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Introduction

National Stock Exchange of India Limited (**NSE**) is one of the leading stock exchanges in India, based in Mumbai. NSE is under the ownership of various financial institutions such as banks and insurance companies. It is the world's largest derivatives exchange by number of contracts traded for the fifth consecutive year and the third largest in cash equities by number of trades for the calendar year 2023. It is the 7th largest stock exchange in the world by total market capitalization, exceeding $5 trillion on May 23, 2024.

Overview

This project aims to analyze stock market data from the **National Stock Exchange of India (NSE)** to identify key trends, performance insights, and stock movement patterns. The analysis includes **price distributions, top gainers & losers, volume vs. turnover relationships, correlation analysis, and moving averages** to extract meaningful insights.

🎯 Goal of the Project

The primary goal of this project is to analyze stock market data from the **National Stock Exchange of India (NSE)** to uncover key trends, insights, and patterns that can assist traders, investors, and analysts in making informed decisions.

Specific Objectives:

1. **Understand Stock Performance** – Analyze price movements, trading volume, and turnover.
2. **Identify Top Gainers & Losers** – Determine which stocks had the highest and lowest percentage changes.
3. **Examine Market Trends** – Use **moving averages** and **correlation analysis** to find stock market trends.
4. **Detect Outliers & Anomalies** – Identify stocks with unusual price movements and potential causes.

5. **Visualize Key Insights** – Use charts and graphs to simplify complex stock data for better understanding.

Long-Term Vision:

This analysis can serve as a foundation for **predictive modeling** and **real-time stock market monitoring**, helping investors develop **data-driven trading strategies**.

Data Description

The dataset contains information about various stocks, including:

- **Stock Prices** (Open, High, Low, Last Traded Price)
- **Percentage Change (% Chng)** – Daily movement in stock price
- **Trading Volume** – Number of shares traded
- **Turnover (₹ crores)** – Total trading value
- **52-Week High & Low** – Long-term price range
- **30-day & 365-day % Change** – Short-term & long-term price trends

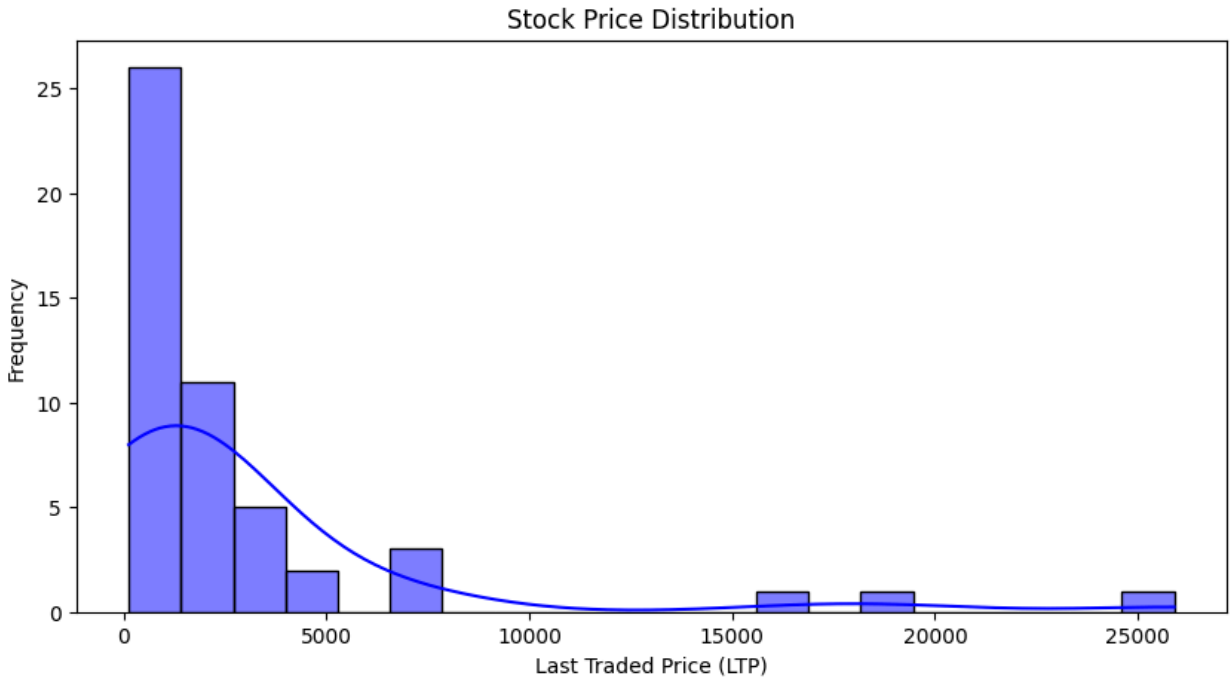
2️⃣ Data Preparation

- Steps taken to **clean the dataset** (e.g., removing commas, converting data types)
- Handling missing values or anomalies
- Description of key columns in the dataset

3️⃣ Exploratory Data Analysis (EDA)

📈 Stock Price Distribution

- Histogram visualization showing how stock prices are distributed



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- Insights on the skewness and outliers

📊 Key Findings & Insights

1️⃣ Stock Price Distribution:

- The histogram reveals that most stocks are concentrated in a specific price range, with a **right-skewed** distribution.
- A few high-priced stocks create a long tail, suggesting a mix of **low-cap and high-cap stocks**.

🚀 Top Gainers & Losers

- Table showcasing **top 5 gainers & losers**

```
top_gainers = df.nlargest(5, '% Chng')
top_losers = df.nsmallest(5, '% Chng')
print("Top 5 Gainers:\n", top_gainers[['Symbol', '% Chng']])
print("Top 5 Losers:\n", top_losers[['Symbol', '% Chng']])
```

```
Top 5 Gainers:
        Symbol  % Chng
9       CIPLA    7.23
12    DRREDDY    3.45
11   DIVISLAB    2.92
32  NESTLEIND    0.38
8   BRITANNIA   -0.19
Top 5 Losers:
         Symbol  % Chng
27    JSWSTEEL   -7.48
42  TATAMOTORS   -6.77
20    HINDALCO   -6.57
0   ADANIPORTS   -6.22
23  INDUSINDBK   -6.19
```

- Possible reasons for significant price changes

📊 Key Findings & Insights

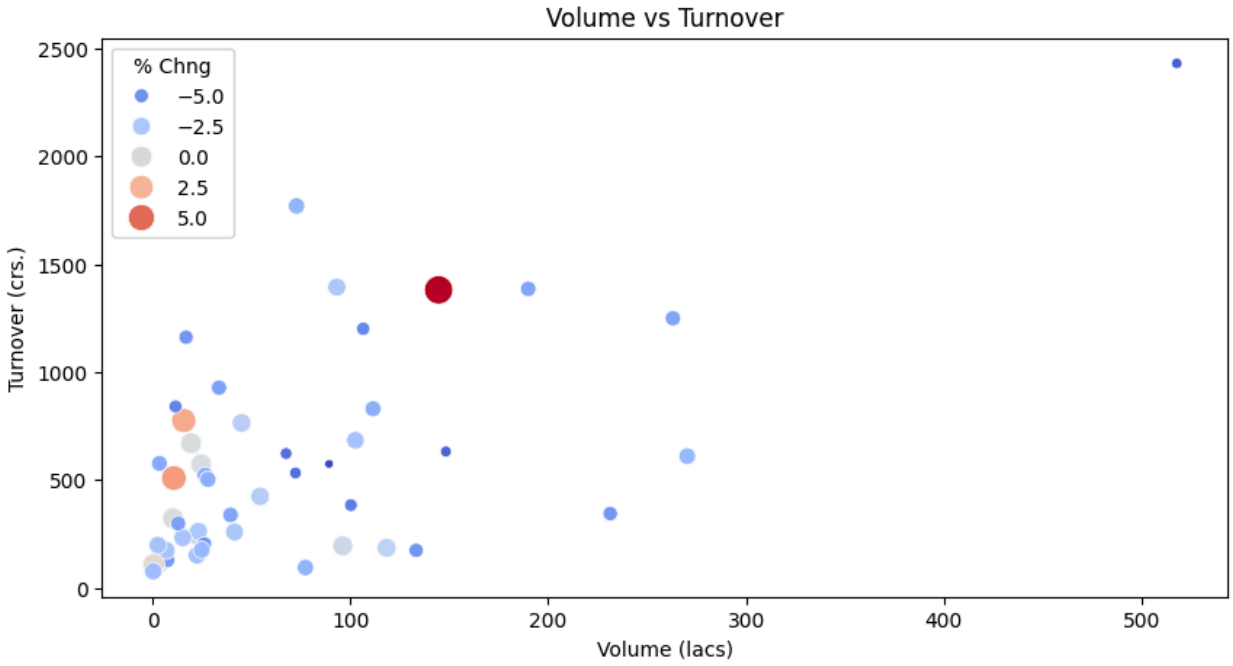
2️⃣ Top Gainers & Losers:

- The **top 5 gainers** showed the highest percentage price increase, indicating stocks with strong positive momentum.
- The **top 5 losers** had significant declines, potentially due to **profit booking, negative news, or market corrections**.

🔥 Volume vs. Turnover

```
plt.figure(figsize=(10, 5))
sns.scatterplot(x=df['Volume (lacs)'], y=df['Turnover (crs.)'], hue=df['% Chng'], size=df['% Chng'], sizes=(20, 200), palette='coolwarm')
plt.title('Volume vs Turnover')
plt.xlabel('Volume (lacs)')
plt.ylabel('Turnover (crs.)')
plt.show()
```

- Scatter plot to analyze **trading volume vs. turnover**



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- Interpretation of how stock liquidity affects turnover

📊 Key Findings & Insights

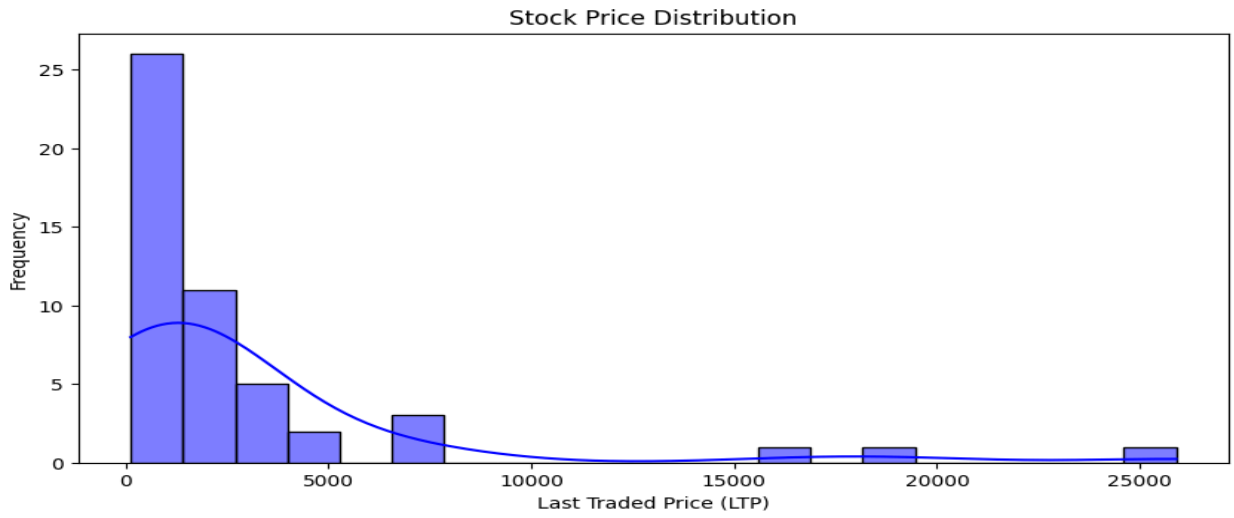
3️⃣ Volume vs. Turnover Relationship:

- **Higher volume stocks generally have higher turnover**, but some exceptions indicate stocks with **higher prices but lower trading volume**.
- Certain stocks exhibit **low volume but high turnover**, suggesting **institutional investor activity** or **low liquidity with high-value trades**.

🔄 Correlation Analysis

```
plt.figure(figsize=(10, 5))
sns.histplot(df['LTP'], bins=20, kde=True, color='blue')
plt.title('Stock Price Distribution')
plt.xlabel('Last Traded Price (LTP)')
plt.ylabel('Frequency')
plt.show()
```

- Heatmap visualization of **correlation between numerical variables**



- Key relationships observed (e.g., LTP vs. High, Volume vs. Turnover)

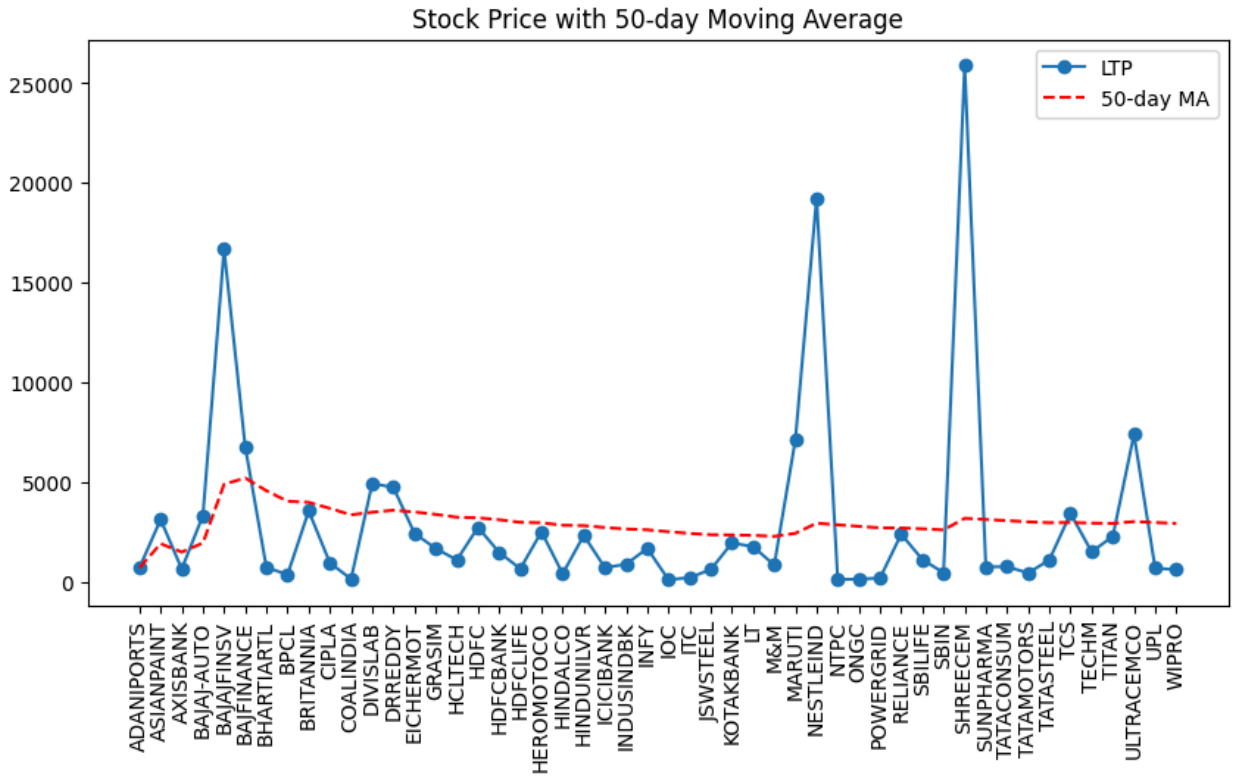
📊 Key Findings & Insights

4️⃣ Correlation Insights:

- **LTP (Last Traded Price) strongly correlates with Open, High, and Low prices**, confirming expected market behavior.
- **Volume and Turnover show a strong positive correlation**, reinforcing that **higher traded volume leads to higher turnover**.
- **Weak correlations between percentage change and other factors** indicate that **price fluctuations are less predictable based on historical trading metrics alone**.

📊 Moving Average Analysis

- Purpose of a **50-day moving average**



- Line plot showing price trends vs. moving averages

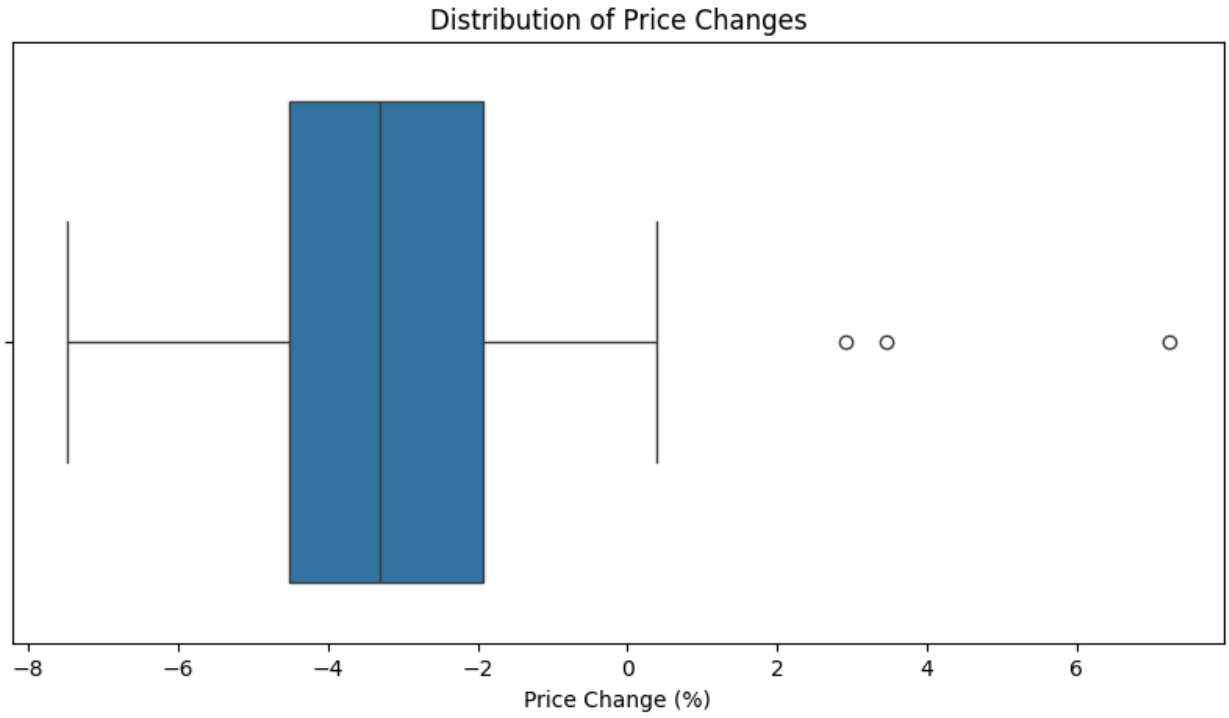
📊 Key Findings & Insights

5️⃣ Moving Average Analysis:

- The **50-day moving average smooths out short-term fluctuations**, helping identify **long-term trends**.
- Stocks trading **far above or below their moving averages** may indicate **overbought or oversold conditions**.

🚨 Outlier Detection

- Box plot analysis for **extreme percentage changes**



- Discussion on potential reasons (e.g., market news, earnings)

📊 Key Findings & Insights

6️⃣ Outlier Detection:

The **box plot of percentage change** highlights extreme movements, suggesting **volatility spikes** in certain stocks.

These outliers could be caused by **earnings reports, news announcements, or market events**.

📌 Conclusion:

Traders can use this analysis to spot **momentum stocks, high-volume movers, and stocks deviating from moving averages**.

Investors can use correlation insights to **identify stable and volatile stocks**.

Future improvements can include **predictive modeling and real-time tracking for dynamic stock insights**.