



**UNIVERSITI UTARA MALAYSIA**  
**SEMESTER 2 SESSION 2023/2024 (A232)**

**SQIT3073 BUSINESS ANALYTICS PROGRAMMING**  
**GROUP A**

# **FUTURE HORIZONS: PREDICTING MALAYSIA'S EXPORT TRENDS WITH ARIMA**

**PREPARED BY: GROUP PYTHONIC MINDS**

<b>NO.</b>	<b>NAME</b>
1	KH'NG WEI XIN
2	TAN WAI CHUAN
3	TAN YI QI
4	NG YONG YUE
5	TAN CHEE HWA (L)

**GITHUB LINK:** <https://github.com/WawaNg0720/PythonicMinds>

**DASHBOARD:** <https://pythonicminds-forecast-malaysia-export-trends.streamlit.app/>

**PRESENTATION VIDEO:** <https://youtu.be/e5COFjJugY0>

## **Table of Contents**

<b>INTRODUCTION</b> .....	1
<b>PROBLEM</b> .....	2
<b>SOLUTION</b> .....	3
<b>METHODOLOGY</b> .....	4
<b>FLOWCHART</b> .....	5
<b>RESULT</b> .....	9
<b>CONCLUSION</b> .....	10

## INTRODUCTION

In today's rapidly evolving global economy, international trade plays a pivotal role in shaping the economic landscape of nations. There are three types of international trade: export, import, and entrepot. Those trades will help the country to expand its markets worldwide. Besides that, the country can access goods and services that may not be available domestically. Therefore, this trade will account for most of a country's gross domestic product (GDP).

In this report, the authors will only focus on Malaysia's export part. Malaysia is a country known for its robust export-oriented economy. It has been a significant player in global trade for decades. Hence, this project will use the dataset "Malaysia's Export by SITC 3-Digit categories from 1990 to 2023" to develop a web dashboard. This dataset is taken from the official website of the Ministry of Economy. For further information, the full form of SITC is Standard International Trade Classification. It is a product classification of the United Nations (UN) used for external trade statistics.

Next, the project aims to develop an analytic web dashboard that forecasts Malaysia's future export trends based on historical data. Moreover, the ARIMA (Autoregressive Integrated Moving Average) Model will be leveraged in this project for forecasting purposes. It is a statistical analysis model that is widely used in time series forecasting.

In conclusion, valuable insights into the trends and patterns of Malaysia's exports will be gained after analysing this dataset. This comprehensive view is crucial for policymakers, businesses, and economists to make informed decisions, optimize trade strategies, and enhance Malaysia's competitiveness in the global market.

## **PROBLEM**

Although the dataset provides extensive export data, the ability to predict future trends in Malaysia's export activities remains a challenging task. Thus, the key problems to be addressed in this project are:

1. How can future trends in Malaysia's exports be accurately forecasted using historical data?
2. What are the significant patterns and seasonal variations in Malaysia's export data?
3. How can these forecasts and insights be presented in an intuitive and accessible manner for stakeholders?

## SOLUTION

To overcome the problems, a dashboard is developed using Streamlit. There are three option menus in the dashboard, namely "**Overview**", "**Dataset**" and "**ARIMA Model**".

First and foremost, the "Overview" section provides a detailed introduction to Malaysia's export landscape. This section introduces Malaysia's export sector and the significant role it plays in the country's economy. Furthermore, a detailed breakdown of Malaysia's key export commodities and the tools provided by this application are explained.

Next, the "Dataset" section allows users to read the actual export data in Malaysian Ringgit (million). The application also provides the user with some quick statistics and descriptive statistics.

Lastly, the last section, which is the "ARIMA Model" is the major part of this application. This page utilizes a combination of the ARIMA model and Plotly chart. The user can interact with this dashboard by selecting the export product category and the number of years to forecast. For further information, a user guide is available to walk users through the process.

In summary, two out of three parts of this dashboard have some interactive functions. The dashboard starts with a comprehensive overview of Malaysia's export sector and sets the stage for deeper analysis in the subsequent sections of the dashboard.



## METHODOLOGY

For this research, the data been chosen is about the export Malaysia within 1990 to 2023 by year. The data getting by *Dagangan luar | Portal rasmi Kementerian Ekonomi*. (n.d.). The data set contains 10 types of export which are food, beverages and tobacco, and so on.

### 1. Data Selection and Data Transformation

The data getting from the *Dagangan luar | Portal rasmi Kementerian Ekonomi*. (n.d.) contains 10 categories of goods that have been export. In this research, the data select whole categories for doing the forecasting. However, the data getting from the website is in the excel form. Therefore, researchers need to transform the data set to CSV. The reason of transformation is because python is much easier to handle CSV type folder comparing to excel file.

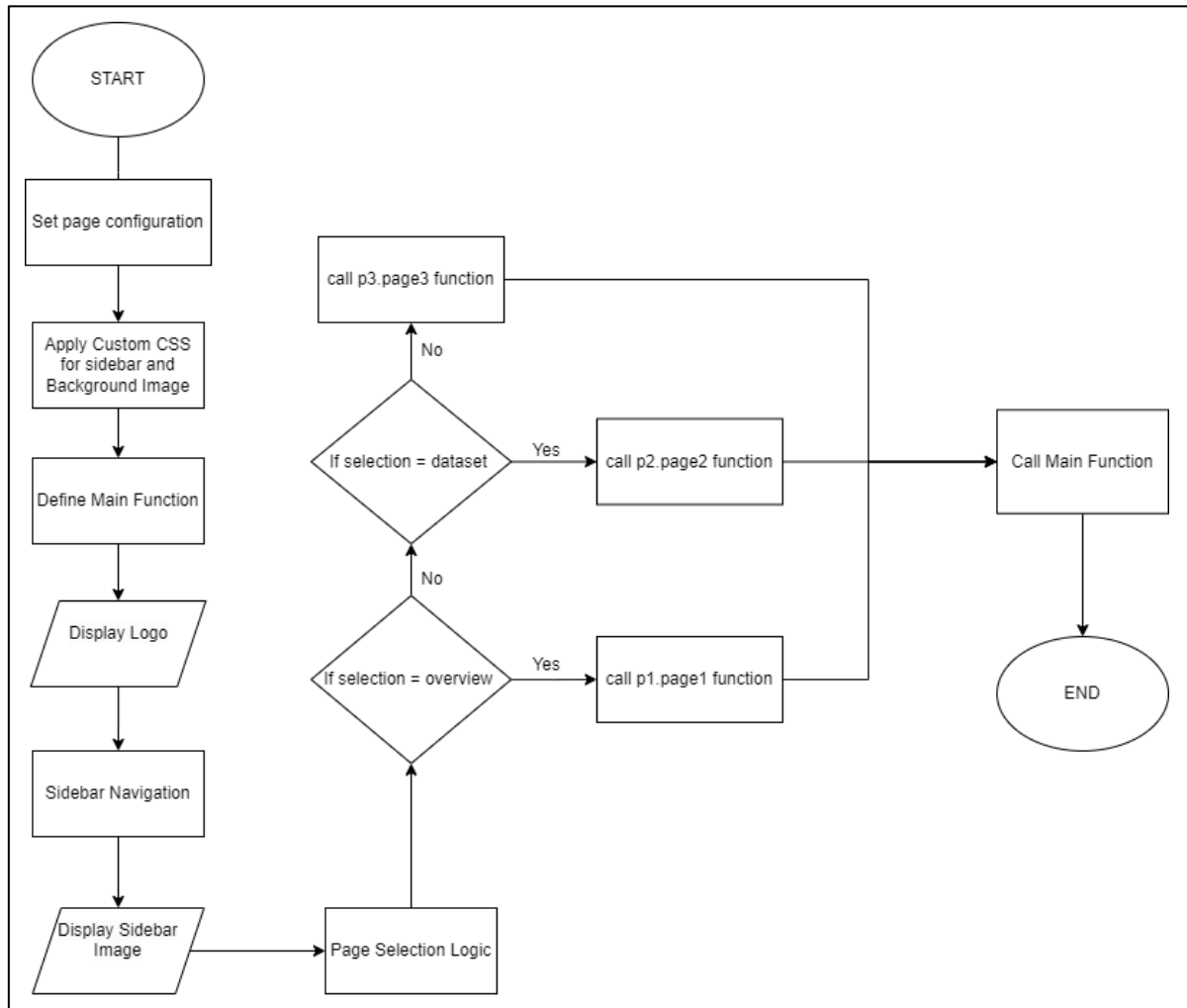
### 2. Forecasting Method

The ARIMA model has been used to analyse time series data since the 1970s, and for good reason: it is both simple and powerful. ARIMA (Autoregressive Integrated Moving Average) is a time series analysis and forecasting technique.

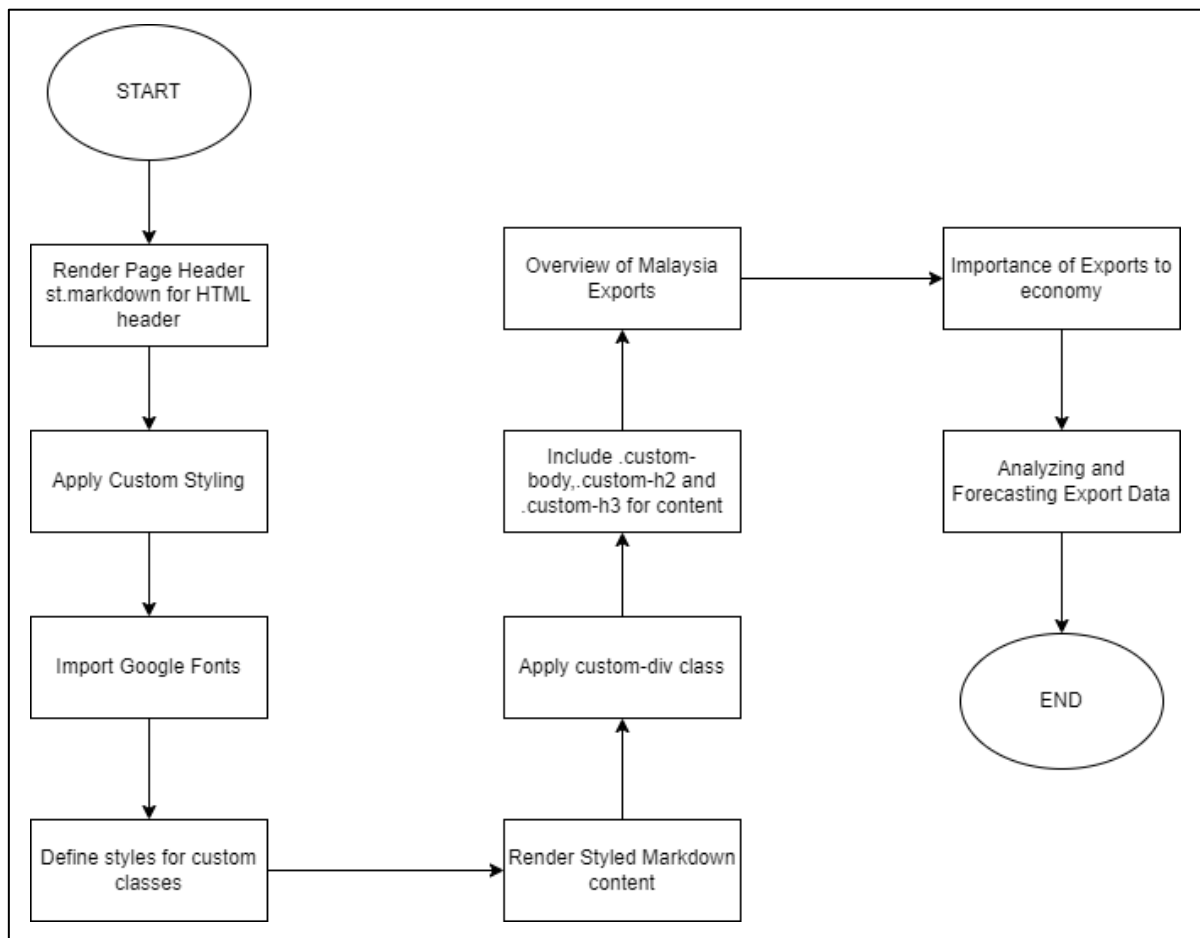
- AR(p) autoregression is a regression model that takes advantage of the dependant relationship between current observations and those from a preceding period. An autoregressive (AR(p)) component is one that uses past values in the regression equation for a given time series.
- I(d) Integration makes the time series stationary by differencing observations (subtracting one observation from the preceding time step). Differencing is the process of repeatedly subtracting a series' current values from its prior values.
- MA(q) Moving Average: a model that employs the relationship between an observation and a residual error from a moving average model when applied to lagged observations. A moving average component represents the model's error as the sum of past error terms. The order q specifies the number of terms to be included in the model.

## FLOWCHART

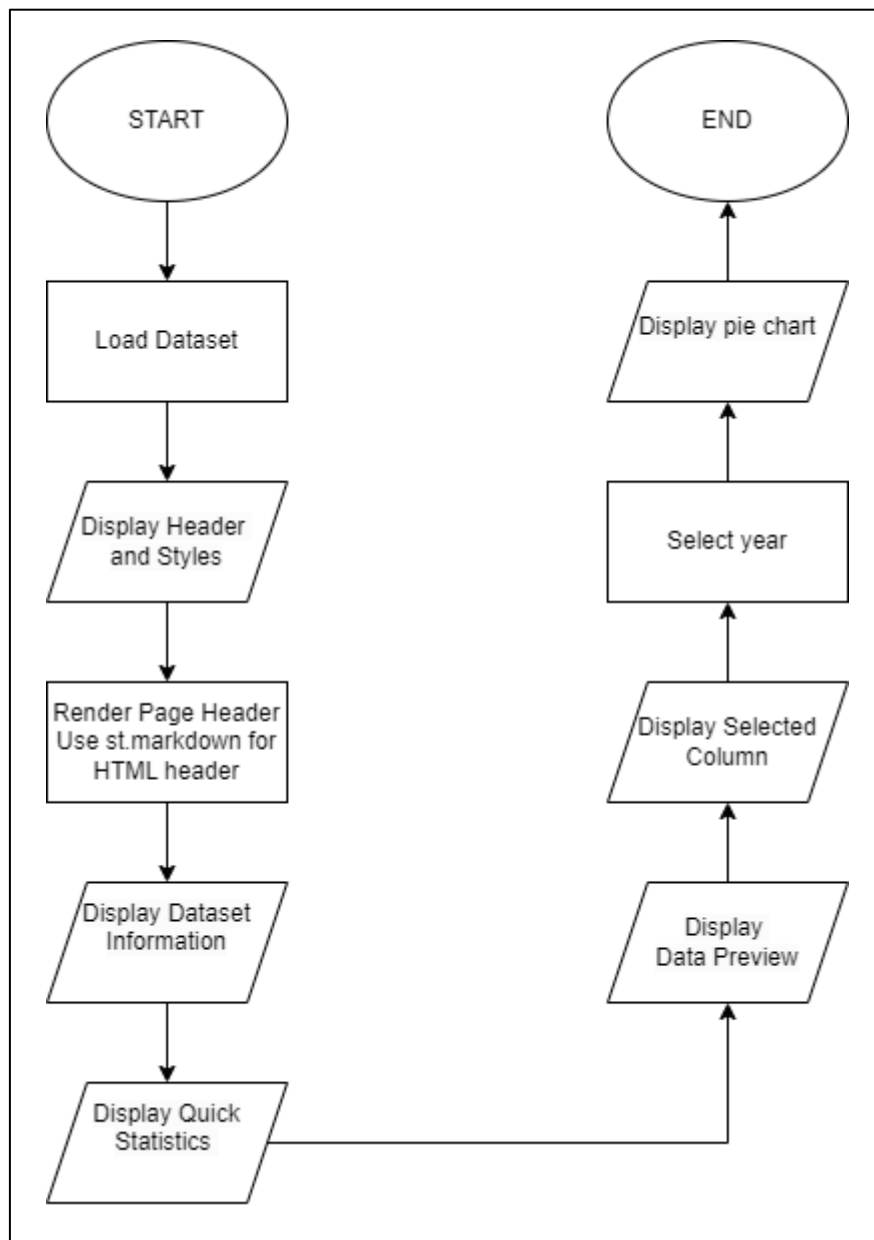
app.py

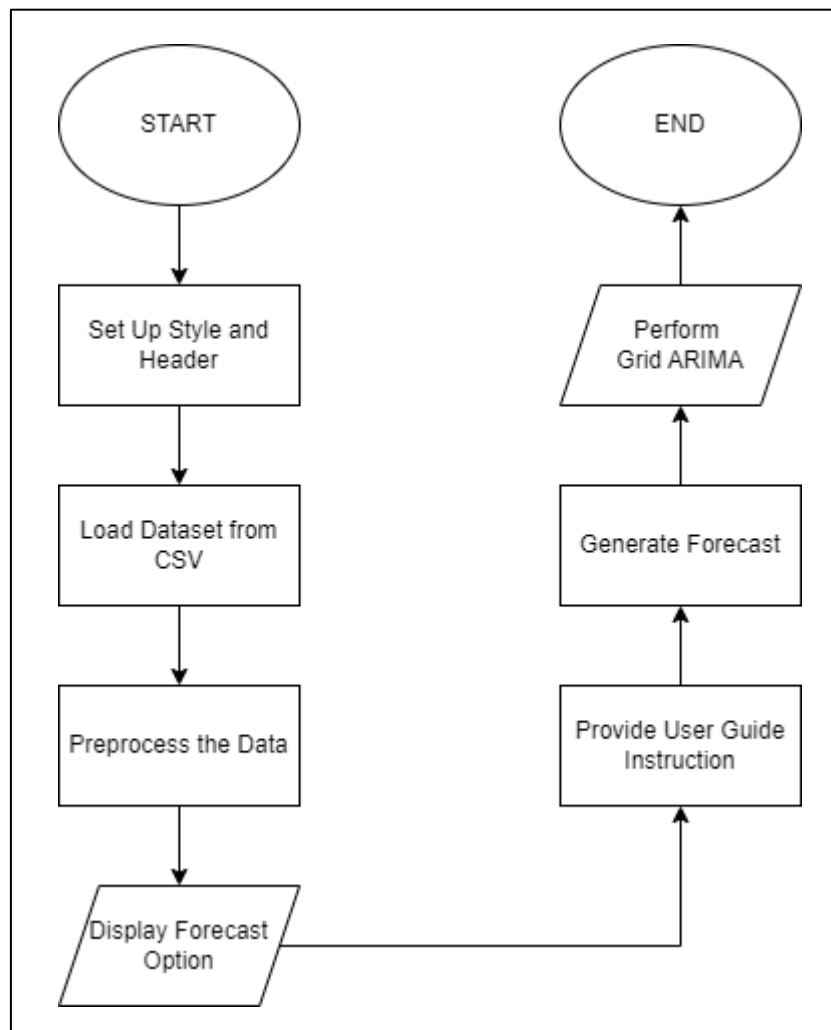


## page1.py









## RESULT

To ensure accurate and reliable predictions, the application will find the most appropriate ARIMA model for each export category. The minimum number of years that can be predicted is two, and the maximum is twenty. As a result, the model's accuracy reached a minimum of 76.92% and a maximum of 88.62%.

Since the chart is plotted using Plotly, the users can move their mouse pointer over the individual years to get an idea of the projected amounts or the real numbers. In addition, the accuracy of each export category varies due to the different values of the export data. Next, the sample size used was 33 years. This has reached the minimum value for drawing statistically sound conclusions.

Moreover, manufacturers and firms across various sectors can strategically align their production and operational plans by leveraging export trend forecasts in Malaysia. By analyzing these categorized trends, companies can identify which products and markets are expected to experience growth. After that, the companies can make informed decisions about whether to increase production quantities, diversify their product lines, or explore new export destinations. This proactive approach enables businesses to optimize their resources, capitalize on emerging opportunities, and enhance their competitive edge in the global market. Thus, the companies still can remain resilient and adaptive in the face of evolving economic conditions.

Last but not least, the model consistently performs well across different subsets of data. Hence, its reported accuracy is more reliable.

## CONCLUSION

This project utilizes the ARIMA model to forecast Malaysia's export trends from 1990 to 2023 and provide valuable insights into future trade activities. Developing an analytic web dashboard enables policymakers, businesses, and economists to visualize and interpret these forecasts effectively. Besides that, the integration of data retrieval, quantitative modelling, and visualization tools ensures the resulting platform is both informative and user-friendly.

However, this project relies solely on export data in Ringgit Malaysia (RM). This restricts the comprehensiveness of the insights. To enable a more robust analysis, future researchers can incorporate additional datasets, such as gross domestic product (GDP) in Malaysia per year or export data in volume. For instance, comparing export trends with GDP fluctuations could reveal whether changes in exports correlate with GDP growth or decline. Therefore, enhancing the analysis with such complementary datasets would provide a more nuanced understanding of Malaysia's economic dynamics and improve the model's predictive power.

To sum up, this project addresses the immediate need for accurate export forecasting and contributes to the broader goal of enhancing Malaysia's economic planning and strategy. With significant commercial value and community impact potential, this analytic system represents a meaningful advancement in the field of economic analytics and decision-making.