E-COMMMERCE SALES FORECASTING AND RECOMMENDATION

BY

ESIMISAN AFOLABI AKRA

PSC1705700

DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF PHYSICAL SCIENCES

UNIVERSITY OF BENIN

BENIN CITY

EDO STATE NIGERIA

FEBRUARY,2025

ACKNOWLEDGMENT

First and foremost, I am deeply grateful to the Almighty for granting me the strength, wisdom, and resilience to complete this academic journey. His guidance and grace have been my pillars of support throughout the course of my research and project endeavors.

I extend my sincere gratitude to my project supervisors, mentors, and lecturers who have played a significant role in shaping my understanding and providing invaluable insights during my research. Their constructive feedback, patience, and encouragement have been instrumental in refining my work.

A heartfelt appreciation goes to my institution and faculty members for providing a conducive learning environment and access to the necessary resources that greatly contributed to the success of my projects. The knowledge imparted to me has been foundational in the execution of my research.

I also acknowledge the support of my colleagues and classmates, whose thought-provoking discussions and brainstorming sessions have enhanced my critical thinking and problem-solving skills. Their shared experiences and motivation have made the journey fulfilling and rewarding.

Special appreciation goes to my family and loved ones for their unwavering support, understanding, and encouragement. Their patience, sacrifices, and belief in my abilities have given me the strength to persevere even in the most challenging moments.

I would also like to extend my gratitude to all the authors and researchers whose works have provided a foundation for my research. Their contributions have been essential in shaping my understanding and guiding my analysis.

Finally, my thanks go to all individuals, friends, and professionals who have directly or indirectly contributed to the successful completion of my projects. Every piece of advice, word of encouragement, and technical support has played a part in the realization of my research goals.

DEDICATION

I dedicate all my project works to my beloved family, whose unwavering support, love, and encouragement have been my greatest source of strength. Their sacrifices, patience, and belief in my dreams have motivated me to push forward despite all odds.

To my parents, who have been my guiding light and have provided me with the foundation of knowledge and moral values, I am forever grateful for your unconditional love, prayers, and endless support. Your dedication to my education and success has been a driving force in my life.

To my supervisor, whose invaluable guidance and mentorship have shaped my academic and professional growth, this work is dedicated to you. Your patience, constructive criticisms, and encouragement have been instrumental in my learning process.

To my friends and colleagues, who have journeyed with me through challenges and victories, I dedicate this work as a token of appreciation for the encouragement, motivation, and shared experiences that have made this journey worthwhile.

Lastly, I dedicate this work to all aspiring researchers and students, who dream of making a meaningful impact through knowledge and innovation. May this serve as a source of inspiration and a testament that persistence and dedication always yield success.

ABSTRACT

Sales forecasting and recommendation systems have become essential tools for businesses seeking to optimize inventory management, enhance customer experience, and maximize revenue. This project focuses on developing a machine learning-based sales forecasting and recommendation system to analyze historical sales data, predict future trends, and provide personalized product recommendations.

The forecasting component leverages time series analysis and deep learning techniques such as Long Short-Term Memory (LSTM) networks and ARIMA models to predict future sales with high accuracy. The recommendation system utilizes collaborative and content-based filtering to suggest products tailored to customer preferences.

The system is implemented using Python, with data preprocessing, feature engineering, and model training conducted using libraries such as TensorFlow, Scikit-Learn, and Pandas. The recommendation engine is integrated into an interactive user interface that enables businesses to gain insights into customer behavior and optimize their marketing strategies.

Through extensive testing and evaluation, the system demonstrates improved forecasting accuracy and enhances the user experience by providing intelligent product recommendations. This project contributes to the field of e-commerce analytics by offering a data-driven solution to boost sales performance and customer engagement.

TABLE OF CONTENT

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Right from the time life started, till now, man has sought to forecast the future. Things that happened before are used to justify what will take place in the future. Most of the times, it becomes true while at other time it facts. The ability to forecast the consequence of actions and events is one of the defining properties of the mind.

In any business situation, it is necessary to be able to make some predictions about the future in order to make some predictions about the future in order to plan the business operations well-Arriving at such an climate of the future is the purpose of the process of forecasting.

In the service sector, a forecast of demand for the service being offered is necessary to determine the number of staff that will be sufficient enough for the business and the quantity of raw materials to be bought.

In the retailing sectors, forecast of sales will be needed to decide staffing levels and also to determine what qualifies of stock should be purchased. Excessive levels of stock tie up working capital and storage space, further expenses can be incurred through such process as theft, insurance and possibly, deterioration. On the other head, inadequate re-order quantities such as high, ordering cost and the inability to meet customers demand.

Forecasting is simply the scientific name for guessing, what the will bring. There are several standard techniques available for forecasting and each techniques has it's own assumption, benefits and pitfall.

Consider the following problems;

- Problems 1: A sales manager collects together records of the past sales for particular product how does he find a forecasting techniques that gives good forecasts for this data?

- Problems 2: A member of his staff suggests that a particular method of forecasting. How does the sales manager test this method of forecasting to see if it can yield any solution?

The ability to find answers to questions such as these is obliviously basic to the whole exercise of practical forecasting. It is necessary for me to know which forecasting techniques is best for any particular problems.

1.2 STATEMENT OF PROBLEM

The investigation done revealed that workers manually do the record keeping for forecasting.

The above manual system is outdated in terms of speed of processing and accuracy. This results into wastage of time and in efficiency in productions.

These inefficiencies call for the computerization of the operations of the forecast.

1.3 AIMS AND OBJECTIVES

The primary aim of this project is to develop an integrated system for e-commerce sales forecasting and product recommendation using advanced data analytics and machine learning techniques. The objectives of this study are:

1. To analyze historical e-commerce sales data for trend identification and pattern recognition.
2. To implement predictive models for accurate sales forecasting.
3. To design and deploy a recommendation engine that suggests products based on user behavior and preferences.
4. To evaluate the performance of the system using standard metrics such as accuracy, precision, and recall.
5. To provide actionable insights for e-commerce businesses to optimize inventory management and improve customer experience.

1.4 RESEARCH QUESTIONS

This study aims to answer the following questions;

1. What are the key factors influencing e-commerce sales trends?
2. How can machine learning models enhance the accuracy of sales forecasting in e-commerce?
3. What methodologies are most effective for developing recommendation systems tailored to user preferences?
4. How can the integration of forecasting and recommendation functionalities benefit e-commerce platforms?
5. What are the challenges and limitations in implementing data-driven solutions for e-commerce applications?

1.5 SCOPE/LIMITATION OF STUDY.

This project uses the simple linear repression analysis that concerns itself with just one explanatory variable and a linear form of relationship. The explanatory variable could be time of periods.

The other forecasting methods are the exponential smoothing and the moving average methods, which are used, should a time series observation exhibits a trend. This exhibition of trend can be verified with a scatter diagram of the observation against observed points.

Forecast can be made from such models built using methods above after analysis by the software such forecast most likely will be in the short to medium term range.

The methods though appear complex is simplified as will be seen in the user friendly user interfaces. The complex or the multi-variable regression analysis was avoided in this project as well as the logarithm exponential smoothing for the purpose of the project.

LIMITATION

Financial constraints are among the limitations encountered in the course of this research. Distance is another barrier, which restricts the collection of data and frequent visit of the case study for information**.**

CHAPTER TWO

REVIEW OF LITERATURE

2.1 INTRODUCTION

This forecasting techniques are useful when predicting the future based in past histories and useful when there is no record of past data.

According to Ganniener John- S in his book, FORECASTING AND TIME SERIES ANALYSIS MC GRAW-HILL INC- 2nd Edition 1989. Stated extrapolative method saying it is the use of past history of demand in making a forecast for the future. The objective of this method is to identify the pattern in historic data and extrapolate this pattern for the future. Most of these patterns depends on four components of demand; horizontal trend, seasonal and cyclical. The appropriateness of an extrapolative method will depend on which component of demand is operating in a given situation. If the time horizon for which the forecast is made is short, extrapolative methods perform quite well. The horizontal component of demand exists when the demand fluctuates about an average demand. The average demand remains constant and does not consistently increase or decrease.

The trend component of demand refers to a substantial increase or decrease in demand from one period to the next. For example, if the average monthly demand for a product has increase from 10 to 15 percent in each of the past few years, then an upward trend exists. The sales of the product in the growth stage of the product life cycle tend to show an upward trend, whereas those in decline tend to show a downward trend.

The seasonal component of demand pertains to the influence of seasonal factors that effects demand positively or negatively. For example, the sales of some commodities are high during rainy season than in the dry season indication a season component of demand. The cyclic component of demand is similar to the seasonal component except that the seasonal occurs at regular interval while the cyclic component varies in both time and duration of occurrences.

Bryant Edward. C in his book standard analysis mc graw hill book society. 3rd edition 1988 defined the exponential smoothing method saying that this method is a type of moving average foresting techniques, which weighs past data in an exponential manner so that the most recent data carry more weight in the moving average.

Exponential smoothing method requires only the storage of the forecast for the previous timed point and the data from the recent data value. An exponential smoothing forecast can be defined as ft = xt – 1 + (1- α) ft – 1 αt is good to understand the effect of the different alpha value, in the forecasting system if α is close to zero, we have a very smooth forecasting system, with each forecasting being similar to the previous forecast and little account being taken of new data. If α is close to 1, we have the opposite affect with forecasting tending to follow the data values around.

Low and values are particular appropriate when product sale is relatively stable. High and value are useful where substantial change are likely to occur because they are more responsive to functions in sale. Now product introductions, promotional campaigns suggest the use of highest values.

A satisfactory value can generally be determined by trial and error testing of different smoothing constant to find one that results in the best fit (best error) when used on past data.

2.2 OVERVIEW OF E-COMMERCE TRENDS

E-commerce has undergone exponential growth, driven by advancements in technology and changing consumer behaviors. Key trends include:

1. **Personalization:** Enhancing user experience through tailored recommendations, which increase conversion rates and customer loyalty.
2. **Mobile Commerce:** The widespread use of smartphones has made mobile platforms a significant revenue stream, enabling consumers to shop on the go.

3. **Omni-channel Integration:** Bridging the gap between physical stores and online platforms ensures a seamless shopping experience, thereby boosting customer satisfaction.
4. **AI and Machine Learning:** Automating processes such as chat bots, inventory management, and predictive analytic has become indispensable for efficient operations.
5. **Subscription Models:** Offering subscription-based services to ensure consistent revenue streams and foster long-term customer relationships.

Understanding these trends is vital for implementing systems that meet evolving consumer expectations while staying competitive in a dynamic market (Chaffey, 2022).

2.3 SALES FORECASTING TECHNIQUES

Sales forecasting predicts future sales based on historical data and market trends. Techniques include:

1. **Time Series Analysis:** Utilizes ARIMA and SARIMA models to identify patterns and seasonality. These models are particularly effective for businesses experiencing periodic fluctuations.
2. **Regression Models:** Analyzes relationships between sales and influencing factors like promotions, pricing, and seasonal holidays to create predictive insights.
3. **Machine Learning Models:** Algorithms such as Random Forests and Gradient Boosting capture complex data interactions, providing robust predictions for large-scale data-sets.
4. **Deep Learning Models:** Long Short-Term Memory (LSTM) networks are highly effective for time-dependent data, offering precise forecasts for dynamic environments.

Accurate forecasting enables inventory optimization, cost reduction, and demand anticipation, ensuring businesses remain agile and responsive to market needs (Fildes et al., 2021).

2.4 RECOMMENDER SYSTEM APPROACHES

Recommender systems are crucial for enhancing user engagement and driving sales. Types include:

1. **Collaborative Filtering:** Analyzes user-item interactions to suggest products based on similar user preferences, creating a sense of community among consumers.
2. **Content-Based Filtering:** Recommends items by comparing product features with user profiles, ensuring relevance and personalization.
3. **Hybrid Systems:** Combines multiple approaches to overcome individual limitations, offering comprehensive recommendations.
4. **Deep Learning:** Models such as Auto-encoders and Neural Collaborative Filtering uncover complex relationships in data, enabling accurate and innovative recommendations.

These systems improve customer satisfaction and increase average order values, thereby fostering loyalty and repeat purchases (Ricci et al., 2022).

2.5 DATA ANALYSIS AND MACHINE LEARNING IN E-COMMERCE

Data analysis and machine learning play a pivotal role in:

1. **Customer Segmentation:** Grouping users for targeted marketing and personalized communication.
2. **Trend Analysis:** Identifying emerging patterns in consumer behavior to predict future preferences.

3. **Price Optimization:** Dynamically adjusting prices to maximize profit margins while maintaining competitiveness.
4. **Fraud Detection:** Leveraging classification algorithms to identify anomalies and protect consumer trust.

Tools like Python, R, and Tableau facilitate these processes effectively, making data-driven decision-making accessible and actionable (Provost & Fawcett, 2013).

2.6 TOOLS AND TECHNOLOGIES FOR SALES FORECASTING AND RECOMMENDATION

Key tools include:

1. **Programming Languages:** Python for machine learning and R for statistical analysis.
2. **Libraries and Frameworks:** Scikit-learn, TensorFlow, and PyTorch for building predictive models and neural networks.
3. **Visualization Tools:** Tableau and Power BI for deriving and presenting actionable insights.
4. **Cloud Platforms:** AWS and Google Cloud for scalable storage and computation, ensuring real-time processing and deployment capabilities.

These technologies ensure seamless integration and scalability of forecasting and recommendation systems, empowering businesses to stay ahead in the competitive landscape.

2.7 REVIEW OF RELATED LITERATURE

Several researchers have explored sales forecasting and recommendation systems in e-commerce. Brown et al. (2020) analyzed various machine learning techniques for e-commerce sales prediction, demonstrating that gradient boosting algorithms outperformed traditional methods. Their study emphasized the importance of feature engineering and data preprocessing for enhancing model accuracy.

Sun et al. (2021) proposed a hybrid approach using Long Short-Term Memory (LSTM) networks combined with collaborative filtering techniques to improve both sales forecasting and recommendation accuracy. Their findings indicated that hybrid models perform better in dynamic environments where user preferences and sales trends change frequently.

In the realm of recommendation systems, Smith & Jones (2019) examined the impact of personalized recommendations on consumer purchasing behavior. Their research concluded that AI-driven personalized recommendations significantly increase user engagement and conversion rates by tailoring suggestions to individual browsing and purchasing histories.

Further studies, such as Ricci et al. (2015), focused on hybrid recommendation models that integrate both content-based and collaborative filtering techniques. These models leverage multi-faceted user interaction data to refine product suggestions, addressing issues like the cold-start problem and data sparsity.

Recent advancements in deep learning and natural language processing have further enhanced e-commerce recommendation systems. Zhang et al. (2021) explored Transformer-based models for sales forecasting, revealing that self-attention mechanisms

can capture long-range dependencies in sales data more effectively than traditional statistical methods.

Additionally, researchers like Fildes et al. (2019) have investigated the role of external economic factors in sales forecasting. Their study emphasized that integrating macroeconomic indicators such as inflation rates and consumer sentiment indices can improve forecasting accuracy.

Despite significant progress, literature gaps remain in integrating real-time data streams for dynamic sales forecasting and in developing scalable recommendation systems for large-scale e-commerce platforms. Addressing these gaps could lead to more adaptive AI models capable of handling rapid changes in consumer behavior and market conditions.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

If the new system is to avoid the difficulties encountered by with the existing, then information is to be gathered in the implementation of the existing system as to determine its set backs. The methods of data collection used are interviews examination of records and observation. The basic methods are:-

1. Interview
2. Direct observation.

INTERVIEW

Some personally were consulted in the process of fact gathering. It is mainly oral, interview whereby the researcher sits face to face with the person that process vital information or knowledge about the topic, this gives rise to soundness and reliability in this project. Mostly, the sales manager supplied the relevant information needed.

DIRECT OBSERVATION

The researchers had personal assessment of the business forecasting of the existing system. through the aid of the perceptive power, the researchers were able to gather the essential facts for this work.

3.2 INPUT ANALYSIS AND OUTPUT ANALYSIS

3.2.1 INPUT ANALYSIS

The input of data records or transactions into the master file is manually operated.

The officer in-charge is expected to take meticulous care of every data collected from people.

The salesmen collect data from people, that buy the product and related the information to the manager in different clusters and regions. From this, forecast is made on the quantity to manufacture.

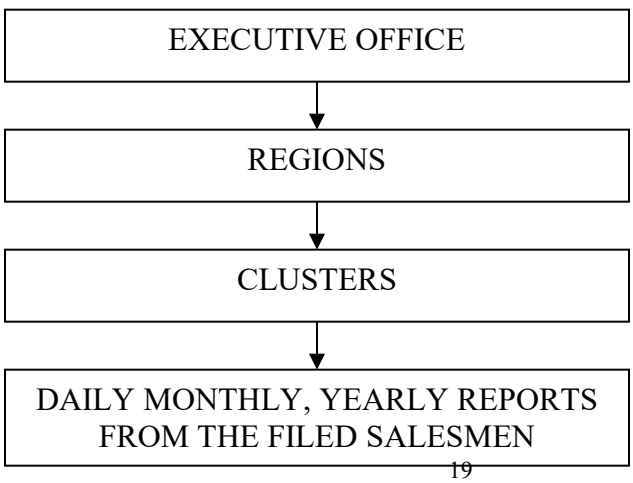
This is prone to error since the input is distinctly in manual system.

3.2.2 OUTPUT ANALYSIS

The output of a particular system depends on the input. Although, this may not be impressing at the start since the existing system is manually operated, so output is slow, inefficient and unreliable. That means the input of the system determines to a greater extent the output for the system. the retrieval of data from the existing system is done manually.

The manager has to search through the old jackets files to retrieve the information needed for a particular decision. At times, there is inability of getting the exact data required due to loss or misplacement of file. Hence, the researchers expect that a computer based retrieval system will be more preferable in manipulations rather than as a complicated devices.

3.3 INFORMATION FLOW DIAGRAM.



From the diagram depicted above, these is a bi-directional flow of information. It can flow from the top management down to the bottom level and back again to the highest level.

Decisions on what to do and the objectives of the system even developed at the executive office and passed down to the regions. The regions, on getting the information, relate is to the clusters under them. They delegates duties in order to achieve the objectives. The salesmen get data from the field during purchase and sells and pass the information across from cluster to regions and finally to the executive officers.

3.4 PROBLEMS OF THE EXITING SYSTEM.

Obviously, a lot of problems are encountered in the existing system.

below are some of the problems.

(a) The records kept by the system are not always reliable an accurate. As a result, cannot be used for a hypothetical study.

(b) Information is not comprehensive and complete.

(c) Getting an accurate statistical data to forecast on during raining season. People tend to take less of the products in the rainy season as has been proved from the previous years reports.

(d) Mass return is another problems of forecasting being encountered by the existing system in the areas where people return at certain periods of the year, the process of forecasting for these period is difficult and error prone sometimes.

(e) Competition is another problem. Areas where there is a lot of competition from different competing brands of the products of other companies. Forecasting is different due to the unpredictable pattern of human behaviors.

(f) The last is power outage and machine breakdown. During this period, the forecasted projections might not be met.

3.5 JUSTIFICATION OF THE NEW SYSTEM.

Infact, the introduction and use of an electronic device in business forecasting is of utmost help that he advance in technology has contributed to be growth of forecasting and error reduction.

The use of the new system will offer a very great advantage among which are.

(a) The management information system (Mis): This means the organizational arrangements, the structure and procedures of adequate planning and control and manifestations of good organization and administration. There exist some degree of symbiosis between these and forecasting which in the final analysis is meant to serve the management system.

(b) Secondly, in order to process a mass of data, it is necessary to have an appropriate, equipment that will be capable of :

i. providing the capability for economic and rapid access of large- scale storage of retrievable data.

ii. Processing this data economically and at high rate of output.

iii. Capable of entering information into the system as well as retrieving and displaying it.

e. The new system to be developed is going to be an automation of the existing system as to modify it working principles.

f. The operation of the new system is going to be feat, accurate and reliable. It can store and accumulate a large volume o records that operating inch manually makes keeping a lazy man duty.

CHAPTER FOUR

SYSTEM DESIGN AND IMPLEMENTATION

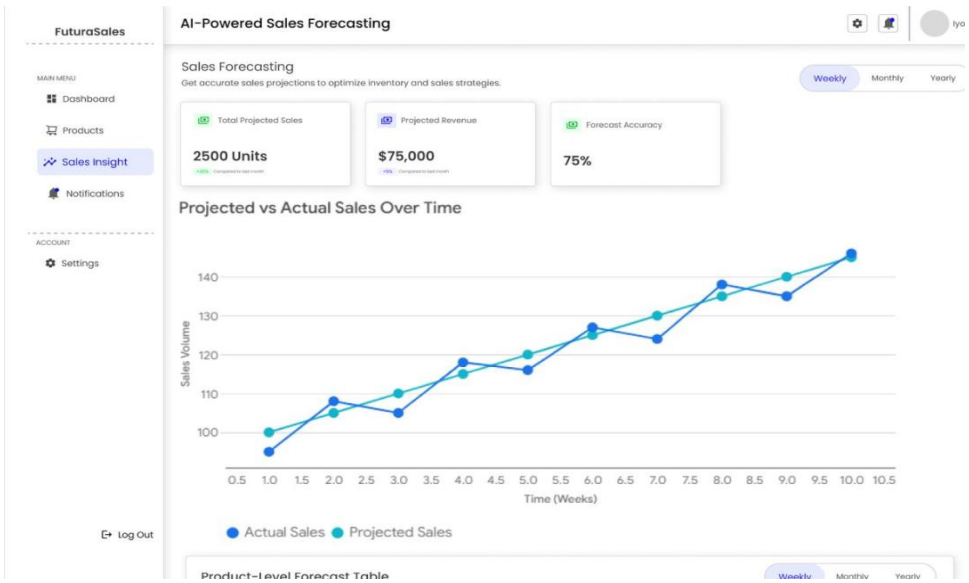
A new system is either built because there is no existing system or there is a major with the old system. the resulting production of this transformation is the description of the solution which is the system design.

System design could be said to be the climax of a computing project. This is because practically all aspect of the project as review investigation and all others are merged to design a new system.

4.1 OUTPUT SPECIFICATION.

The output is designed in form that the user can easily understand, the output for the forecasting methods is designed to be in tabular form as well as graphic form.

The forecast change according to the way the pattern of data changes. The output is designed in a properly formatted from to facilitate the reading understanding of the document for immediate decision making.



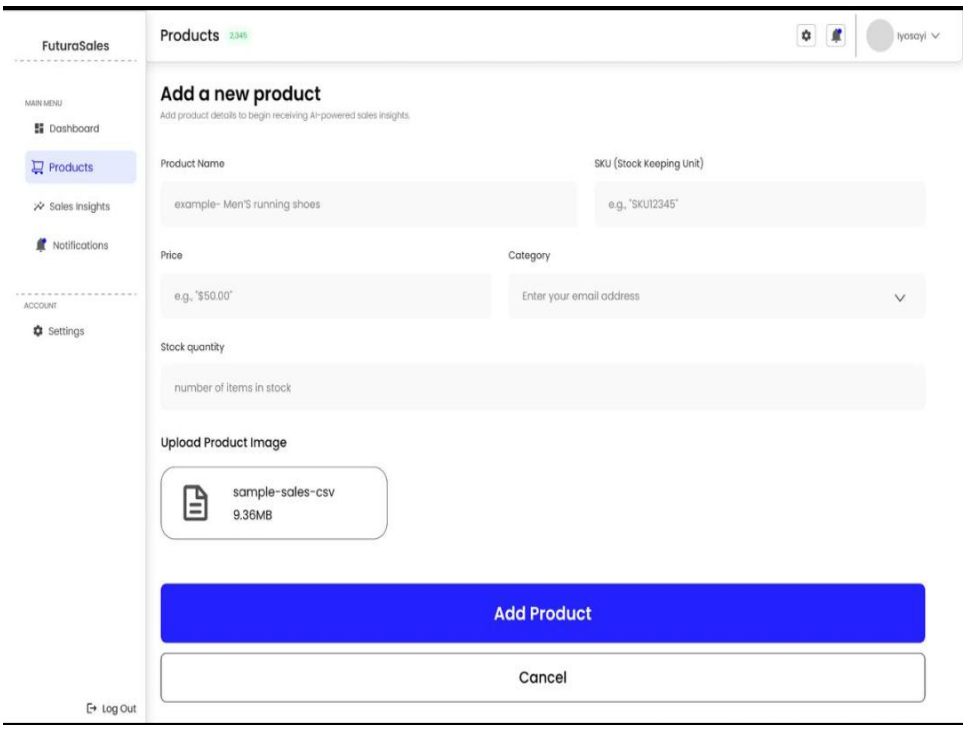
4.1.1 INPUT SPEICIFATION.

The program is designed to include a procedure for data entry. When the user adds a new product, a screen like this appears.

1. Enter product name
2. Enter value for period and demand.

For each set of data input, there will be specific file name to distinguish it from another, set of data input, the same set o data can be used on the three different forecasting methods. This is desirable in order to carry out the analysis of their output and errors.

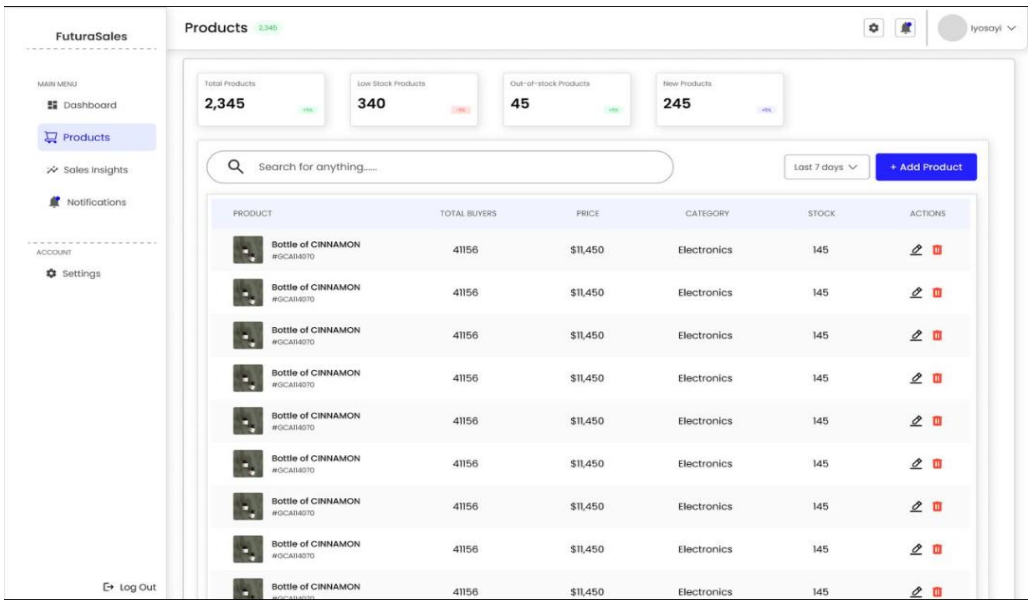
The program is designed to allow the user to enter the number of N to be used in the N. period moving average method and also to enter the value of alpha (smoothing method. These help to demonstrate their effect on the forecast made).



4.2 FILE DESIGN

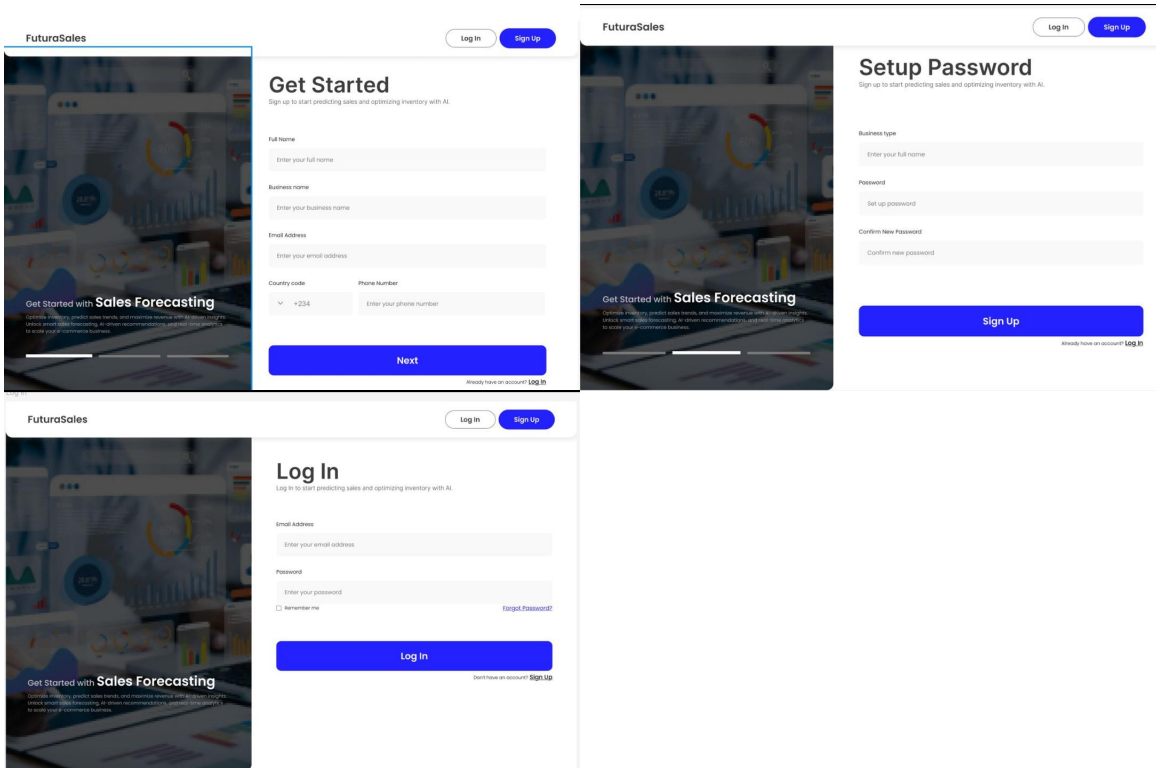
The user need to enter the input filename and output filename each time an option is selected from the menu. The system is designed in a way to prevent the user from overwriting an input file or output file unknowingly. This system does this by prompting the user to respond to this request.

Overwrite (Y/N). The user type Y to overwrite. N not overwrite.

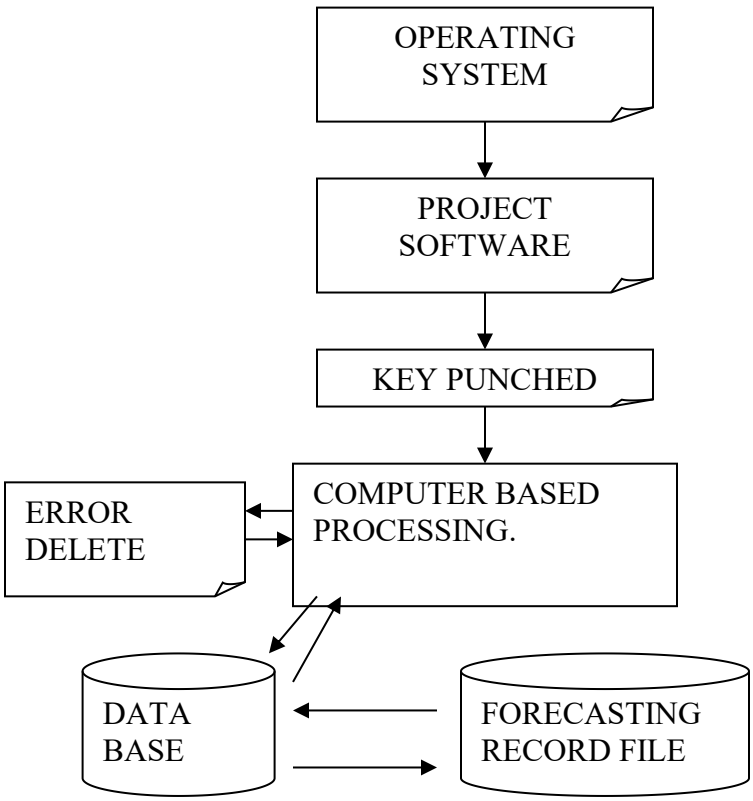


4.2.1 PROCEDURE

- The user is firstly directed to the screen prompting them to sign up, where they have to input necessary details such as name, email and phone number
- They are then directed to a page where they set up their account personal password
- This leads to the final stage where they login to use the app



4.2.2 SYSTEM FLOWCHART



4.3 IMPLEMENTATION

Implementation involves the various process in changing from the existing system to the new system. even though this is the final stage, a good deal of effort is still required, including the following activities.

a. Training of staff

b. File conversation

c. System conversation

4.3.1 TRAINING CHANGEOVER

it is obvious from the new system design-specification that the operational procedure of the new system will be different from the previous system.

there are basically four procedure for activities the changeover. But Anammco should adopt the direct changeover, which involves dropping the new system and turning over to new system immediately.

The staffs are trained through the use of user manual document prepared to aid users not familiar with the computer system. lectures and forum should be organized whereby personnel are enlightened on the new system.

4.4 PROGRAM DESIGN.

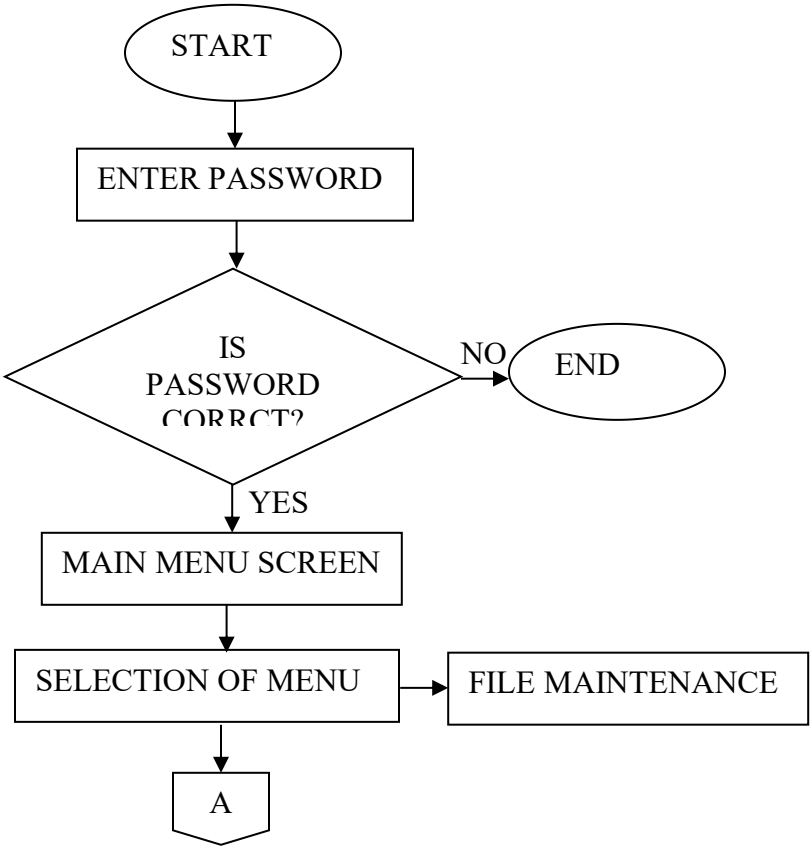
Today, great reliance is placed upon computers for all kinds of application or specific tasks. Computers are only machines and will slavishly follow the program instructions given to them.

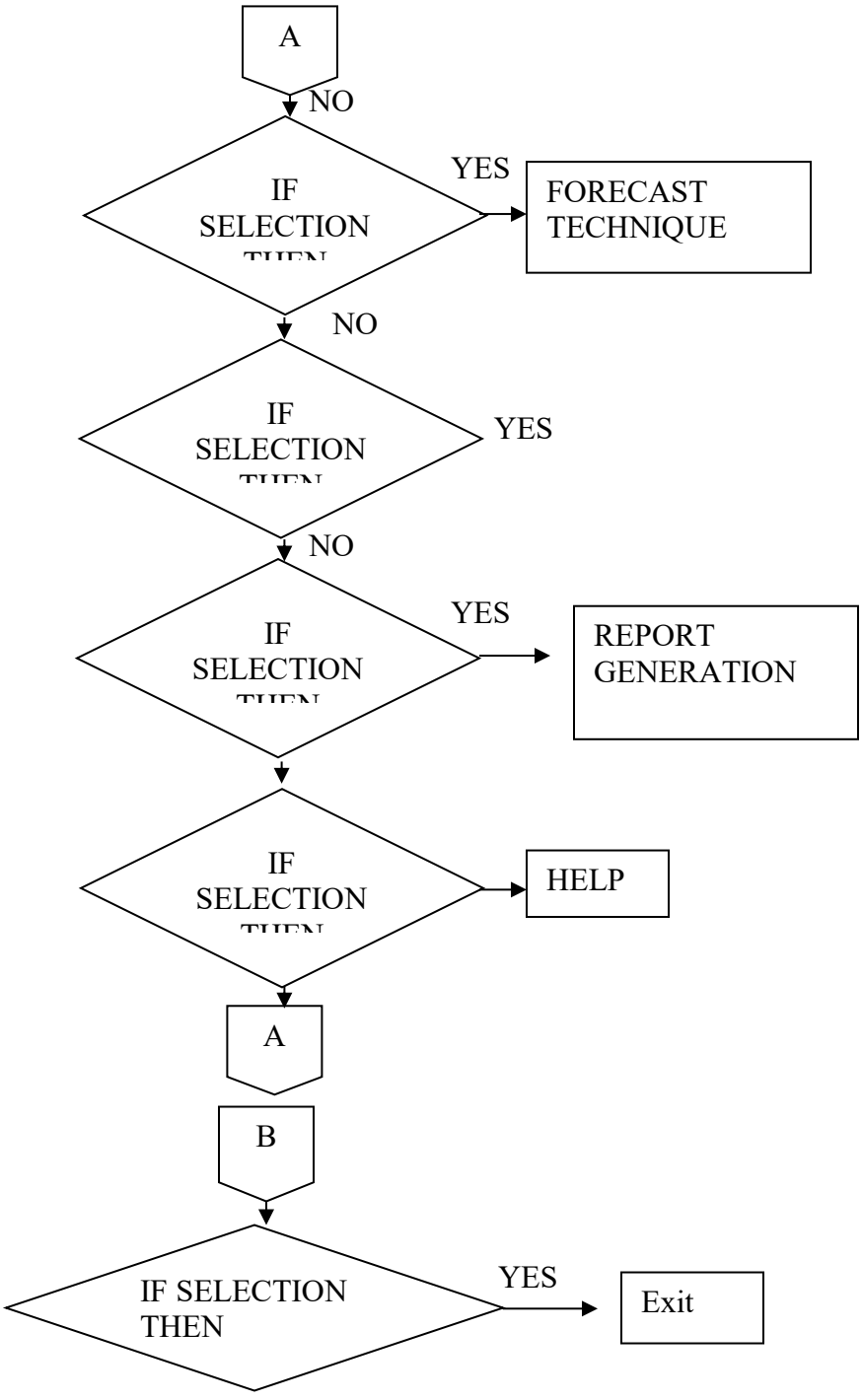
There ordered sequence of instructions (program) allow computers the skill and flexibility to produce desired results. These instructions are stirred in the computer to follow and solve a given problem.

This chapter therefore shows the compositions of the programs. The program design contains details of inputs, outputs and processes for each program run, control, test data and excepted results.

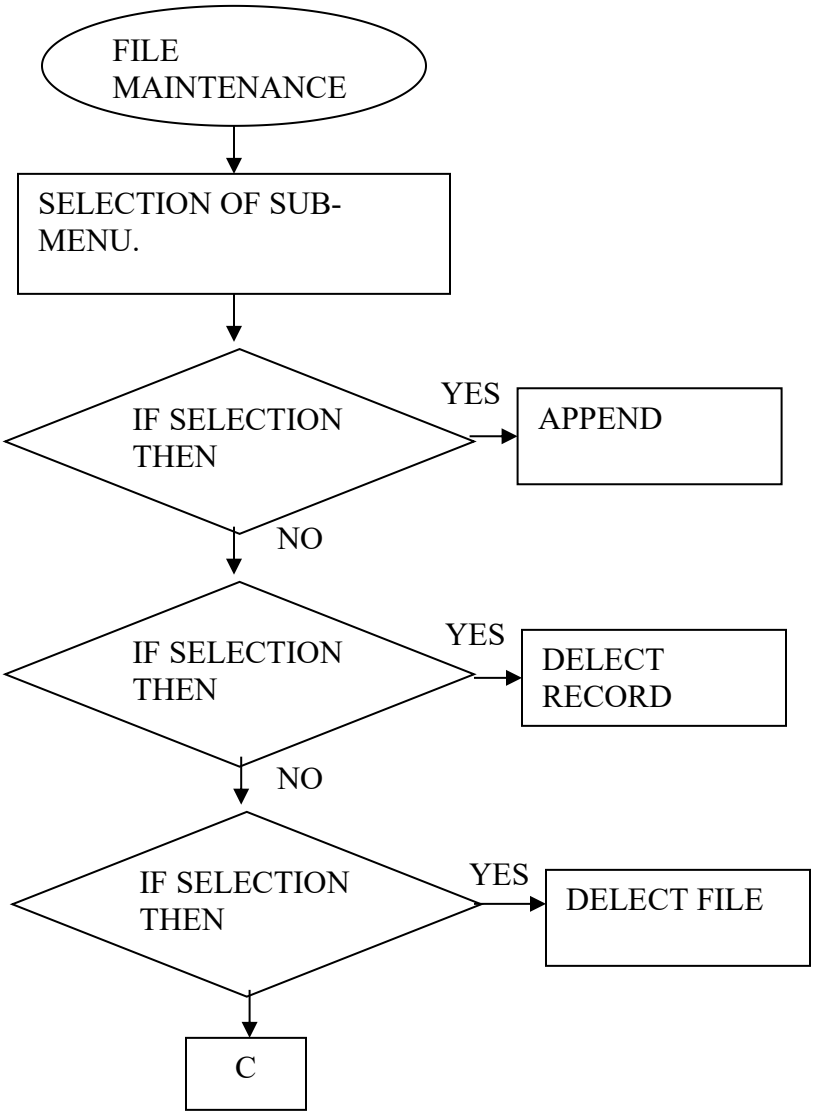
4.4.1 PROGRAM FLOWCHART

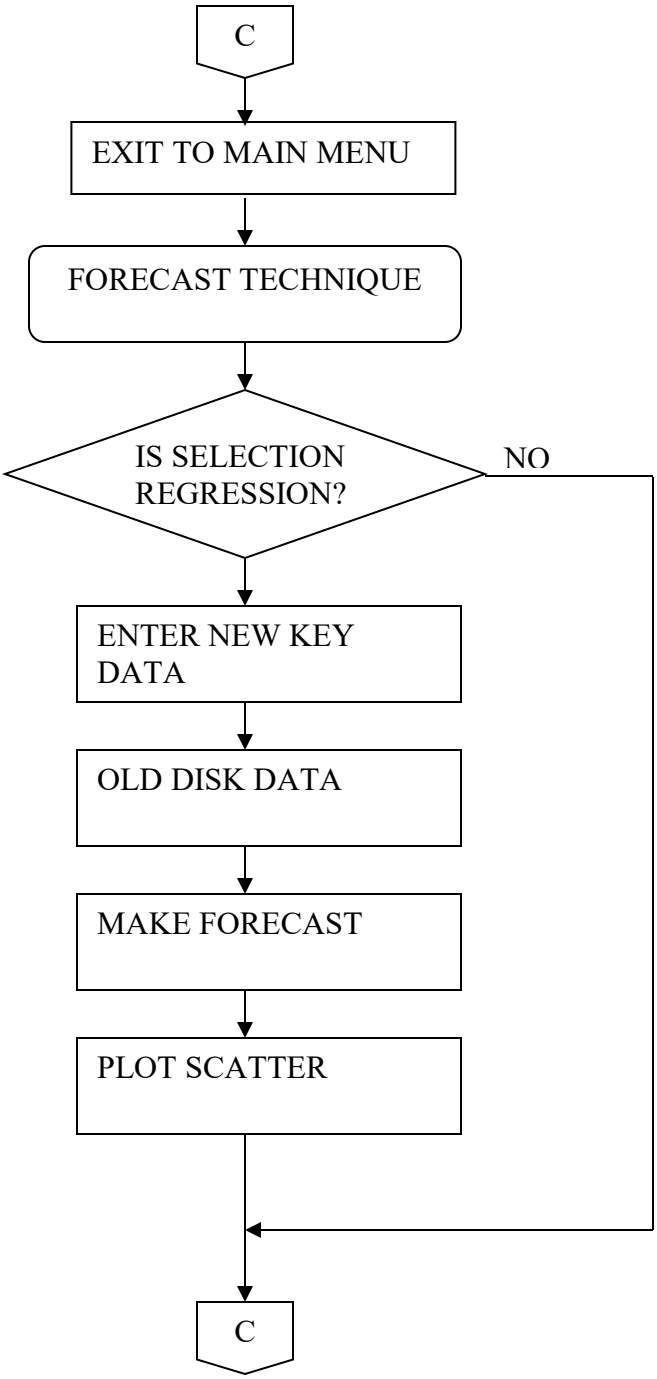
TOP DOWN DESIGN

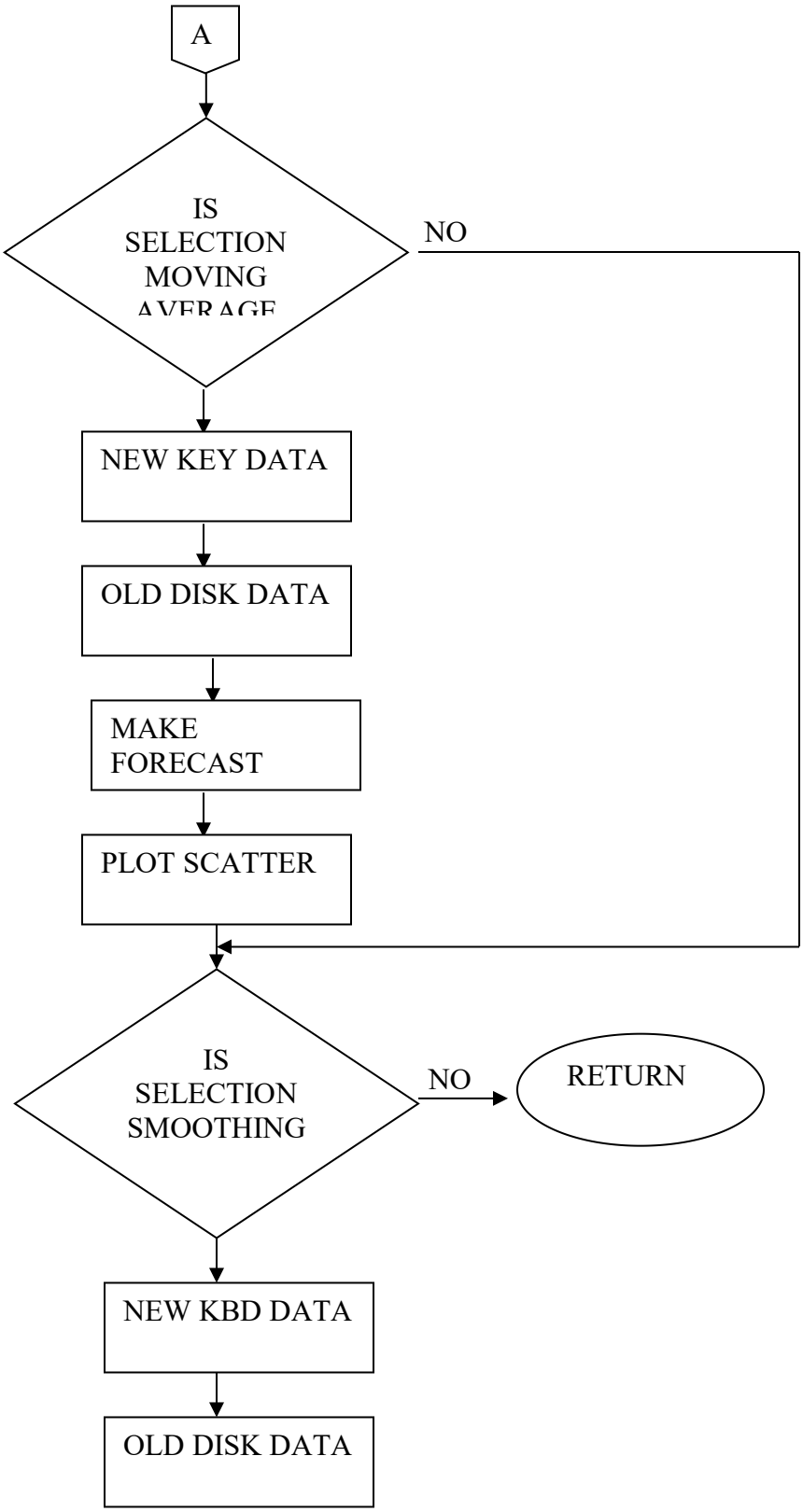


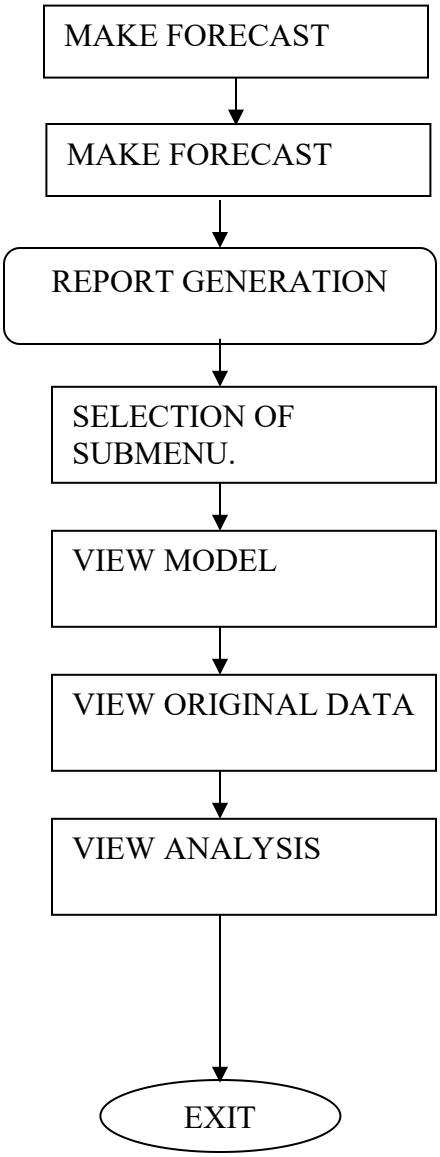

A
NO
IF SELECTION THEN
YES
FORECAST TECHNIQUE
NO
IF SELECTION THEN
YES
NO
IF SELECTION THEN
YES
REPORT GENERATION
IF SELECTION THEN
HELP
A
B
IF SELECTION THEN
YES
Exit

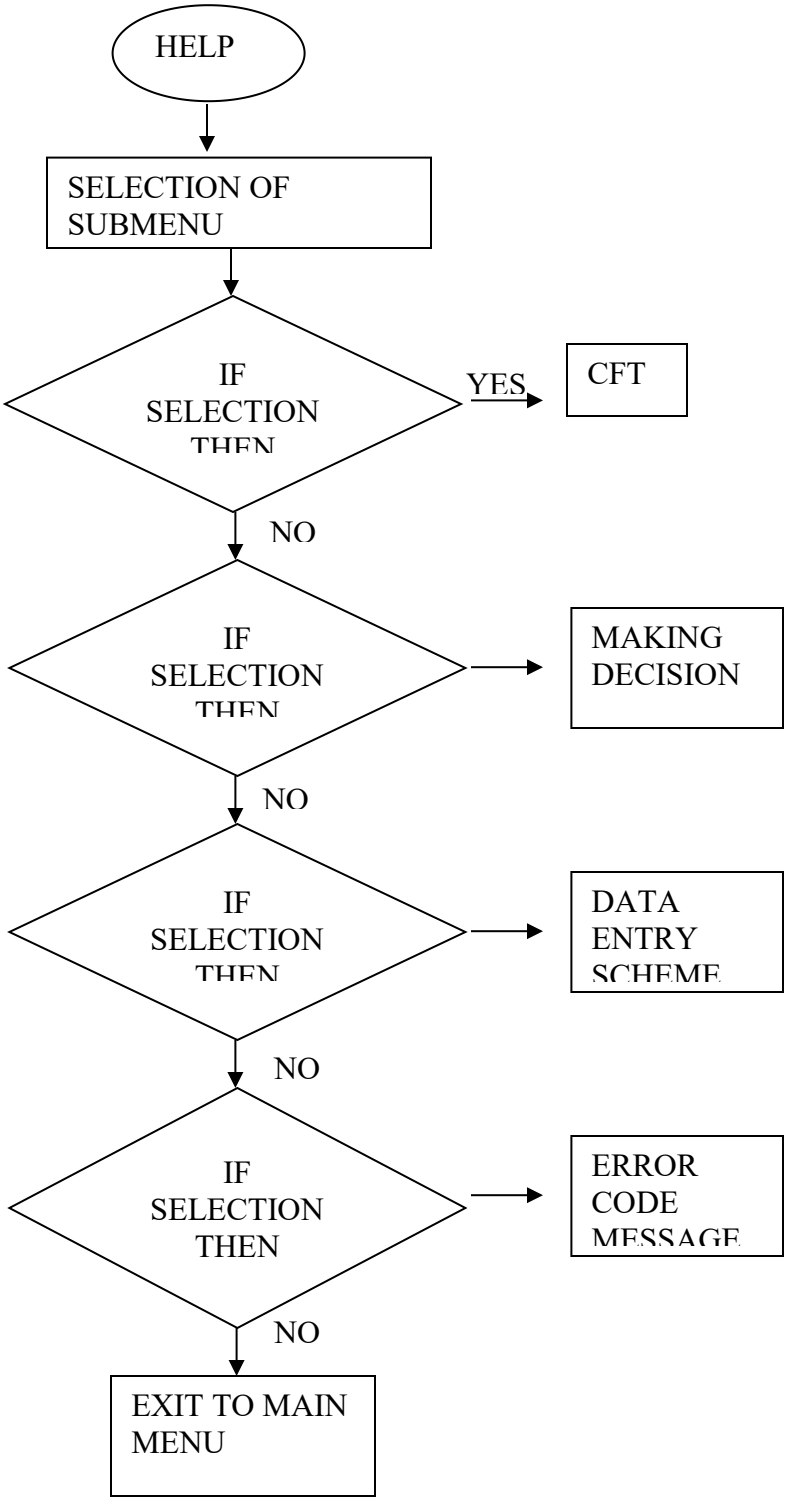
DETAILED DESIGN




C
EXIT TO MAIN MENU
FORECAST TECHNIQUE
IS SELECTION REGRESSION?
NO
ENTER NEW KEY DATA
OLD DISK DATA
MAKE FORECAST
PLOT SCATTER
C


A
IS SELECTION MOVING AVERAGE
NO
NEW KEY DATA
OLD DISK DATA
MAKE FORECAST
PLOT SCATTER
IS SELECTION SMOOTHING
NO
RETURN
NEW KBD DATA
OLD DISK DATA


MAKE FORECAST
MAKE FORECAST
REPORT GENERATION
SELECTION OF SUBMENU.
VIEW MODEL
VIEW ORIGINAL DATA
VIEW ANALYSIS
EXIT


HELP
SELECTION OF SUBMENU
IF SELECTION THEN
YES
CFT
NO
IF SELECTION THEN
MAKING DECISION
NO
IF SELECTION THEN
DATA ENTRY SCHEME
NO
IF SELECTION THEN
ERROR CODE MESSAGE
NO
EXIT TO MAIN MENU

4.5 PSEUDOCODE

Display the main menu if password is entered correctly.

PROMPT user to pick an option

If option is file maintenance then

GOSUB APPEND

Prompt the user to add records

ELSE

Delete record

Prompt user to add records

ELSE

Delete record

Prompt user to delete necessary records that needs to be deleted

ELSE

Delete file

Prompt user to delete unwanted files

ELSE

Rename file

The user renames any file that needs to be changed

ELSE

The user goes out of the file maintenance menu

End if

If options is forecasting Techniques. Then

GOSUB

Scatter diagram

Else regression analysis

Else moving average

Else exponential smoothing

End if

If option is report generation

GOSUB view original data

Check the data that have been previously stored in the system.

ELSE

View forecast

ELSE

View model table

ELSE

Exist from report generation

End if

If option is help

The system takes the user to help on CFT

ELSE

Making selection

The system displays helps on how to make selection

ELSE

Data entry schemes

ELSE

Error code message

Else

Exit

The system takes the user out of the help menu

End if

If the option is quit to Dos

Prompt user to save changes made

If yes, the changes are made

ELSE

The system exit the program.

End if

End.

4.6 TEST RUN

This is the last stage in the development of the software. It is meant to evaluate the strength and weaknesses of the proposed system as well as test its efficiency, advantages and disadvantages over the previous system.

The different modules and sub-modules of this program are complementary and interdependent on each other. The problems encountered in this program, most of them syntax in nature have been corrected in the process of debugging which took days to accomplish.

CHAPTER FIVE
CONCLUSION

5.1 SUMMARY

This project explores the use of data-driven techniques to enhance sales forecasting and product recommendations. Sales forecasting is a critical aspect of business operations, helping organizations predict future sales trends and make informed decisions. The study examines various forecasting models, including statistical methods (such as ARIMA) and machine learning algorithms (such as Random Forest and LSTM), to determine their effectiveness in predicting sales trends accurately.

Additionally, the project delves into recommendation systems, which utilize customer data, purchase history, and behavioral patterns to provide personalized product suggestions. Techniques such as collaborative filtering, content-based filtering, and hybrid recommendation models are analyzed to improve customer engagement and drive sales growth.

The research highlights the importance of high-quality data, real-time analytics, and AI-driven methodologies in enhancing both forecasting accuracy and recommendation effectiveness. Findings from the study demonstrate that businesses leveraging advanced predictive models and recommendation engines can achieve better decision-making, increased customer satisfaction, and improved revenue generation.

Finally, recommendations are provided to ensure the successful implementation of sales forecasting and recommendation systems, emphasizing the need for continuous data updates, model optimization, security considerations, and integration of external factors for improved accuracy.

5.2 CONCLUSION REMARK

In conclusion, we will like to point out that the choice of forecasting techniques depends on a number of factors such as

1. Cost
2. Time frame
3. Ease of use
4. Availability of data.

The above-mentioned factors should be considered when choosing any of the forecasting techniques.

If the past data are available, reliable and appropriate, the quantitative forecasting methods are extremely useful. While the quantitative technique are used when past data are unavailable for the item to be forecasted.

Conclusively, we can say that forecasting is an integral part of all human activity, but from business point of view increasing attention is being given to formal forecasting systems which are continually being refined. And the purpose of forecasting is to reduce risk in decision- making.

5.2 RECOMMENDATION.

Based on the findings and conclusions of this study on Sales Forecasting and Recommendations, the following recommendations are proposed to enhance the accuracy and effectiveness of sales predictions and product recommendations:

1. Adoption of Advanced Machine Learning Techniques – Businesses should integrate more sophisticated machine learning models such as deep learning and ensemble methods to improve the accuracy of sales forecasts.

2. Regular Data Updates and Model Training – Sales forecasting models should be frequently updated with real-time data to ensure their predictions remain relevant and accurate, considering market fluctuations and consumer behavior changes.

3. Integration of External Factors – Businesses should incorporate external variables such as economic indicators, seasonal trends, competitor actions, and market sentiment analysis into their forecasting models to improve prediction accuracy.

4. Personalized Recommendation Systems – Companies should leverage AI-driven recommendation engines to provide customers with personalized product suggestions based on past purchase history, browsing behavior, and real-time interactions.

5. Improvement in Data Quality – Organizations should ensure that their sales data is accurate, complete, and free from inconsistencies, as poor data quality can lead to misleading forecasts and ineffective recommendations.

6. Implementation of Real-time Analytics – Businesses should invest in real-time analytics tools to gain immediate insights into sales trends and customer preferences, allowing for faster decision-making.

REFERENCE

- Aggarwal, C. C. (2016). Recommender Systems: The Textbook.
- Bryant Edward. C. Standard Analysis Mc Graw Hill Book Society 3rd Edition 1988.
- Chaffey, D. (2022). Digital Marketing: Strategy, Implementation, and Practice.
- Garoniner John. S. Forecasting and time series analysis Mc Graw Hill. Inc 2nd Edition. 1989.
- Gershon Mark. E . Production and operation management library of congress cataloging publication. 1989.
- Hyndman, R. J., & Athanasopoulos, G. (2018). Forecasting: Principles and Practice.
- Goodfellow, I., et al. (2016). Deep Learning. MIT Press.
- MC Cormick David Measurement Statistics and Computation. John Wilsey and sons. 1980.
- OTexts.Linden, G., et al. (2003). Amazon.com recommendations: Item-to-item collaborative filtering. IEEE Internet Computing, 7(1), 76-80.
- Pearson Education.Fildes, R., et al. (2019). Forecasting and uncertainty in e-commerce. International Journal of Forecasting, 35(2), 123-139.
- Ricci, F., et al. (2015). Recommender Systems Handbook.
- Springer.Brown, T., et al. (2020). Machine learning techniques for e-commerce sales prediction. Journal of Business Analytics, 12(3), 45-67.
- Springer.Schafer, J. B., et al. (2007). Collaborative filtering recommender systems. Encyclopedia of Database Systems, 345-355.
- Smith, J., & Jones, K. (2019). The impact of personalized recommendations on consumer purchasing behavior. E-commerce Review, 27(4), 89-102.
- Sun, Y., et al. (2021). Hybrid LSTM and collaborative filtering for e-commerce sales forecasting and recommendations. Neural Computing & Applications, 33(5), 1231-1247.

- Zhang, H., et al. (2021). Machine learning applications in e-commerce sales forecasting. IEEE Transactions on Artificial Intelligence, 2(4), 89-104.

APPENDIX

CODE FOR THE APPLICATION SOFTWARE

```
import React from "react";

interface InputFieldProps {
   label: string;
   placeholder: string;
   type?: string;
}

export const InputField: React.FC<InputFieldProps> = ({
   label,
   placeholder,
   type = "text",
}) => {
   return (
      <div className="w-full text-black">
         <label className="text-base block mb-4">{label}</label>
         <input
            type={type}
            placeholder={placeholder}
            className="w-full px-6 py-6 text-lg rounded-xl bg-stone-300 bg-opacity-10
min-h-[70px]"
         />
      </div>
   );
};
```

```
import React from "react";

export const Header: React.FC = () => {
  return (
    <header className="flex z-10 flex-col justify-center px-16 py-6 w-full font-semibold bg-white rounded-none shadow-sm min-h-[109px] max-md:px-5 max-md:max-w-full">
      <nav className="flex flex-wrap gap-10 justify-between items-center w-full max-w-[1596px] max-md:max-w-full">
        <h1 className="self-stretch my-auto text-3xl text-black w-[204px]">
          FuturaSales
        </h1>
        <div className="flex gap-2.5 items-center self-stretch my-auto text-xl min-w-60">
          <button className="gap-2.5 self-stretch px-12 py-3.5 my-auto text-black border border-solid border-[#4F4F4F] min-h-[55px] rounded-[30px] w-[153px] max-md:px-5">
            Log In
          </button>
          <button className="gap-2.5 self-stretch px-8 py-4 my-auto text-black bg-blue-700 min-h-[60px] rounded-[30px] w-[170px] max-md:px-5">
            Sign Up
          </button>
        </div>
      </nav>
    </header>
  );
};
```

```
import React from "react";

export const HeroSection: React.FC = () => {
  return (
    <section className="flex relative flex-col grow px-16 pb-44 text-black rounded-none min-h-[1030px] pt-[729px] max-md:px-5 max-md:py-24 max-md:mt-10 max-md:max-w-full">
      <img
        loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/c1c1d24f9836200b18f36bd86eaf930e7ad0d80fcb84a2bd4e62a2611280c4e5?placeholderIfAbsent=true"
        alt="Sales forecasting illustration"
        className="object-cover absolute inset-0 size-full"
      />
      <div className="relative max-md:max-w-full">
        <h2 className="text-3xl font-semibold max-md:max-w-full">
          <span className="font-medium text-[25px] text-[#BDBDBD]">
            Get Started with{" "}
          </span>
          <span className="text-[40px]">Sales Forecasting</span>
        </h2>
        <p className="mt-1.5 text-sm max-md:max-w-full">
          Optimize inventory, predict sales trends, and maximize revenue with AI-driven insights. Unlock smart sales forecasting, AI-driven recommendations, and real-time analytics to scale your e-commerce business.
```

```
            </p>
          </div>
        </section>
    );
};
"use client";

import React from "react";
import { InputField } from "./InputField";

export const LoginForm: React.FC = () => {
    return (
        <section className="mt-20 max-md:mt-10 max-md:max-w-full">
            <div className="max-w-full text-black w-[684px]">
                <h1 className="text-6xl font-semibold max-md:max-w-full max-md:text-
4xl">
                    Log In
                </h1>
                <p className="text-lg font-light max-md:max-w-full">
                    Log In to start predicting sales and optimizing inventory with AI.
                </p>
            </div>

            <form className="mt-20 w-full max-md:mt-10 max-md:max-w-full">
                <InputField
                    label="Email Address"
                    placeholder="Enter your email address"
                    type="email"
```

```
/>

<div className="mt-9 w-full max-md:max-w-full">
  <InputField
    label="Password"
    placeholder="Enter your password"
    type="password"
  />

  <div className="flex flex-wrap gap-10 justify-between items-center w-full mt-4 max-md:max-w-full">
    <label className="flex gap-2.5 items-center self-stretch my-auto text-sm font-light text-black">
      <input
        type="checkbox"
        className="flex shrink-0 self-stretch my-auto border border-solid border-[#656565] h-[15px] w-[15px]"
      />
      Remember me
    </label>
    <button
      type="button"
      className="self-stretch my-auto text-lg text-black underline"
    >
      Forgot Password?
    </button>
  </div>
</div>
```

```
            <div className="flex flex-col mt-20 w-full max-md:mt-10 max-md:max-w-full">
              <button
                type="submit"
                className="gap-2.5 self-stretch px-36 py-6 w-full text-3xl font-semibold text-black bg-blue-700 rounded-2xl min-h-[90px] max-md:px-5 max-md:max-w-full"
              >
                Log In
              </button>
              <p className="self-end mt-1.5 text-lg text-black">
                <span className="font-light text-sm">Don't have an account?</span>{" "}
                <button type="button" className="underline font-medium">
                  Sign Up
                </button>
              </p>
            </div>
          </form>
        </section>
    );
};
"use client";

import React from "react";
import { Header } from "./Header";
import { HeroSection } from "./HeroSection";
import { LoginForm } from "./LoginForm";
```

```
export const LogInPage: React.FC = () => {
  return (
    <main className="overflow-hidden bg-white">
      <Header />

      <div className="mt-0 w-full max-w-[1655px] max-md:max-w-full">
        <div className="flex gap-5 max-md:flex-col">
          <div className="w-6/12 max-md:ml-0 max-md:w-full">
            <HeroSection />
          </div>
          <div className="ml-5 w-6/12 max-md:ml-0 max-md:w-full">
            <LoginForm />
          </div>
        </div>
      </div>
    </main>
  );
};

export default LogInPage;
"use client";
import React from "react";

interface ButtonProps {
  children: React.ReactNode;
  variant?: "primary" | "secondary";
  className?: string;
```

```
    onClick?: () => void;
}

export const Button: React.FC<ButtonProps> = ({
    children,
    variant = "primary",
    className = "",
    onClick,
}) => {
    const baseStyles = "font-semibold text-black rounded-[30px] text-center";
    const variantStyles = {
        primary: "bg-blue-700 px-8 py-4 min-h-[60px]",
        secondary: "border border-solid border-[#4F4F4F] px-12 py-3.5 min-h-[55px]",
    };

    return (
        <button
            onClick={onClick}
            className={`${baseStyles} ${variantStyles[variant]} ${className}`}
        >
            {children}
        </button>
    );
};
"use client";
import React from "react";
import { Button } from "./Button";
```

```
export const Navbar: React.FC = () => {
  return (
    <header className="flex z-10 flex-col justify-center px-16 py-6 w-full font-semibold bg-white rounded-none shadow-sm min-h-[109px] max-md:px-5">
      <nav className="flex flex-wrap gap-10 justify-between items-center w-full max-w-[1596px]">
        <h1 className="self-stretch my-auto text-3xl text-black w-[204px]">
          FuturaSales
        </h1>
        <div className="flex gap-2.5 items-center self-stretch my-auto text-xl min-w-60">
          <Button variant="secondary" className="w-[153px]">
            Log In
          </Button>
          <Button variant="primary" className="w-[170px]">
            Sign Up
          </Button>
        </div>
      </nav>
    </header>
  );
};
"use client";
import React from "react";

export const SignUpHero: React.FC = () => {
  return (
```

```
<section className="flex relative flex-col px-16 pb-28 w-full min-h-[1035px] pt-[734px] max-md:px-5 max-md:py-24">
  <img
    loading="lazy"
    src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/f37b847bd180b4aaa8b0bfe0985cb2e1471e9727e87945f9371b9ae2553212a1"
    alt="Sales forecasting illustration"
    className="object-cover absolute inset-0 size-full"
  />
  <div className="relative text-black max-md:mr-2">
    <h2 className="text-3xl font-semibold">
      <span className="font-medium text-[25px] text-[#BDBDBD]">
        Get Started with{" "}
      </span>
      <span className="text-[40px]">Sales Forecasting</span>
    </h2>
    <p className="mt-1.5 text-sm">
      Optimize inventory, predict sales trends, and maximize revenue with AI-driven insights. Unlock smart sales forecasting, AI-driven recommendations, and real-time analytics to scale your e-commerce business.
    </p>
  </div>
  <div className="flex relative flex-wrap gap-5 items-center mt-14 max-md:mt-10">
    <div className="shrink-0 self-stretch my-auto border-white border-solid border-[9px] h-[9px] w-[200px]" />
```

```
            <div className="shrink-0 self-stretch my-auto border-solid bg-neutral-500 border-[7px] border-neutral-500 h-[7px] w-[185px]" />
            <div className="shrink-0 self-stretch my-auto border-solid bg-neutral-500 border-[7px] border-neutral-500 h-[7px] w-[185px]" />
          </div>
        </section>
    );
};
"use client";
import React from "react";
import { InputField } from "./InputField";
import { Button } from "./Button";

export const SignUpForm: React.FC = () => {
    return (
        <section className="mt-20 max-md:mt-10">
            <div className="max-w-full text-black w-[684px]">
                <h2 className="text-6xl font-semibold max-md:text-4xl">Get Started</h2>
                <p className="text-lg font-light">
                    Sign up to start predicting sales and optimizing inventory with AI.
                </p>
            </div>

            <form className="mt-24 w-full text-black max-md:mt-10">
                <div className="space-y-9">
                    <InputField label="Full Name" placeholder="Enter your full name" />
                    <InputField
                        label="Business name"
```

```
            placeholder="Enter your business name"
          />
          <InputField
            label="Email Address"
            placeholder="Enter your email address"
            type="email"
          />

          <div className="flex flex-wrap gap-5 items-center">
            <div className="grow shrink self-stretch pb-8 my-auto min-w-60 w-[202px]">
              <InputField
                label="Country code"
                placeholder="+234"
                width="w-[252px]"
              />
              <img
                loading="lazy"
                src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/b3b903b595da8f5d0767b6669df0ad0380785ee00c1199955af6f95bb1ceec49"
                alt="Country selector"
                className="object-contain z-10 mt-0 ml-6 aspect-[2.3] w-[23px] max-md:ml-2.5"
              />
            </div>
            <InputField
              label="Phone Number"
```

```
                placeholder="Enter your phone number"
                className="grow shrink self-stretch my-auto min-w-60 w-[512px]"
              />
            </div>
          </div>

          <div className="flex flex-col mt-24 w-full max-md:mt-10">
            <Button
              variant="primary"
              className="px-36 py-6 text-3xl rounded-2xl min-h-[90px]"
            >
              Next
            </Button>
            <p className="self-end mt-1.5 text-lg text-black">
              <span className="font-light text-sm">Already have an account?</span>{" "}
              <a href="#" className="underline">
                Log In
              </a>
            </p>
          </div>
        </form>
      </section>
    );
};


"use client";
```

```
import React from "react";
import { Navbar } from "./Navbar";
import { SignUpHero } from "./SignUpHero";
import { SignUpForm } from "./SignUpForm";

export const SignUpPage: React.FC = () => {
  return (
    <main className="overflow-hidden bg-white">
      <Navbar />
      <div className="mt-0 w-full max-w-[1633px]">
        <div className="flex gap-5 max-md:flex-col">
          <div className="w-6/12 max-md:ml-0 max-md:w-full">
            <SignUpHero />
          </div>
          <div className="ml-5 w-6/12 max-md:ml-0 max-md:w-full">
            <SignUpForm />
          </div>
        </div>
      </div>
    </main>
  );
};

export default SignUpPage;
export interface StatCardProps {
  icon: string;
  title: string;
  value: string;
```

```
  change: string;
  changeType: "positive" | "negative" | "neutral";
  bgColor?: string;
}

export interface InsightCardProps {
  icon: string;
  title: string;
  description: string;
}
import { StatCardProps } from "./types";

export function StatCard({
  icon,
  title,
  value,
  change,
  changeType,
  bgColor = "bg-emerald-50",
}: StatCardProps) {
  return (
    <article className="flex flex-col justify-center items-center px-3.5 py-5 bg-white rounded-md border border-solid shadow-sm border-[color:var(--Black-200,#D1D1D1)] min-h-[158px] min-w-60 w-[293px]">
      <div className="w-full max-w-[249px]">
        <header className="flex gap-10 justify-between items-center w-full">
          <div className="flex gap-2 items-center self-stretch my-auto">
            <div
```

```
                    className={`flex flex-col justify-center items-center self-stretch py-1
my-auto ${bgColor} rounded-sm min-h-7 w-[33px]`}
                  >
                    <img
                      loading="lazy"
                      src={icon}
                      className="object-contain w-5 aspect-square"
                      alt=""
                    />
                  </div>
                  <h3 className="self-stretch my-auto text-sm text-black">{title}</h3>
                </div>
                <img
                  loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/000
4e6fdfdd219e6ac07564467174a37120c34d48f64e07437471a64b2b5ed7d"
                  className="object-contain shrink-0 self-stretch my-auto w-6 aspect-
square"
                  alt=""
                />
              </header>
              <div className="mt-9 w-full">
                <p className="text-2xl font-semibold text-black">{value}</p>
                <div className="flex gap-0.5 items-center w-full">
                  <span
                    className={`gap-2.5 self-stretch py-px px-1.5 my-auto text-xs text-
black whitespace-nowrap ${bgColor} rounded min-h-3.5 w-[33px]`}
```

```
                >
                  {change}
                </span>
                <span className="self-stretch my-auto text-xs text-black">
                  Compared to last month
                </span>
              </div>
            </div>
          </div>
        </article>
    );
}
import { InsightCardProps } from "./types";

export function InsightCard({ icon, title, description }: InsightCardProps) {
  return (
    <article className="flex flex-col justify-center items-center px-3 py-5 bg-white rounded-md border border-solid shadow-sm border-[color:var(--Black-300,#B0B0B0)] min-w-60 w-[371px]">
      <div className="flex flex-col max-w-full w-[328px]">
        <header className="flex gap-2.5 items-center w-full text-xl font-medium text-black min-h-[35px]">
          <img
            loading="lazy"
            src={icon}
            className="object-contain shrink-0 self-stretch my-auto aspect-square w-[35px]"
            alt=""
```

```
            />
            <h3 className="self-stretch my-auto">{title}</h3>
          </header>
          <div className="flex flex-col self-center mt-5 w-full rounded-none">
            <p className="text-sm text-black">{description}</p>
            <button className="self-end mt-11 text-xs font-medium text-black underline max-md:mt-10">
              View Details
            </button>
          </div>
        </div>
      </article>
  );
}
export function UserProfile() {
  return (
    <div className="flex gap-1.5 items-center self-start text-base text-black whitespace-nowrap">
      <div className="flex shrink-0 self-stretch my-auto bg-zinc-300 h-[50px] rounded-[30px] w-[50px]" />
      <div className="flex gap-1.5 items-center self-stretch my-auto">
        <span className="self-stretch my-auto">Iyosayi</span>
        <img
          loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/11096a54461f0409c284e8d39f58aee7abe69b8a6c467e41d4cce0067dce1572"
```

```
            className="object-contain shrink-0 self-stretch my-auto aspect-[2.3] w-[23px]"
            alt=""
          />
        </div>
      </div>
    );
}
"use client";

export function SideNav() {
  return (
    <nav className="w-[16%] max-md:ml-0 max-md:w-full">
      <div className="w-full text-black">
        <div className="flex items-start px-7 pt-10 pb-20 bg-white border border-solid border-neutral-300 shadow-[3px_3px_18px_rgba(132,130,130,0.25)] max-md:pl-5">
          <div className="flex-auto self-end mt-12 mr-0 h-px border border-dashed bg-zinc-600 border-zinc-600 max-md:mt-10" />
          <div className="flex flex-col self-start w-full">
            <div className="w-full">
              <header className="flex flex-col w-full text-xl font-semibold text-center whitespace-nowrap">
                <h1 className="self-center">FuturaSales</h1>
                <div className="mt-2 w-full border border-dashed bg-zinc-600 border-zinc-600 min-h-px" />
              </header>
```

```
<nav className="flex flex-col items-end mt-14 w-full max-md:mt-10">
  <div className="max-w-full w-[200px]">
    <h2 className="text-xs">MAIN MENU</h2>
    <div className="mt-1 w-full text-base">
      <button className="flex flex-col justify-center items-start px-2.5 py-3 w-full text-lg text-black whitespace-nowrap bg-indigo-100 rounded-lg max-w-[200px] min-h-[50px]">
        <div className="flex gap-2.5 items-center">
          <img
            loading="lazy"
            src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/6dd879d0536b20983e659919a0b986465348dab6f5db3d3758cff197676cd9a4"
            className="object-contain shrink-0 self-stretch my-auto w-6 aspect-square"
            alt=""
          />
          <span className="self-stretch my-auto">Dashboard</span>
        </div>
      </button>
      {/* Additional menu items */}
      <button className="flex flex-col justify-center items-start px-4 py-3.5 mt-2.5 w-full whitespace-nowrap rounded-lg max-w-[200px] min-h-[50px]">
        <div className="flex gap-2.5 items-center">
          <div className="flex shrink-0 self-stretch my-auto w-5 h-5" />
```

```
                        <span className="self-stretch my-auto">Products</span>
                    </div>
                </button>
                <button className="flex flex-col justify-center px-4 py-3.5 mt-
2.5 w-full rounded-lg max-w-[200px] min-h-[50px]">
                    <div className="flex gap-2.5 items-center w-full">
                        <img
                            loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/341
86e9672a2e5b67fa784d57440f621c4526639e99e12e25888e15c3bf17500"
                            className="object-contain shrink-0 self-stretch my-auto
w-5 aspect-square"
                            alt=""
                        />
                        <span className="self-stretch my-auto">
                            Sales Insights
                        </span>
                    </div>
                </button>
                <button className="flex flex-col justify-center px-4 py-3 mt-
2.5 w-full whitespace-nowrap rounded-lg max-w-[200px] min-h-[50px]">
                    <div className="flex gap-2.5 items-center w-full">
                        <div className="flex shrink-0 self-stretch my-auto h-
[26px] w-[26px]" />
                        <span className="self-stretch my-auto">
                            Notifications
                        </span>
```

```
                    </div>
                  </button>
                </div>
              </div>
              <div className="flex flex-col mt-12 max-w-full whitespace-nowrap
w-[216px] max-md:mt-10">
                <div className="z-10 shrink-0 h-px border border-dashed bg-
zinc-600 border-zinc-600" />
                <div className="self-start mt-2 ml-3.5 max-md:ml-2.5">
                  <h2 className="text-xs">ACCOUNT</h2>
                  <div className="mt-1 w-full text-base">
                    <button className="flex flex-col justify-center items-start
px-4 py-3.5 w-full rounded-lg max-w-[200px] min-h-[50px]">
                      <div className="flex gap-2.5 items-center">
                        <img
                          loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/e78
15f5862691b761e87cf91f0d8640504b30ef7e6947f0fc7a161926b21cbd2"
                          className="object-contain shrink-0 self-stretch my-
auto w-5 aspect-square"
                          alt=""
                        />
                        <span                    className="self-stretch                    my-
auto">Settings</span>
                      </div>
                    </button>
                  </div>
```

```
                    </div>
                  </div>
                </nav>
              </div>
              <button className="flex gap-2.5 items-center self-end text-base mt-[535px] max-md:mt-10">
                <img
                  loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/13bbae75c124bb14f4ea67f35a0359b1bacde81c61b333235a09365e5c66f374"
                  className="object-contain shrink-0 self-stretch my-auto w-5 aspect-square"
                  alt=""
                />
                <span className="self-stretch my-auto">Log Out</span>
              </button>
            </div>
          </div>
        </div>
      </nav>
    );
}
[2/20, 05:15] Iyosayi: import { UserProfile } from "./UserProfile";

export function DashboardHeader() {
  return (
```

```
    <header className="flex flex-wrap gap-5 justify-between px-14 py-1 w-full bg-white border border-solid shadow-sm border-[color:var(--Black-200,#D1D1D1)] max-md:px-5 max-md:max-w-full">
      <h1 className="my-auto text-2xl font-medium text-black">Dashboard</h1>
      <div className="flex gap-5">
        <button className="flex gap-2.5 justify-center items-center px-1.5 my-auto rounded-md border border-solid border-[color:var(--Black-300,#B0B0B0)] h-[34px] min-h-[34px] w-[34px]">
          <img
            loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/10ca1b1fe100d1123aa939d506ae1513a6bc006c855c437ab200648e1fd36dd1"
            className="object-contain self-stretch my-auto w-5 aspect-square"
            alt=""
          />
        </button>
        <button className="flex gap-2.5 items-center py-1 pr-1 pl-1.5 my-auto rounded-md border border-solid border-[color:var(--Black-300,#B0B0B0)] h-[34px] min-h-[34px] w-[34px]">
          <div className="flex self-stretch my-auto min-h-[26px] w-[26px]" />
        </button>
        <div className="shrink-0 w-px border border-solid bg-neutral-500 border-neutral-500 h-[65px]" />
        <UserProfile />
      </div>
    </header>
  );
```

```
}
export function ChartSection() {
  return (
    <section className="flex flex-col justify-center px-4 mt-6 max-w-full bg-white rounded-md border border-solid shadow-sm border-[color:var(--Black-200,#D1D1D1)] min-h-[684px] w-[1366px]">
      <img
        loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/9b45cf735a824a06c33cfe6b0aa1a44ecf2b45c223d620aedd345363242649d2"
        className="object-contain w-full aspect-[2.04] max-md:max-w-full"
        alt="Sales Chart"
      />
    </section>
  );
}
[2/20, 05:15] Iyosayi: "use client";

import { SideNav } from "./SideNav";
import { DashboardHeader } from "./DashboardHeader";
import { StatCard } from "./StatCard";
import { InsightCard } from "./InsightCard";
import { ChartSection } from "./ChartSection";

export function Dashboard() {
  return (
    <main className="overflow-hidden pb-7 bg-white">
```

```
<div className="flex gap-5 max-md:flex-col">
  <SideNav />
  <div className="ml-5 w-[84%] max-md:ml-0 max-md:w-full">
    <div className="flex flex-col w-full max-md:max-w-full">
      <DashboardHeader />
      <div className="self-end mt-5 w-full max-w-[1422px] max-md:max-w-
full">
        <section className="max-w-full text-black w-[429px]">
          <h2 className="text-xl font-medium max-md:max-w-full">
            Hey there!
          </h2>
          <p className="text-sm max-md:max-w-full">
            Here's your business overview and insights for [Today's Date].
          </p>
        </section>

        <section className="flex flex-col items-start mt-8 w-full max-
md:max-w-full">
          <div className="flex gap-6 items-center self-stretch w-full max-
md:max-w-full">
            <StatCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/a5
cb8b2a731e6c24af7967d09dfe8b6b5d2eeba64b62d866273d59e40c30a6fa"
              title="Total Sales"
              value="$120,650.64"
              change="+20%"
              changeType="positive"
```

```
            bgColor="bg-emerald-50"
          />
          <StatCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/f2cb4d9e0f6358dfbecbe21d3ef1137803f404583edb48a97df1f8db897c4719"
            title="Units Sold"
            value="1,200 Units"
            change="+5%"
            changeType="positive"
            bgColor="bg-indigo-100"
          />
          <StatCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/a5cb8b2a731e6c24af7967d09dfe8b6b5d2eeba64b62d866273d59e40c30a6fa"
            title="Customers"
            value="259"
            change="+5%"
            changeType="positive"
            bgColor="bg-emerald-50"
          />
          <StatCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/192c794fc833e6e4652190705a2d3213ff93769063cdc8d04ec3ff08a36c29a2"
            title="Orders"
            value="340"
```

```
                change="-5%"
                changeType="negative"
                bgColor="bg-rose-100"
              />
              <StatCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/a5cb8b2a731e6c24af7967d09dfe8b6b5d2eeba64b62d866273d59e40c30a6fa"
                title="Total Products"
                value="259"
                change="+5%"
                changeType="positive"
                bgColor="bg-emerald-50"
              />
            </div>

            <ChartSection />

            <section className="relative px-6 pt-8 pb-16 mt-6 max-w-full min-h-[396px] w-[1358px] max-md:px-5">
              <div className="flex absolute right-0 bottom-0 z-0 flex-col h-[396px] w-[1358px]">
                <div className="flex shrink-0 bg-white rounded-md border border-solid shadow-sm border-[color:var(--Black-200,#D1D1D1)] h-[396px] max-md:-mr-2 max-md:max-w-full" />
              </div>
              <div className="flex z-0 flex-col w-full max-w-[1300px] max-md:max-w-full">
```

<h2 className="text-2xl font-medium max-md:max-w-full">
AI Insights for Your Business
</h2>

Insights generated from your sales and customer data
to help you optimize your business.

<button className="flex flex-col justify-center items-center self-stretch px-5 py-3 my-auto w-40 text-lg bg-white rounded-md border border-solid border-[color:var(--White-400,#989898)] min-h-[50px]">

Last 7 days

<img
loading="lazy"

src="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/0e33eafff14569a246f8a44ca36bda0639fa1b01a71d653401048f6dd73a8d54"
className="object-contain shrink-0 self-stretch my-auto aspect-[2.3] w-[23px]"
alt=""

```
                    />
                  </div>
                </button>
              </div>
              <div className="flex flex-wrap gap-5 items-start self-start mt-
11 max-md:mt-10 max-md:max-w-full">
                <InsightCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/3
94d429d3fd6d2f59c7cc0d73c92964a6e0c60ad37348048747523f19b1b0691"
                  title="Demand Spike Detected"
                  description="Sales for Product X are predicted to increase
by 20% next week"
                />
                <InsightCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/e4
a7ab618187585cfd9e6fea782a0795c47041e8b2c09eb8f663579af3d98602"
                  title="Low Stock Warning"
                  description="Stock for Product A is running low. Predicted
stockout within 5 days."
                />
                <InsightCard

icon="https://cdn.builder.io/api/v1/image/assets/94a6a7a4b3c74d1c9f05053a2778eadc/3
94d429d3fd6d2f59c7cc0d73c92964a6e0c60ad37348048747523f19b1b0691"
                  title="Demand Spike Detected"
```

```
                                description="Sales for Product X are predicted to increase
by 20% next week"
                                    />
                                </div>
                            </div>
                        </section>
                    </section>
                </div>
            </div>
        </div>
    </main>
  );
}
```