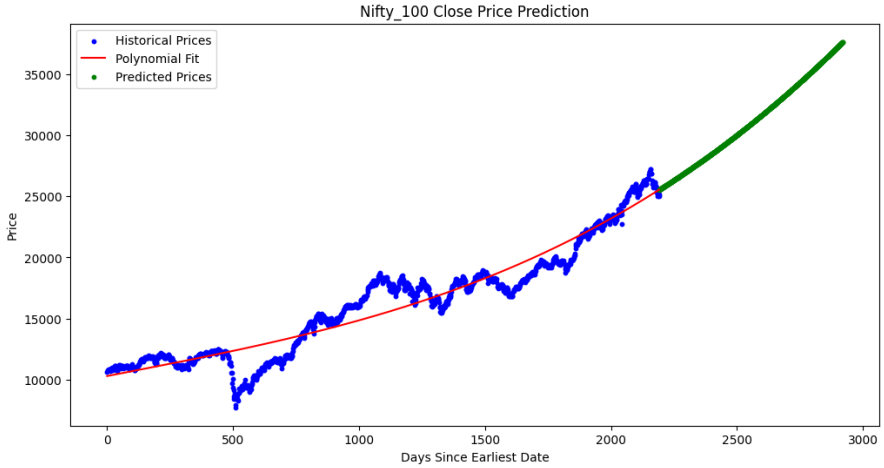


Fig: NIFTY 100 Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	25184.6	25558.24	-373.64
04-Nov-24	24857.75	25597.72	-739.97
05-Nov-24	25060.8	25610.89	-550.09
06-Nov-24	25403.15	25624.08	-220.93
07-Nov-24	25110.7	25637.27	-526.57

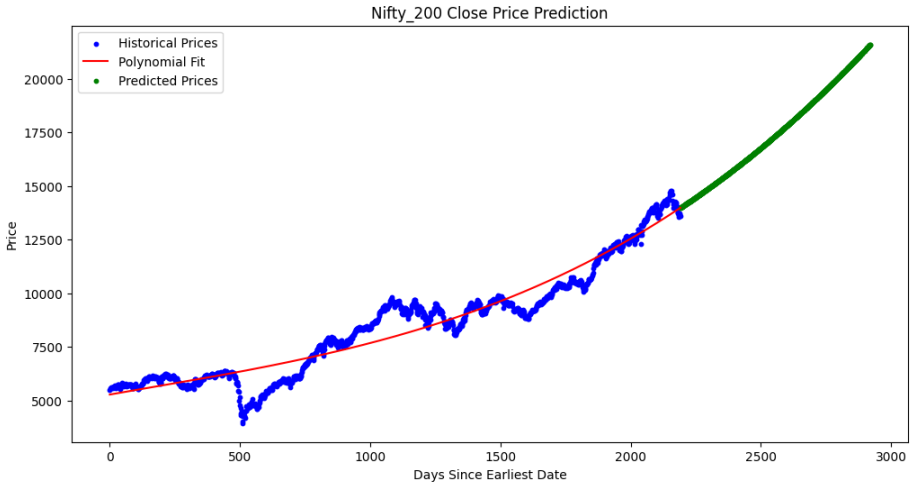


Fig: NIFTY 200 Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	13690.35	13993.29	-302.94
04-Nov-24	13513.55	14017.59	-504.04
05-Nov-24	13618.85	14025.71	-406.86
06-Nov-24	13824.1	14033.82	-209.72
07-Nov-24	13681.75	14041.95	-360.2

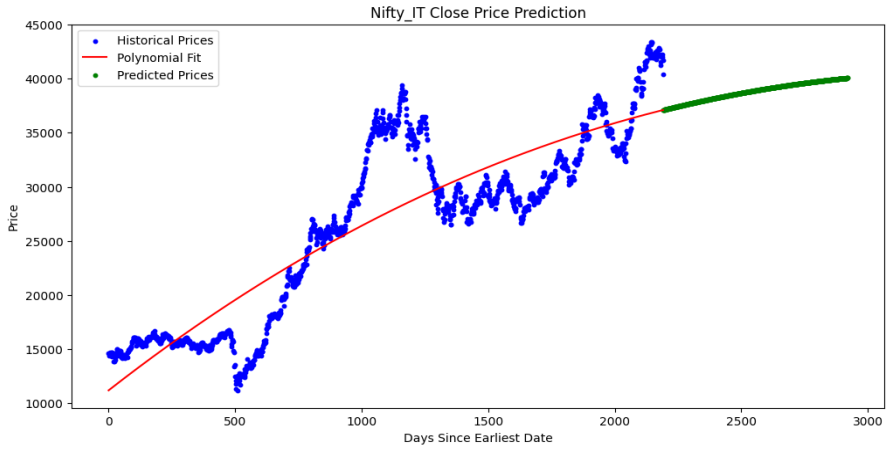


Fig: NIFTY IT Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	40433.65	37106.36	3327.29
04-Nov-24	40421.8	37123.87	3297.93
05-Nov-24	40424.6	37129.7	3294.9
06-Nov-24	42039.5	37135.52	4903.98
07-Nov-24	41752.4	37141.34	4611.06

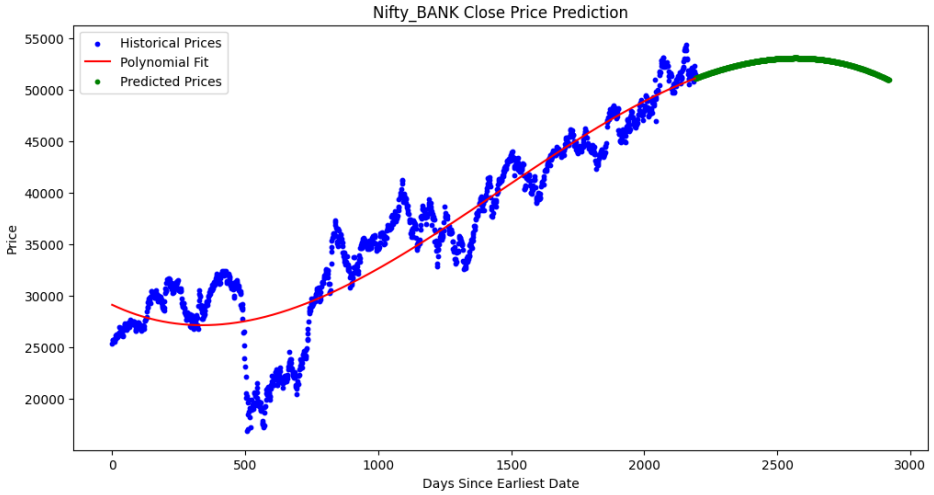


Fig: NIFTY BANK Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	51673.9	51090.04	583.86
04-Nov-24	51215.25	51119.31	95.94
05-Nov-24	52207.25	51129.03	1078.22
06-Nov-24	52317.4	51138.72	1178.68
07-Nov-24	51916.5	51148.39	768.11

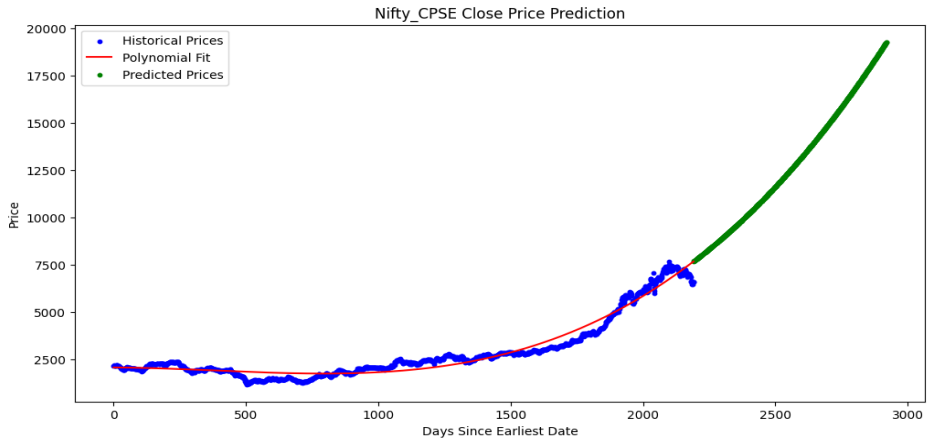


Fig: NIFTY CPSE Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	6666.55	7683.67	-1017.12
04-Nov-24	6529.2	7716	-1186.8
05-Nov-24	6577.25	7726.8	-1149.55
06-Nov-24	6707.05	7737.62	-1030.57
07-Nov-24	6644.4	7748.44	-1104.04

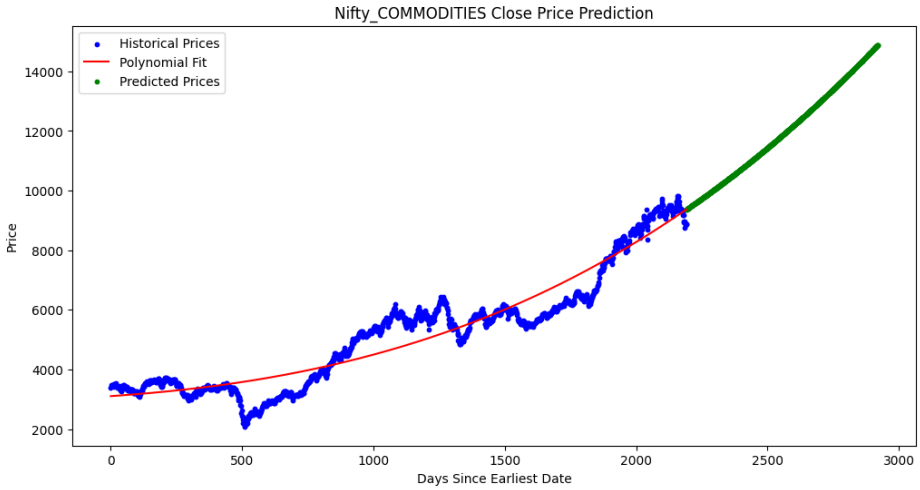


Fig: NIFTY COMMODITIES Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	8958.4	9371.97	-413.57
04-Nov-24	8760.15	9390.22	-630.07
05-Nov-24	8906.5	9396.31	-489.81
06-Nov-24	9062	9402.41	-340.41
07-Nov-24	8897.25	9408.41	-511.16

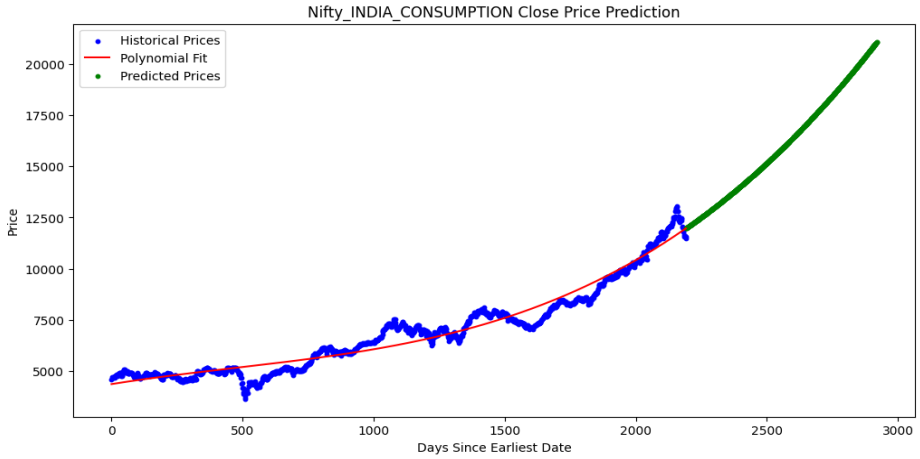


Fig: NIFTY INDIA CONSUMPTION Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	11569.2	11976.3	-407.1
04-Nov-24	11432.6	12003.09	-570.49
05-Nov-24	11434.8	12012.04	-577.24
06-Nov-24	11570.15	12021	-450.85
07-Nov-24	11433.6	12029.96	-596.36

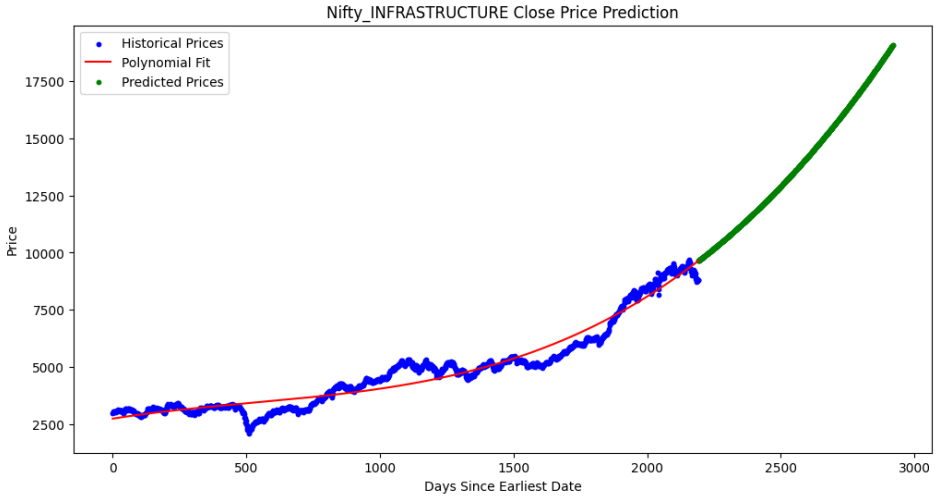


Fig: NIFTY INFRASTRUCTURE Regression model

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	8869.15	8655.22	213.93
04-Nov-24	8681.7	8625.49	56.21
05-Nov-24	8705.85	8594.54	111.31
06-Nov-24	8857.15	8562.8	294.35
07-Nov-24	8767.7	8530.69	237.01

For every Polynomial Regression model build we compared the predicted close price values with the actual close price values for 9 indices and encountered differences in actual and predicted values.

LSTM

LSTM (Long Short-Term Memory) is a deep learning technique specialized for time-series analysis and prediction. It captures sequential patterns and long-term dependencies in data, for forecasting future trends. In this project, LSTM is used to predict the Close Price of indices by learning from historical data, enabling modelling of market behaviour and forecasting future trends.

X-Axis (Date): Represents the timeline from 2019 to 2027.

Y-Axis (Close Price): Represents the closing price of the NIFTY index.

Data Components:

Historical Data (Blue Line):

Represents the observed (actual) closing prices of the NIFTY index from 2019 to 2024. It illustrates past market behaviour, highlighting key trends, fluctuations, and patterns.

Future Forecast (Orange Line):

Represents the LSTM model's predictions for the NIFTY index closing prices for the future period (2025-2027). The forecasted line is derived by training the model on historical data, allowing it to project trends based on learned patterns.

Description:

LSTM handles nonlinear and sequential data, providing forecasts for market behavior analysis. The predictions extend historical trends, showcasing its ability to model temporal dependencies.

The following are the visualizations depicting LSTM model for the 9 indices: NIFTY 50, NIFTY 100, NIFTY 200, NIFTY IT, NIFTY BANK, NIFTY CPSE, NIFTY COMMODITIES, NIFTY INDIA CONSUMPTION, NIFTY INFRASTRUCTURE respectively.

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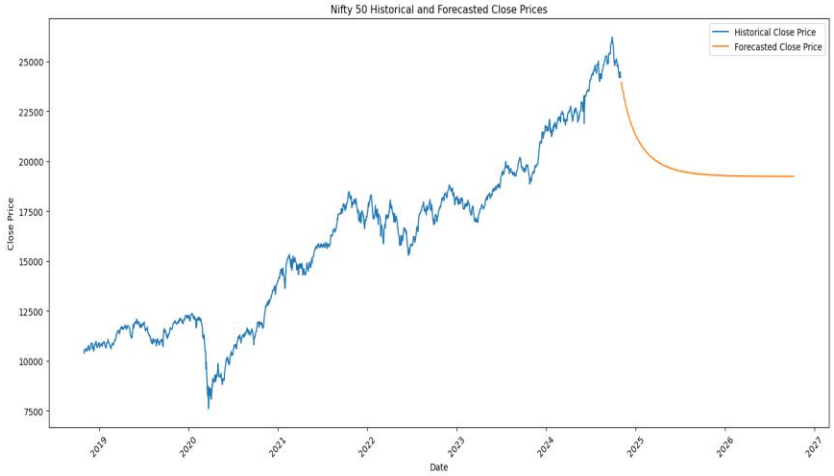

Fig: NIFTY 50 prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	24304.35	23939.15	365.2
04-Nov-24	23995.35	23880.84	114.51
05-Nov-24	24213.3	23806.63	406.67
06-Nov-24	24484.05	23722.27	761.78
07-Nov-24	24199.35	23632.27	567.08

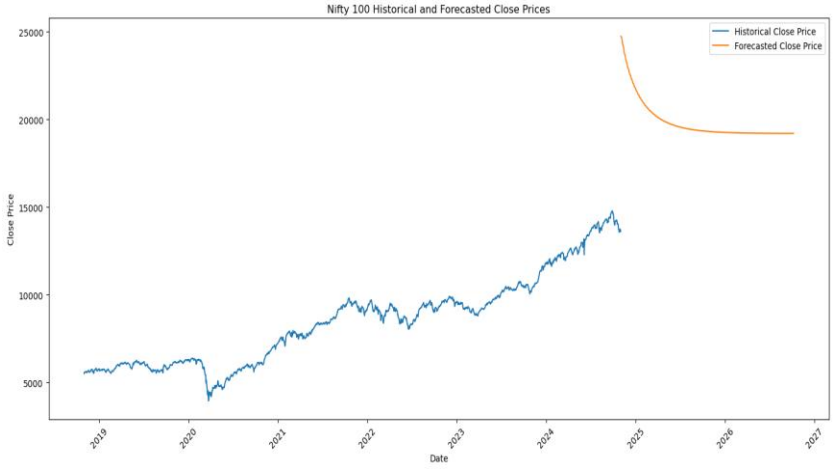

Fig: NIFTY 100 prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	25184.6	24746.02	438.58
04-Nov-24	24857.75	24686.7	171.05
05-Nov-24	25060.8	24603.41	457.39
06-Nov-24	25403.15	24505.54	897.61
07-Nov-24	25110.7	24399.84	710.86

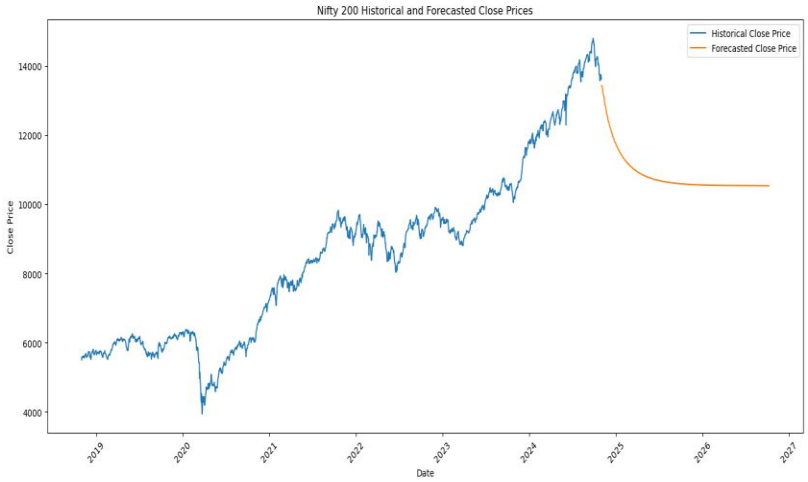

Fig: NIFTY 200 prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	13690.35	13426.5	263.85
04-Nov-24	13513.55	13395.83	117.72
05-Nov-24	13618.85	13350.45	268.4
06-Nov-24	13824.1	13296.09	528.01
07-Nov-24	13681.75	13236.76	444.99

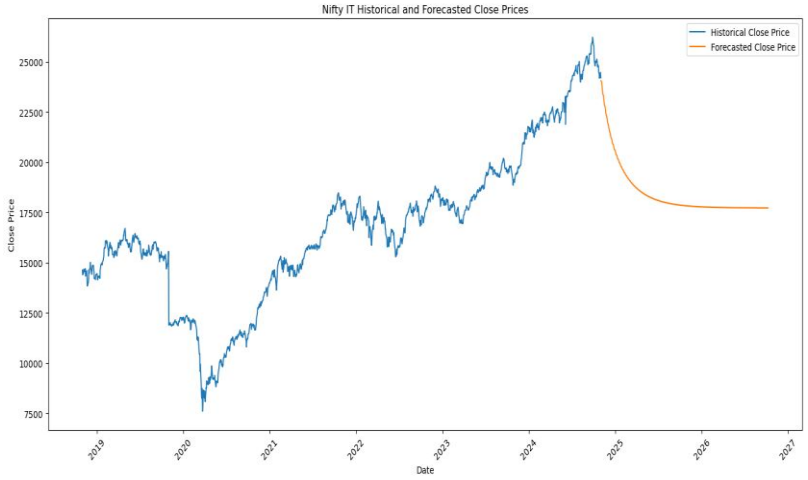

Fig: NIFTY IT prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	40433.65	24054.03	16379.62
04-Nov-24	40421.8	23957.08	16464.71
05-Nov-24	40424.6	23830.6	16594
06-Nov-24	42039.5	23694.27	18345.23
07-Nov-24	41752.4	23558.74	18193.66

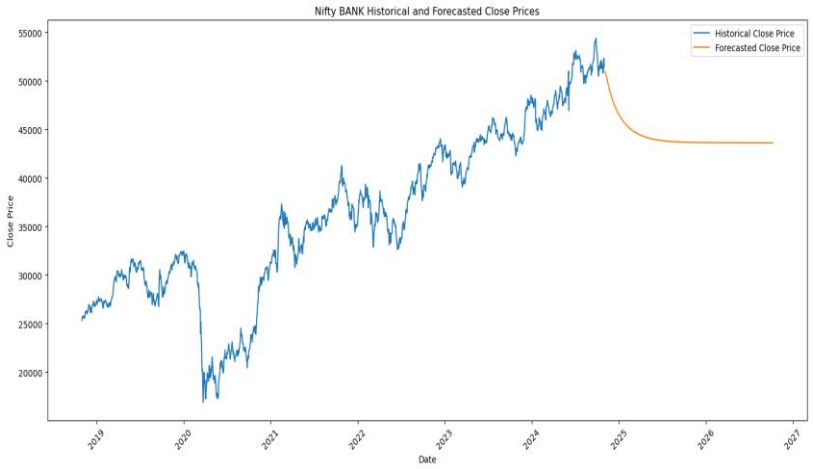

Fig: NIFTY BANK prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	51673.9	50958.3	715.6
04-Nov-24	51215.25	50917.07	298.18
05-Nov-24	52207.25	50832.46	1374.79
06-Nov-24	52317.4	50719.21	1598.19
07-Nov-24	51916.5	50587.69	1328.81

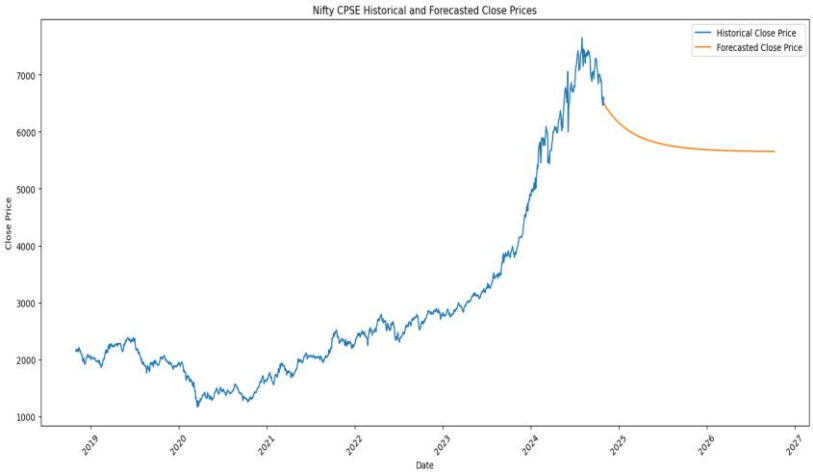

Fig: NIFTY CPSE prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	6666.55	6496.56	169.99
04-Nov-24	6529.2	6481.8	47.4
05-Nov-24	6577.25	6468.39	108.86
06-Nov-24	6707.05	6455.98	251.07
07-Nov-24	6644.4	6444.37	200.03

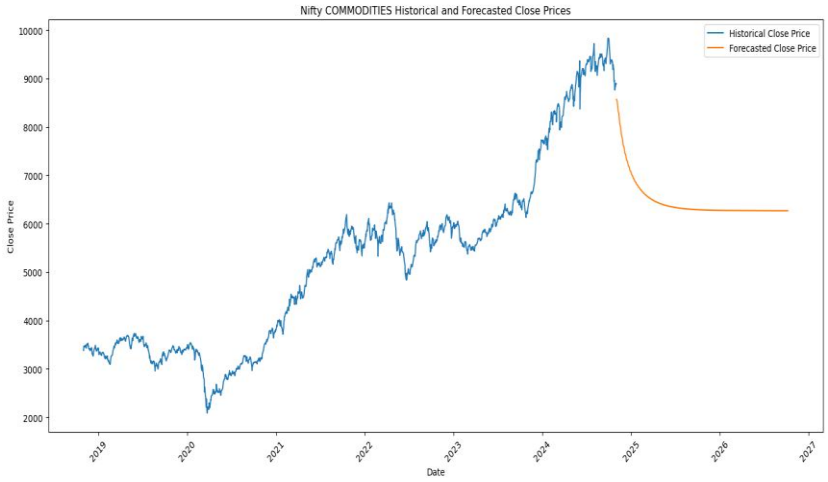

Fig: NIFTY COMMODITIES prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	8958.4	8567.75	390.65
04-Nov-24	8760.15	8532.56	227.59
05-Nov-24	8906.5	8488.78	417.72
06-Nov-24	9062	8438.94	623.06
07-Nov-24	8897.25	8385.2	512.08

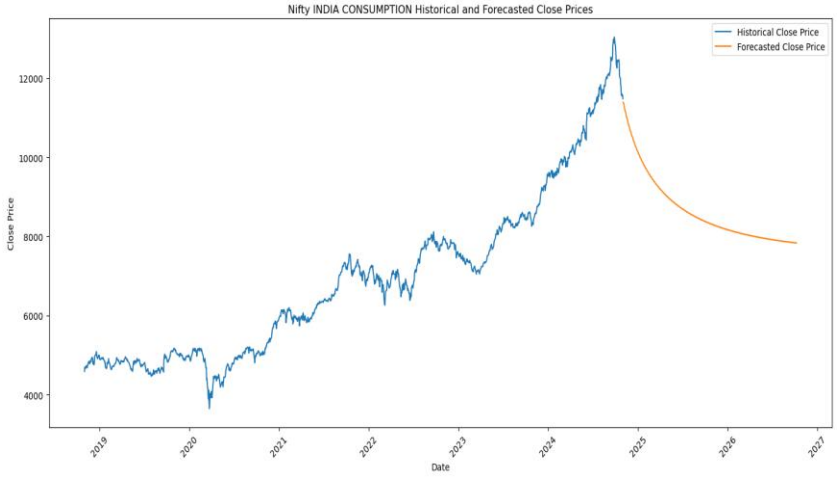

Fig: NIFTY INDIA CONSUMPTION prediction using LSTM

Date	NSE Actual Close Price	Predicted Close Price	Difference
01-Nov-24	11569.2	11390.31	178.89
04-Nov-24	11432.6	11347.22	85.38
05-Nov-24	11434.8	11305.52	129.28
06-Nov-24	11570.15	11264.91	305.24
07-Nov-24	11433.6	11225.22	208.38

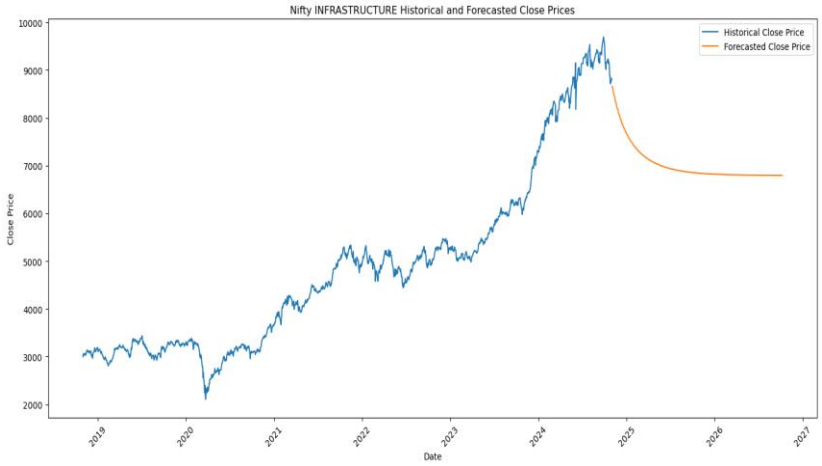

Fig: NIFTY INFRASTRUCTURE prediction using LSTM

For every LSTM model build we compared the predicted close price values with the actual close price values for 9 indices and encountered differences in actual and predicted values.

Comparison of Close Price values of various models

INDEX	Date	NSE Actual Close Price	REGRESSION		LSTM	
			Predicted Close Price	Difference	Predicted price	Difference
NIFTY 50	01-Nov-24	24304.35	24490.31	-185.96	23939.15	365.2
	04-Nov-24	23995.35	24521.29	-525.94	23880.84	114.51
	05-Nov-24	24213.3	24531.62	-318.32	23806.63	406.67
NIFTY 100	01-Nov-24	25184.6	25558.24	-373.64	24746.02	438.58
	04-Nov-24	24857.75	25597.72	-739.97	24686.7	171.05
	05-Nov-24	25060.8	25610.89	-550.09	24603.41	457.39
NIFTY 200	01-Nov-24	13690.35	13993.29	-302.94	13426.5	263.85
	04-Nov-24	13513.55	14017.59	-504.04	13395.83	117.72
	05-Nov-24	13618.85	14025.71	-406.86	13350.45	268.4
NIFTY BANK	01-Nov-24	51673.9	51090.04	583.86	50958.3	715.6
	04-Nov-24	51215.25	51119.31	95.94	50917.07	298.18
	05-Nov-24	52207.25	51129.03	1078.22	50832.46	1374.79
NIFTY IT	01-Nov-24	40433.65	37106.36	3327.29	24054.03	16379.62
	04-Nov-24	40421.8	37123.87	3297.93	23957.08	16464.72
	05-Nov-24	40424.6	37129.7	3294.9	23830.6	16594
NIFTY CPSE	01-Nov-24	6666.55	7683.67	-1017.12	6496.56	169.99
	04-Nov-24	6529.2	7716	-1186.8	6481.8	47.4
	05-Nov-24	6577.25	7726.8	-1149.55	6468.39	108.86
NIFTY COMMO-DITIES	01-Nov-24	8958.4	9371.97	-413.57	8567.75	390.65
	04-Nov-24	8760.15	9390.22	-630.07	8532.56	227.59
	05-Nov-24	8906.5	9396.31	-489.81	8488.78	417.72
NIFTY INFRAST-RUCTURE	01-Nov-24	8869.15	9643.19	-774.04	8655.22	213.93
	04-Nov-24	8681.7	9670.25	-988.55	8625.49	56.21
	05-Nov-24	8705.85	9679.29	-973.44	8594.54	111.31
NIFTY INDIA CONSUM.	01-Nov-24	11569.2	11976.3	-407.1	11390.31	178.89
	04-Nov-24	11432.6	12003.09	-570.49	11347.22	85.38
	05-Nov-24	11434.8	12012.04	-577.24	11305.52	129.28

Table: Actual vs predicted close price values of 9 indices

The above table consists of comparison of various 9 indices and values of NSE actual Close price values to and ML model generated predicted Close price values.

Profit Table

INDEX	Historical 6 years			Predicted 2 years		
	1 NOV 2018 Close Price	31 OCT 2024 Close Price	Profits	1 NOV 2024 Close Price	30-10-2026 Close Price	Profits
NIFTY 50	10380.45	24205.35	13824.90	24490.31	32985.13	8494.82
NIFTY 100	10607.60	25059.50	14451.90	25558.24	37663.24	12105.00
NIFTY 200	5505.55	13618.20	8112.65	13993.29	21603.61	7610.32
NIFTY BANK	25323.65	51475.35	26151.70	51090.05	50927.28	-162.77
NIFTY IT	14622.00	24205.35	9583.35	37106.37	40063.36	2956.99
NIFTY CPSE	2150.70	6599.15	4448.45	7683.68	19283.05	11599.37
NIFTY COMMODITIES	3381.85	8887.85	5506.00	9371.97	14887.01	5515.04
NIFTY INFRASTRUCTURE	3001.60	8823.40	5821.80	9643.2	19081.3	9438.10
NIFTY INDIA CONSUMPTION	4587.15	11480.80	6893.65	11976.3	21082.6	9106.30

Table: Profit and loss table

The table summarizes historical and predicted data for various NSE indices over specific periods. Here's a breakdown of the key columns and their meanings:

1. **INDEX**: Lists the indices being analysed (e.g., NIFTY 50, NIFTY 100, NIFTY BANK, etc.).
2. **Historical 6 Years**:
    - **1 NOV 2018 Close Price**: Closing price of the respective index on November 1, 2018.
    - **31 OCT 2024 Close Price**: Closing price of the respective index on October 31, 2024.
    - **Profits**: The difference between the closing prices of October 31, 2024, and November 1, 2018, representing the profit/loss over the six years.
3. **Predicted 2 Years**:
    - **1 NOV 2024 Close Price**: The actual close price of the index on November 1, 2024 (used as the starting point for predictions).
    - **30-10-2026 Close Price**: The predicted closing price of the index on October 30, 2026.

- **Profits**: The difference between the predicted closing price (October 30, 2026) and the actual closing price (November 1, 2024), representing the projected profit/loss for the next two years.

- **NIFTY 50**: Historical profits were significant (13,824.90), with predicted profits over two years at 8,494.82.
- **NIFTY 100**: Shows the highest predicted profit (12,105.00) over the next two years.
- **NIFTY BANK**: Historical profits were strong (26,151.70), but predicted losses are observed (-162.77) over the next two years.
- **NIFTY CPSE**: Historical profits are modest (4,448.45), but the predicted profits are significantly higher (11,599.37).

Power BI Dashboard

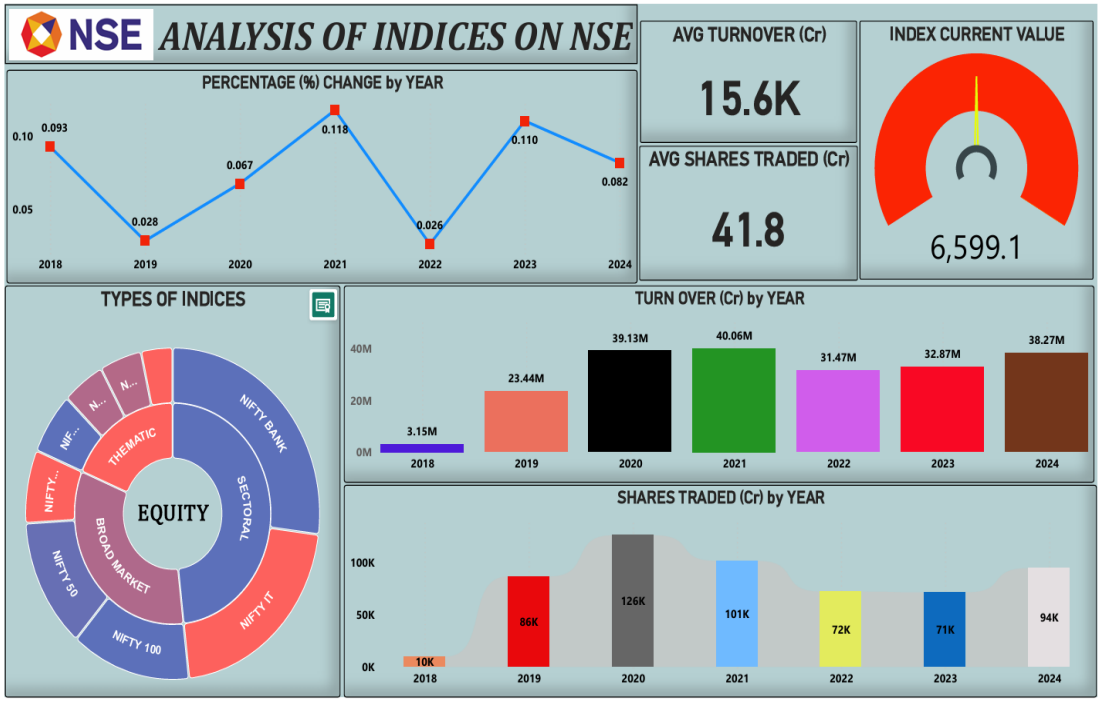

Fig: Power BI Dashboard of Analysis of Indices on NSE

This dashboard provides an overview of key performance metrics and trends for NSE indices over multiple years. It includes data on turnover, shares traded, percentage changes, types of indices, and current values.

Types of Indices:

- A sunburst chart categorizes indices into:
    - **Broad Market:** NIFTY 50, NIFTY 100, NIFTY 200
    - **Sectoral:** BANK, IT,
    - **Thematic:** NIFTY INDIA CONSUMPTION, NIFTY CPSE, NIFTY INFRASTRUCYURE, NIFTY COMMODITIES

Percentage (%) Change by Year (Top Left)

- A line chart shows the yearly percentage change in NSE indices:
    - High growth years: 2021 (0.118) and 2023 (0.116).
    - Lower growth in 2020 (0.025) and 2022 (0.082), indicating slower market movement.
    - Negative or minimal change in earlier years (2018 and 2019).

Index Current Value (Top Right)

- Displays the current index value: **6,599.1**.
- A speedometer visualization shows the current value in the context of past performance.

Average Turnover and Shares Traded (Top Center)

- **Average Turnover:** ₹15.6K crore.
- **Average Shares Traded:** 41.8 crore shares.

Turnover by Year (Center)

- Bar chart showing annual turnover in crore:
    - **Highest turnover:** 2020 (₹40.06K crore).
    - Turnover fluctuated between ₹23.44K crore (2019) and ₹39.13K crore (2018).

Shares Traded by Year (Bottom Center)

- Bar chart displays shares traded annually (in crore):
    - Highest trading volume: **2020 (126 crore shares)**.

- Decline in 2022 (72 crore shares) and recovery in 2024 (94 crore shares).

Market Activity Trends:

- 2020 was a peak year for both turnover and trading volumes, possibly due to market volatility caused by the pandemic.
- Recent years show stabilized performance but slightly lower turnover.

Diverse Indices:

- The breakdown into broad market, sectoral, and thematic indices helps capture varied investment opportunities.

Current Performance:

- The index's current value of **6,599.1** reflects strong market positioning.

Recovery Signs:

- Trading volume in 2024 (94 crore shares) shows recovery from the drop in 2022, indicating renewed investor interest.

Conclusion

This project successfully combines historical analysis and predictive modeling to deliver insights into NSE indices. By leveraging data analytics and advanced models, it highlights the interplay of market trends, economic conditions, and sector-specific factors, empowering stakeholders to navigate complexities and optimize investment outcomes. The study underscores the importance of integrating analytics into financial strategies for better decision-making and sustainable growth.