**Unlocking Safaricom’s Future: Predicting the Stock Price of Kenya's telecom giant**

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**Project Overview**

**1.** **Introduction:**

Our project revolves around leveraging time-series analysis to predict Safaricom's stock prices. Using advanced analytics on historical market data and key macroeconomic factors, we aim to extract crucial insights and build a robust predictive model for future stock prices.

**2.** **Problem Statement**

The challenge lies in the inherent unpredictability of Safaricom's stock movements. Our focus is on constructing a robust predictive model through advanced time-series analysis to unravel critical patterns in Safaricom's historical data. This predictive model aims to offer a reliable forecast of future stock prices, aiding stakeholders in navigating the complex and uncertain financial markets.

**3.** **Objectives**

**Main Objectives**

- Develop a robust time-series forecasting model for Safaricom's stock prices.

**Specific Objectives**

1. To Identify opportune times to buy and sell Safaricom stocks to maximize returns by analyzing historical data, market trends and economic indicators to pinpoint optimal entry and exit points for various project stakeholders.

2. To integrate market sentiment analysis to quantify external factors influencing Safaricom stock prices, leveraging sentiment scores from news, economic indicators, and regulatory changes.

3. To conduct sensitivity analysis to assess how inflation rate variations, interest rate, and GDP affect the model's predictions. This can be achieved by simulating different economic scenarios above and understanding how these changes affect stock price forecasts.

**Success Criteria:**

We will choose the model with RMSE, MSE close to zero.

**Data Sources**

·Stock Price Data

Source: WJS

Content: Historical stock prices, trading volume

·Economic Indicators

Source: CBK

Content: Inflation rates, interest rates, GDP

**Methodology**

**1. Initial Data Preparation**

* Transform data into a consistent time-series format.
* Handle missing values and outliers appropriately.
* Incorporate macroeconomic factors into the historical stock price data using resampling techniques
* Engineer additional features, such as moving averages
* Assess the quality and completeness of the data, addressing any missing values or outliers.

**2. Exploratory Data Analysis(EDA)**

* Explore Safaricom’s stock price patterns, identifying trends, and seasonality.
* Analyze correlations between stock prices, trading volume, and economic indicators.

**3. Modeling and Evaluation**

Time Series Models

ARIMA(AutoRegressive Integrated Moving Average)

LSTM(Long Short-Term Memory)

Facebook Prophet Model

On incorporating macroeconomic factors in modelling:

Conduct a comparative analysis between univariate time series modelling, such as ARIMA, and multivariate time series modelling, such as Vector Auto Regression (VAR), to evaluate their respective capabilities in capturing the dependencies and interactions between the stock price and macroeconomic factors i.e. interest rates, inflation rates and GDP.

**How are we going to incorporate the macroeconomic factors in modeling?**

In our project, we'll incorporate macroeconomic factors into our modeling approach. We'll conduct a thorough comparative analysis, exploring a range of time series models. Alongside conventional options like ARIMA and VAR, we'll delve into advanced techniques like LSTM. ARIMA, a univariate model, will help us to excel in capturing trends and seasonality in stock prices. VAR will extend this by incorporating dependencies among multiple time series variables, making it suitable for modeling interactions with macroeconomic factors. LSTM, a deep learning model, can capture long-term dependencies, essential for intricate relationships in financial time series.

Our evaluation process will focus on each model's proficiency in capturing dependencies and interactions with macroeconomic factors, ensuring we select the most effective approach for our specific financial time series data dynamics to predict the future stock market prices.

**4**. **Deployment**

Create an interactive Streamlit app that enables users to interact with the deployed model and obtain insights that empower investors to seize opportunities, optimize their portfolios and ride the waves of Safaricom’s stock market with confidence.