**INTRODUCTION**

**Background:**  
Inflation is a fundamental economic indicator that directly influences policy decisions, investment strategies, and business operations. In countries like Nigeria, where inflation can fluctuate due to factors such as oil price changes and fiscal policies, accurate inflation prediction becomes paramount. By leveraging machine learning models, it is possible to forecast future inflation trends more reliably, aiding in better economic planning.

The Consumer Price Index (CPI) is the primary metric used to measure inflation; essentially, a rising CPI directly indicates increasing inflation, meaning the prices of goods and services in a basket are generally going up over time, while a falling CPI signifies decreasing inflation or even deflation.

**Objectives:**  
The main objective of this study is to develop a machine learning model that predict the relationship between the consumer price index indicators and inflation rate in Nigeria.

**Scope:**  
The dataset used in this study spans from March 2003 to June 2024, providing monthly data on Nigeria’s inflation rate, oil prices, crude oil production and export, and CPI components, including food, energy, health, transport, communication, and education.

**DATA COLLECTION AND PREPARATION**

**DataSource:**

The dataset was sourced from Kaggle (https://www.kaggle.com/datasets/iamhardy/nigeria-inflation-rates). This dataset provides detailed monthly and yearly data on the inflation rate, crude oil prices, production and crude oil export and CPI components.

**Variables in the dataset include:**

1. **Inflation Rate:** Monthly percentage change in consumer prices.
2. **Crude Oil Price:** Monthly average price of crude oil.
3. **Production and Export:** Data on Nigeria's crude oil production and export volumes.
4. **CPI Components:** Breakdown of Consumer Price Index into sectors like food, energy, health, transport, communication, and education.

**Data Processing:**

* **Handling Missing Values:** Missing data points were imputed using the mean for numerical variables and the median for categorical data where appropriate.
* **Handling Outliers:** Outliers in the "CPI Food" and "Inflation Rate" columns were detected and adjusted to improve the model's accuracy.

**MODEL SELECTION AND TRAINING**

**ModelSelection:**

A **Linear Regression** model was chosen for this analysis due to its simplicity and interpretability. The model was implemented using the Linear Regression class from the scikit-learn library.

**Train-TestSplit:**  
The dataset was divided into two parts:

* **Training Set (80%):** Used to train the model.
* **Test Set (20%):** Used to evaluate the model’s performance.

The independent variable (X) for the model was the "CPI Food" index, while the dependent variable (y) was the "Inflation Rate".

**MODEL PERFORMANCE & EVALUATION**

**PerformanceMetric:**  
The **Mean Absolute Error (MAE)** was used as the primary metric for model evaluation. MAE measures the average magnitude of errors in the model’s predictions, making it a good choice for this regression problem.

**Results:**

* **Baseline Model MAE:** 3.45 (a simple guess or average of the target values).
* **Model (Train) MAE:** 2.42
* **Model (Test) MAE:** 2.33

The test MAE of 2.33 indicates that the model’s predictions are closer to the actual values than the baseline model (3.45), demonstrating improved predictive accuracy.

**LIMITATIONS**

1. **Data Quality:** The performance of the model heavily depends on the accuracy and completeness of the data. Missing or noisy data can skew predictions.
2. **Assumption of Linearity:** The linear regression model assumes a linear relationship between CPI Food and inflation. However, this relationship may not always hold, as inflation can be influenced by various non-linear factors.
3. **External Factors:** The model does not take into account external influences, such as government policies, changes in global economic conditions, or unexpected events like oil price shocks.

**CONCLUSION & RECOMMENDATIONS**

The linear regression model demonstrates promising results with an MAE of 2.33 on the test set, outperforming the baseline of 3.45. The study highlights the significant increasing inflation rate by the rising percentage of consumer price index of food. This suggests a strong correlation between these variables.

However, the study acknowledges several limitations, such as the assumption of linearity and the exclusion of external factors.

**Recommendations:**

The Central Bank of Nigeria can help reduce the inflation rate in Nigeria through monetary and fiscal policies such as:

1. Ensure that commercial banks in Nigeria increases its interest rate. This in turn controls the supply of money in the country. Thereby limiting the purchasing power of the people
2. Advising the federal government to reduce its spending.
3. Increasing taxes as this will reduce disposable income of consumers.
4. Promote competition of close substitute of goods and services.
5. Diversify investment rather than solely dependent on crude oil production
6. Improve supply chains of goods and services.

This study demonstrates that machine learning models can be valuable tools for predicting inflation rates, offering insights that can help shape economic policies and business strategies.