NAIROBI STOCK EXCHANGE PREDICTION

A Data Diggers Production.

MEET THE TEAM

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INTRODUCTION

A stock exchange is a regulated marketplace where buyers and sellers trade shares of publicly listed companies.

In Kenya, the official stock exchange is the Nairobi Securities Exchange (NSE) which began in 1954 as the Nairobi Stock Exchange, and was later renamed to NSE in 2011.

In 2014, the NSE was demutualized, allowing it to operate as a public limited company and list its own shares on the exchange.

Today, there are approximately 60 listed companies across key sectors including the banking ,telecommunications, manufacturing, agriculture and construction sectors.

PROBLEM STATEMENT

Despite the growing interest in the NSE, investors and analysts often lack clear, data-driven insights into stock price trends, sector behavior and market risks.

This project seeks to address this gap by analyzing daily trading data from 2013 to 2024 to uncover patterns, forecast price movements and evaluate market dynamics using statistical and machine learning models.

The goal is to support informed investment decisions and deepen an understanding of Kenya’s stock market behavior.

PROJECT OBJECTIVES

Objective 1

To explore the performance of stocks on the NSE market

Objective 2

To offer short-term predictions of stock prices or trends

Objective 3

To develop a machine learning-based tool that provides predictive insights and visualizations for NSE market trends

DATA OVERVIEW

The data is a compilation of historical daily stock market price data relating to the Kenyan Nairobi Securities Exchange (NSE) from 2013 to 2024, with 13 columns including Date, Stock Code, Stock Name, Price Change and the Volume Traded.

STAKEHOLDERS

1. Individual Investors
2. Institutional Investors
3. Stockbrokers and Analysts
4. NSE and Regulatory Bodies
5. Financial Advisors

Daily Price Trend

There is generally an upward trend from 2013 to 2025, with fluctuations in the Day Price.

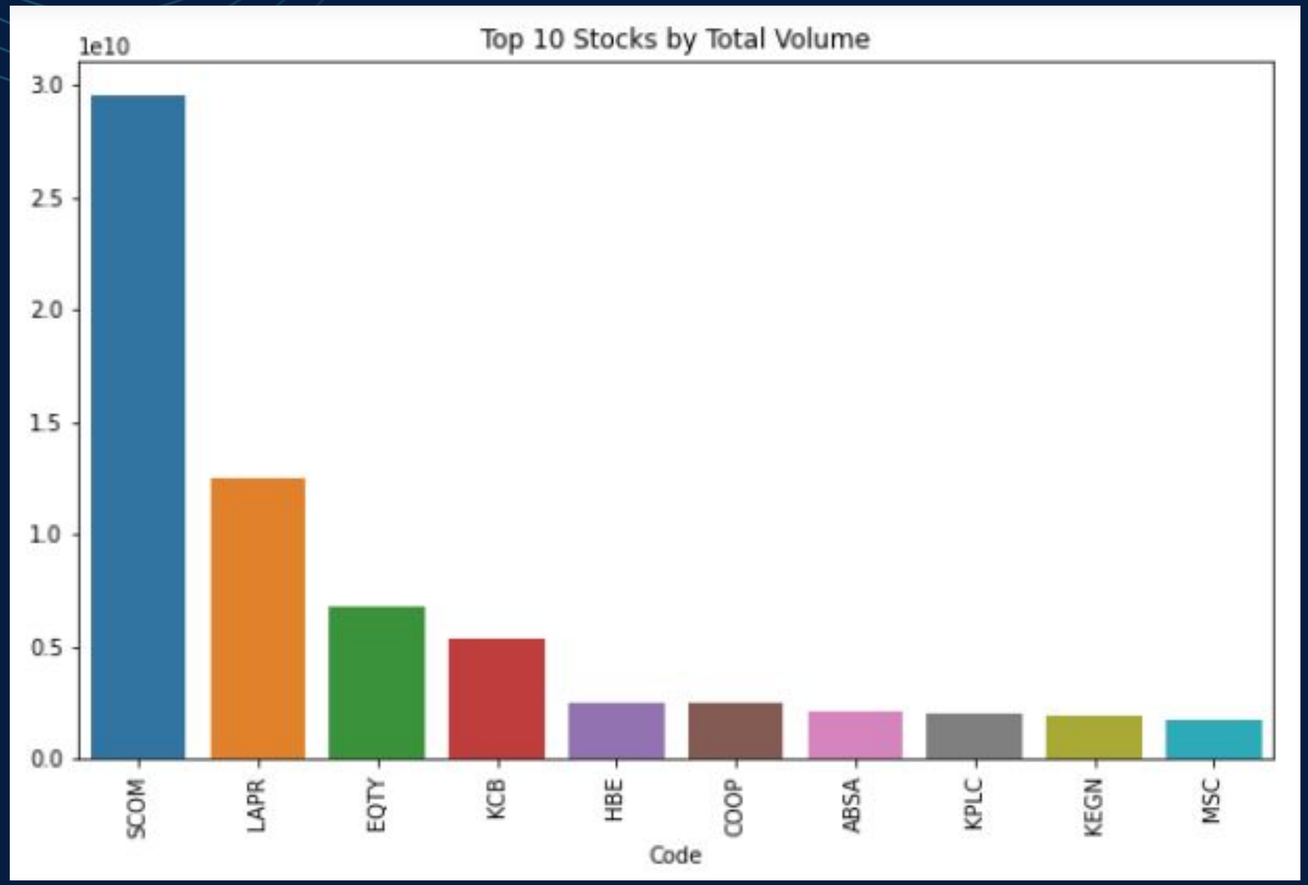
In 2014-2015 Kenya raised its first Eurobond , injecting over 2 billion into the economy , therefore increasing market activity

The peak in 2024 may be attributed to the recovery of the economy post Covid-19.

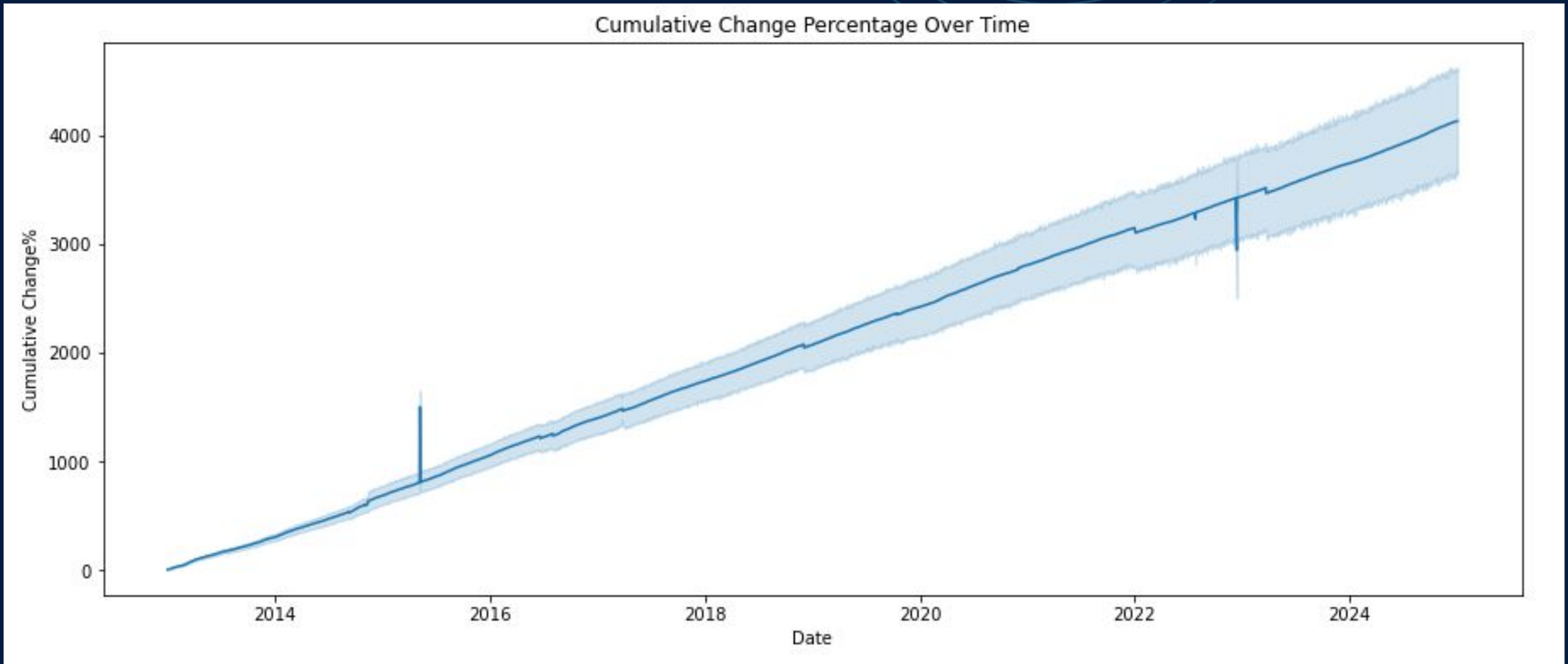
Top 10 stocks by Total Volume

Safaricom is leading with 29.6 billion, followed by Laptrust Imara Income- REIT which records approximately 12.5 billion shares then Equity Group Holdings Ltd recording 6.7 billion shares.

These are the most popular and liquid stocks picking the interest of investors.



Cumulative percentage change over time

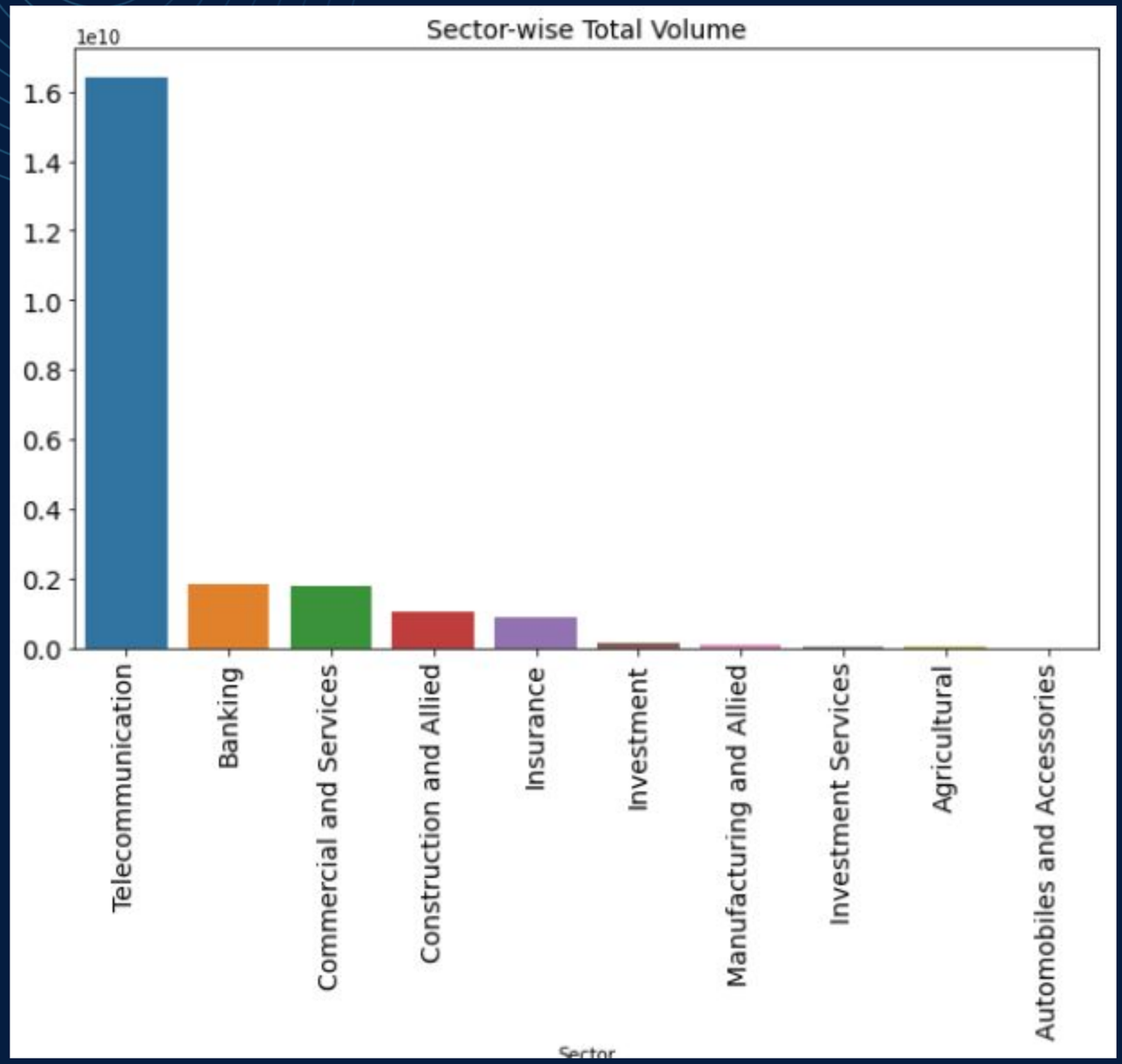


Despite the fluctuations, there is a consistent upward trend, indicating consistent growth.

The NSE, like many emerging markets is sensitive to both domestic events and global trends, as evidenced by the sudden spike in 2015 caused by the Eurobond and the sudden dip in 2023, possibly due to post-election uncertainties and economic shocks like inflation.

Total Volume by Sector

The Telecommunication sector is dominating the trading activity, with the traded volume exceeding 1.6 million units. suggesting extreme concentration of market activity.



MODELS

MODEL	MAE	MSE	RMSE
SARIMA	3.3668	15.0955	3.8853
XGBOOST	0.9720	4.4058	2.0990
LSTM	3.9024	380.122	19.4967

METRICS OF SUCCESS

To evaluate model performance, we used the following error metrics:

- Mean Absolute Error (MAE)
- Mean Squared Error (MSE)
- Root Mean Squared Error (RMSE)

XGBOOST outperformed all other models, achieving the lowest error values across all metrics.

RECOMMENDATIONS

Focus on high volume stocks. They have better liquidity and represent strong investor interest. This makes them suitable for short-term trading strategies due to the frequent price movement.

Allocate a larger portion of liquidity-sensitive investments to Telecommunication and Banking sectors for easier entry/exit and potentially lower transaction costs.

Diversify across both high-volume and emerging sectors to balance risk and tap into growth opportunities.

What Next?

1. Enhance Feature Engineering and Integration by
- Adding technical indicators like Bollinger Bands to enrich model input.
- Incorporating volume-based metrics to reflect market liquidity.
- Integrating fundamental and macroeconomic data like earnings reports and sector performance.

2. Expanding Data Utilization and Continuous Retraining by
- Defining an optimal historical data window for modeling.
- Automating data ingestion and model retraining through pipelines.
- Exploring high-frequency data (hourly/intraday) for improved short-term forecasting.

3. Improving Model Evaluation and Performance Monitoring by
- Using advanced metrics like Sharpe Ratio (risk-adjusted return),Maximum Drawdown (worst peak-to-trough loss) and Hit Rate (accuracy of directional predictions).
- Implementing drift detection to identify and react to market regime changes.

Thank you!