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**ASSOCIATION RULE MINNING USING REGRESSION ALGORITHM TO
PREDICT CUSTOMER BEHAVIOR IN FRUIT AND VEGETABLE
DEPARTMENT.**

A dissertation submitted in partial fulfillment of the Bachelor's Honors Degree in Computer Science

Form of Approval

The signatories confirm that they have supervised the dissertation of Muvunde Ephraim.,
**“Association rule mining using regression algorithm to predict customer behavior in
fruit and vegetable department.”**, Bindura University of Science Education accepted this
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DEDICATIONS

First and foremost, I want to express my gratitude and adoration to the Almighty, who constantly provides us with the illumination we need to proceed in the right direction. I'd like to thank my parents as well, because they are the ones who have helped me get to where I am now. They made a significant contribution to my life and were always supportive of me by demonstrating a positive outlook on life; thank you, parents. I'd also like to express my gratitude to every member of the Muvunde family who has helped me with my studies in any way possible, including financially, with clothes, with food, and with prayers. Thank you so much for your continued support, my family.

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When I was mistaken, he would correct me and present me with some helpful resources.

ABSTRACT

The operation of businesses and organizations depends heavily on computers and software. With the aid of software, enormous amounts of data are produced. It is necessary to evaluate these enormous databases to find insightful data that can help businesses, organizations, and even individuals make better decisions. An approach that helps meet this criterion is data mining. The goal of data mining is to find hidden patterns in massive amounts of data that were previously undiscovered by applying mathematical, statistical, and machine learning approaches.

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CHAPTER 1

PROJECT PROPOSAL

1.1 INTRODUCTION

Purchasing Power of Consumers in Zimbabwe entails the consumer behavior of how Zimbabwean citizens react in buying products and services depending on major economic constraints they encounter on their day-to-day living. Consumer behavior is crafted from the factors that affects the individual expenditure like income, interest rates, exchange rates, unemployment rate, time i.e., season, fiscal policy, monetary policy, inflation rate etc. This topic (consumer behavior) is of paramount importance in the economy because it can be used by national economist to measure most important economic indicators which can tell if the country's economy is increasing or deteriorating for example, Consumer Price Index, Producer Price Index and Purchasing Power Parity etc.

There are so many factors that influence the behavior of how consumers react when buying products and service which brings this topic to a real concern to business people, because behavior of consumers when buying products or services determines profits, business continuity and comparative advantage of the firm at large which investors and or entrepreneurs can obtain in the long run. Most of the large firms in Zimbabwe employs most expensive labor i.e., economists, statisticians, data analysts etc. to deal with this most complicated and sophisticated aspect of consumer behavior so that they can achieve corporate goals, leaving SMEs at risk of making loses in profits and market share. Therefore, analysis of consumer behavior can be used as game theory tool by large firms so as to out compete small firms through analysis of consumer behavior by employing economists.

The use of most expensive labor is decreasing more rapidly as technology increases exponentially, balancing off business opportunities for large firms and SMEs because technology brings cheap but most accurate results or solutions to the problems that people encounter in their daily lives as quick as possible. For example robotics is in use by Ford, Mercedes-Benzenes and BMW in the car assembly to replace mechanics, computer visioning is being utilized right now by Google in self-driving cars to replace drivers, ERP systems like

Odoo and Ozone are in use to downsize employing of excess labor i.e. accountants and human resource managers and for this project, machine learning is going to be utilized to analyze consumer behavior so as to predict amount of stock which is in need to meet the demand in the future avoiding losses associated with decaying or expiring of some products. Full package of this system might one day replace critical employees i.e., economists, statisticians, data analysts and procurement directives of a certain company and in return, returning profits to the firm.

1.2 BACKGROUND

Case of Spar Magic Moments supermarket, a highly machine learning algorithmic computer program is going to be developed to help directors to make best decisions on how to make orders of perishable products i.e., fruits and vegetables and other products by satisfying the human demand and at the same time reducing loses of revenue due to decaying or expiring of products before they are sold to the potential customer.

The machine learning algorithmic computer program which is going to be developed will be in a position to learn on itself from past consumer behavior data without being programmed explicitly. The software program will be developed using supervised machine learning methodology (regression) to predict customer behavior depending on their previous behavior when they were buying products and then the system will predict user's most probable products, they are likely to buy in the future. This data can be used to forecast future reordering quantity of stock of every item in the retail shop so as to meet the demand of every product that they want to sell.

1.3 PROBLEM STATEMENT

There is high loss in the fruit-and-vegetable department at Spar Magic Moments supermarket due to the fact that procurement manager issues ordering of many fruits and vegetables that exceeds human demand, leading to decaying of many fruits and vegetables, resulting in loss of expected revenue.

1.4 PROJECT AIM

To develop a model using machine learning algorithm that predicts expected consumer behavior basing on their previous expenditure.

1.5 RESEACH OBJECTIVES

- ❖ To develop an AI model that predict customer behavior using their previous expenditure.
- ❖ To measure the success rate of the proposed system.
- ❖ To maintain the system so that it will be beneficial to any products regardless that they are perishable or non-perishable

1.6 RESEARCH QUESTION

- ❖ Why big data is a big concern when designing a machine learning computer program?
- ❖ What technological tools that are relevant when developing a system that is always available to the management?
- ❖ How to maintain a system so that the system will won't get absolute to the organization as a whole?

1.7 SIGNIFICANCE OF STUDY

This project is of vey importance not only to Spar Magic Moments but to all wholesale and retail shops who sale perishables and or non-perishable products in more general sense. This is so because, business it's not only focused on avoiding loses but it also includes the idea of generating sales revenue as quickly as possible so that the business can reinvest the profits so that their monthly profit margins will increase at an increasing rate which resembles healthy of the business which can guarantee continuity, future and expansion of the business.

The proposed system can guarantee to give similar results since the system will be recommending ordering of commodities depending on consumer behavior (demand) of products for the previous months.

1.8 SCOPE

- 2 The system is only designed to address the issues faced by the fruit and vegetable department at Spar Magic Moments, but other departments within the company that experience similar issues and regard this initiative as beneficial to them can also use it.

2.2 ASSUMPTIONS OF THE RESEARCH

- The model is trained using data from the Spar Magic Moments supermarket that was created from cash receipts of the Spar Magic Moments supermarket. Selling of

perishable goods occurs as follows. Other design technologies will be assumed to be available to assume that the feasibility study of the project will pass First in First out sequence

- All Sales will be recorded in a database to create datasets that the algorithm can use to continue learning from at predetermined intervals.
- The majority of the elements that influence customer behavior will be held constant while a few will be taken into consideration (we need dataset here in order to determine factors that we will us)

2.3 LIMITATIONS

- Because the system is a web application, users must have an internet connection in order to interact with the model remotely.

2.4 INSTRUMENT AND METHODOLOGY

- These are the resources the researcher will make use of when designing and putting into practice the system.

The following tools will be used:

- ❖ PHP programming language
- ❖ SQL
- ❖ HTML, CSS and JavaScript

1.12 CONCLUSION

The proposed systems have been proposed with high vision and aim to provide a solid and concrete solution to wholesale, retail outlets and supermarkets who sell perishable products with aim to minimize cost and increase sales revenue in order to maximize highest-possible profit with high turnaround to insure good health of the firm in terms of business continuity. High level computer language will be used to develop the system which guarantees high scalability and availability of the system through use of data structures and algorithms to handle big data and use of server-based technology to maximize availability of the system to the end user.

CHAPTER 2

LETERATURE REVIEW

2.1 INTRODUCTION

Development of the proposed system is not new in the world of computer science because most machine learning models are derived from similar technologies and they are considered successful models after passing the Turing test. Therefore, for this chapter, the aim is to examine most recent related systems that where developed which are directly related to the proposed system.

During the process of examining these systems, the main aim is notice how other computer gurus managed to create their models in terms of technologies used and assumptions raised etc. so as to pinpoint their weaknesses during their development and deployment of the system so that I can justify why proposed system will be better after designing the proposed model.

AUTHOR	TECHNOLOGY USED	ASSUMPTION RAISED	WEAKNESS	JUSTIFICATION
(Gitakartika, 2021)	Python, TensorFlow (Neural Network)	The model was created using a number of datasets, including the geolocation dataset, the dataset for translating product names, the multi-store dataset, the dataset for items, and the dataset for customers.	The system is more important to customers than to business personnel because the recommendations could be products from the store since multiple stores dataset was used to create the model. The developer's goal is to advise customers about the products they want to	Multiple datasets were used to create the model, and the datasets were extracted from a single store database, which can be beneficial to both business people and their customers because the proposed system allows business people to explore each client's most likely future purchasing patterns, and with this information, business

			buy by suggesting other similar products that have already been purchased by other customers.	people can predict future stock to meet upcoming demand, and this model is flexible enough for clients to use to observe the recommendations.
(Inzaugarat, 2019)	Python, TensorFlow (K-means algorithm)	Income, age and gender are only factors that affect expenditure of consumer while other factors are hold constant	Use general spending of individuals basing on income, gender and age only to predict their future spending on general	Proposed system will use customer spending on specific products to predict actual products they are likely to buy in the future basing on several datasets generated from a retail shop database which encompasses all factors that affect consumer behavior indirectly

AUTHOR	TECHNOLOGY USED	ASSUMPTION RAISED	WEAKNESS	JUSTIFICATION
(Lindahe, 2020)	R programming language (regression algorithm)	Dataset used is that of customers who purchased using cards (bank cards). The dataset does not provide the real category information and it is speculated that the card category has little effect on	The model can determine the loyalty of the customers basing on the transactions they have made using cards neglecting people who purchase on real cash and on credit which makes their model slightly bad.	The proposed model will be trained on the dataset that accepts any method of payment to predicted the future purchasing pattern of the customer which gives the proposed system a higher position to be a better model. In addition, if the model predicts if a customer is likely to purchase more in the future therefore, the

		customer loyalty score in the future		model can be easily twisted to tell how the loyal the customer is to the company which can be resourceful to the business to determine customers to promote when buying their goods and or services
(Sree, 2020)	Python, TensorFlow (KNN, Logistics regression, Support Vision Machine, Naïve Byes, Decision Tree, Random Forest)	No assumption raised for the development of this model	The model predicts the propensity of any customer to churn in a moth to come	Proposed system will be of multiple use like that Sree has developed because if the proposed system predicts if the customer is likely to purchase nothing in the future then it means that the model can easily tell if the customer is likely to churn in the future. So, to conclude this proposed model can encompass the Sree's model and goes further in providing other useful information to the business.

<p>(Adebola Orogun,2019)</p>	<p>Data networks (use appriori algorithm)</p>	<p>Dataset used is the one that was extracted from previous customer expenditures on goods they bought online</p>	<p>The model can determine the loyalty of the customers basing on the transactions they have made online neglecting people who purchase on real cash and on credit which makes their model slightly bad.</p>	<p>The proposed model will be trained on the dataset that accepts any method of payment to predicted the future purchasing pattern of the customer which gives the proposed system a higher position to be a better model. In addition, if the model predicts if a customer is likely to purchase more in the future therefore, the model can be easily twisted to tell how the loyal the customer is to the company which can be resourceful to the business to determine customers to promote when buying their goods and or services</p>
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(Catherine afolalu 2019)	Python programming language Php and JavaScript Clustering algorithm with graphical based approach	No assumption raised for the development of this model	Evidence from the literature reveals a product prediction pattern for customers. The product qualities were anticipated by these investigations. Leaving out the attributes of the buyer.	The goal of this research is to create a datamining system and put it on a website for an electronic commerce company. To predict client behavior, the electronic commerce website's customer information and history should be employed.
(David Bell, Chidozie Mgbemena 2018)	Python, TensorFlow (Logistics regression, , Decision Tree, Random Forest)	Income, age and gender are only factors that affect expenditure of consumer while other factors are not be able to be explored to find other factors that affect expenditure of customers.	Initially, a dataset is chosen for a given time period (or series of time periods) that contains variables of interest. For analysis, customer, behavior, and outcome attributes are standardized.	Proposed system will use customer spending on specific products to predict actual products they are likely to buy in the future basing on several datasets generated from a retail shop database which encompasses all factors that affect consumer behavior indirectly

(Kulkarni et al. 2019) seeks to measure the complexity of consumer in-store movements using certain variables, and provides a purchasing model that takes into account the influence of complex customer movements on buy behavior. We calculated the specific dimension of shopping routes using the box counting approach and explored its correlations with cart size and sales, both of which are considered crucial for marketing. We discovered that the customer group with high dimensions had statistically higher mean values for the number of times they visited the online website, the length of time they spent in the online store, and the amount of money they spent than the customer group with lower dimensions. We used a binomial logit model to see if the dimension had any beneficial influence on their purchases.

(Salehinejad, Hojjat, and Shahryar, 2016) developed a deep learning technique for improving marketing strategy efficiency. When examined using deep learning techniques like Recurrent Neural Network (RNN), huge data accurately predicts customer behavior. Client loyalty number (CLN), recency, frequency, and monetary value are the variables evaluated here (RFM). Customer behavior patterns can be predicted using these, such as the number of times a product is purchased, the time gap between purchases, and so on. The customer data is refined in every phase of the network using Recurrent Neural Networks by feeding the output as input to the next network layer.

(Serhat Peker, Altan Kocyigit, P. Erhan Eren 2018) According to experts, shopping list prediction is a critical duty for businesses since it allows them to deliver a customised list of products to a specific customer while also increasing customer happiness and loyalty. Many studies in the literature have used individual-level and segment-based customer behavior modeling methodologies to forecast customer behaviors. Previous attempts to forecast customer shopping lists, on the other hand, have rarely used these cutting-edge methods. In this way, the segment-based method to shopping list prediction is introduced, followed by an empirical comparison of the individual level and segment-based techniques in this topic. Well-known machine learning classifiers and customers' purchase histories are used for this purpose, and the comparison is carried out on a real-world dataset through a series of trials. According to the findings, there is no clear victor in this comparison, and the results of consumer behavior modeling methodologies are dependent on the machine learning algorithm used. The study can assist researchers and practitioners in better understanding the many aspects of employing customer behavior modeling methodologies in the prediction of shopping lists.

2.2 CONCLUSION

The above literature review attempted to investigate what other writers and developers attempted to do in order to monitor customer behavior in order for businesses to identify solutions to consumer behavior analysis that are simple and inexpensive rather than relying on expensive labor. The proposed system has the advantage of predicting an individual's next order, which gives it a leg up in terms of providing more information about future purchasing patterns and providing the most important insights to managers, such as how many customers are likely to churn in the future so that they can find courses that can help the firm improve their products, and the system will give insights of products.

which are expected to be purchased in the future so that reordering quantities may be predicted to fulfill demand, etc. However, for this project, it will be designed to anticipate future consumer purchasing habits, but the model will be open sourced on the developer's GitHub account so that other developers can add more features to provide more insights to the clients.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

In this chapter entails that the proposed system will use research methodology and to be more specific quantitative research with experimental research design is the most appropriate methodology to use for the proposed system. This is so because, the model to be developed relays on the past data which needs to be researched on before implementing the project. The other thing is, during the development the model has to be experimented on to ensure that it predicts the future with high accuracy.

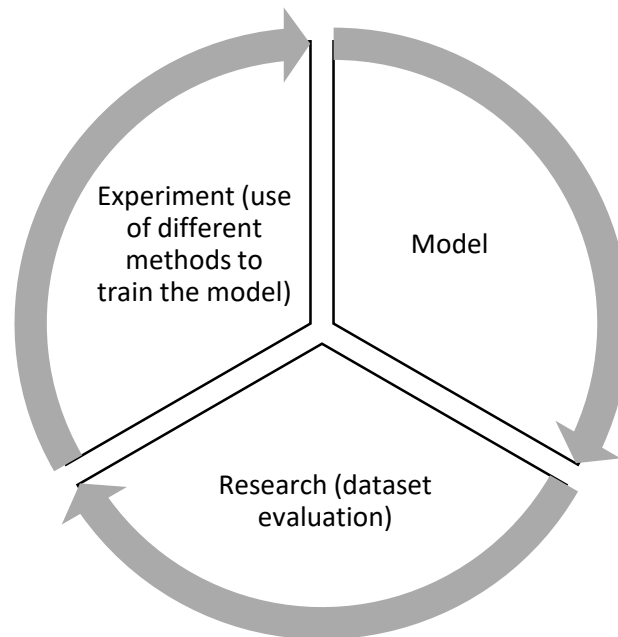


fig 1.2 tells the cycle of how machine learning model is developed

When the model is to be developed there is a need to research on the dataset that has to be used to create the model. The dataset is evaluated basing on the information it holds which is measured by the number of rows and columns it holds and the relevance of the column description towards the

problem at hand. When the dataset(s) are obtained, the developer has to analysis the dataset to know what kind of data in the dataset i.e. categorical or non-categorical data, discrete or continuous data, numeric or non-numeric data etc. and to figure out the data which has relationship with another data so that the developer can figure out the most appropriate tool or method to use to train the model e.g. KNN, K-means, Logistics regression, Support Vision Machine, Naïve Byes, Decision Tree, Random Forest etc.

3.2 RESEACH DESIGN

A research design can be characterized as a broad strategy for addressing the research questions. The research design refers to the overall plan for integrating the many components of the study in a coherent and logical manner, ensuring that the research problem is properly addressed; it is the blueprint for data collecting, measurement, and analysis. The success of a project is determined by a strong research design, which entails developing many modules and merging them to create a usable product, as well as specifying the functionality of each module. The term "system design" refers to the combination of various modules and the resources required to create a workable product that meets the set specifications. The user interface should be designed in such a way that it is very user friendly and convenient for the end users.

3.3 FUNCTIONAL REQUIREMENTS

A functional requirement (FR) is a description of the service that the software must provide, according to (Martin, 2021). It's a term that refers to a software system or its components. Product features or functions that must be implemented to enable users to complete their duties are also known as functional requirements. As a result, it's critical to make them explicit.

The system will carry out the following tasks:

- Should be able to determine how many times the specified products have been purchased together.
- The application must be able to run on a variety of web browsers.

- The system must be able to generate a summary or report of the products, which we can refer to as a product report, so that we can see and make better decisions.

3.4 NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements, often known as NFRs, are a set of criteria that describe how well a system will function, as opposed to functional requirements, which focus on the precise business functions that a system performs. These define the criteria that can be used to assess a system's behavior to ensure that it behaves as it should.

These are the system's non-functional requirements:

- **Accessibility-** The system must be able to be accessed by anybody, regardless of their location, as long as they have a device that can connect to the internet and can utilize a web browser.
- **Reliability—**The system should be dependable, accessible at all times, and users should have some level of faith in it.

Efficiency-It should be able to detect products that are purchased together as quickly as feasible and offer the necessary results.

- **Usability-** It should be simple to use and understand, with an interface that is not confusing to users and is user-friendly.
- **Scalability-** The system should be able to work with any web browser and display information on any screen, regardless of size.

Any interface utilized for the system should have a clear interface.

3.5 SOFTWARE DEVELOPMENT METHODOLOGY

This can be easily stated as a simpler method of developing software by following a set of prescribed steps until a product is fully created from a specific viewpoint. The researcher used the agile development approach, which is one of the greatest development methodologies available, to design a system that detects products that can be bought hand in hand in a retail organization's fruit and vegetable department.

This software development strategy allows for the development of software in stages termed increments, which are completed in phases. Each increment will add functionality to the system in development, and each completed element will build on the system's preceding parts.

The researcher adopted this strategy during the development process since it enables for quick creation of a system in situations when time is of the essence or where the time frame for developing the model is very constrained. The researcher will be able to complete the development procedure inside the specified time or time frame if they use this approach of development. Another important advantage for using this approach of development is that it allows for changes to be made while the software is being developed. To come up with a model, certain features will have to be removed and others will have to be added.

with a model that functions flawlessly Additions and deletions of features are being made in order to satisfy the system's stated goals. Because it enables for easy implementation of modifications to the model under development, the Agile method has proven to be a very powerful and vital technique of development. The Agile development process employs sprints, which can be used to track the performance and progress of the model under development.

3. 6 READING AND PROCESSING DATA

This model will rely on a database that contains all of the items present in the fruit and vegetable industry. The Stemming Methodology The act of reducing a word to a stem is known as stemming. A stem is similar to a root for a word, and it is used in writing. However, this doesn't have to be a word; nouns like study, studies, and studying all originate from the word studi, which isn't a word. For example, if we have the words actor and actress, the root word will be act.

The stemming procedure is carried out because we need to reduce these words to their stems or roots in order to improve our performance on our tests.

3.7 CONVERSION OF TEXTUAL DATA TO NUMERICAL DATA

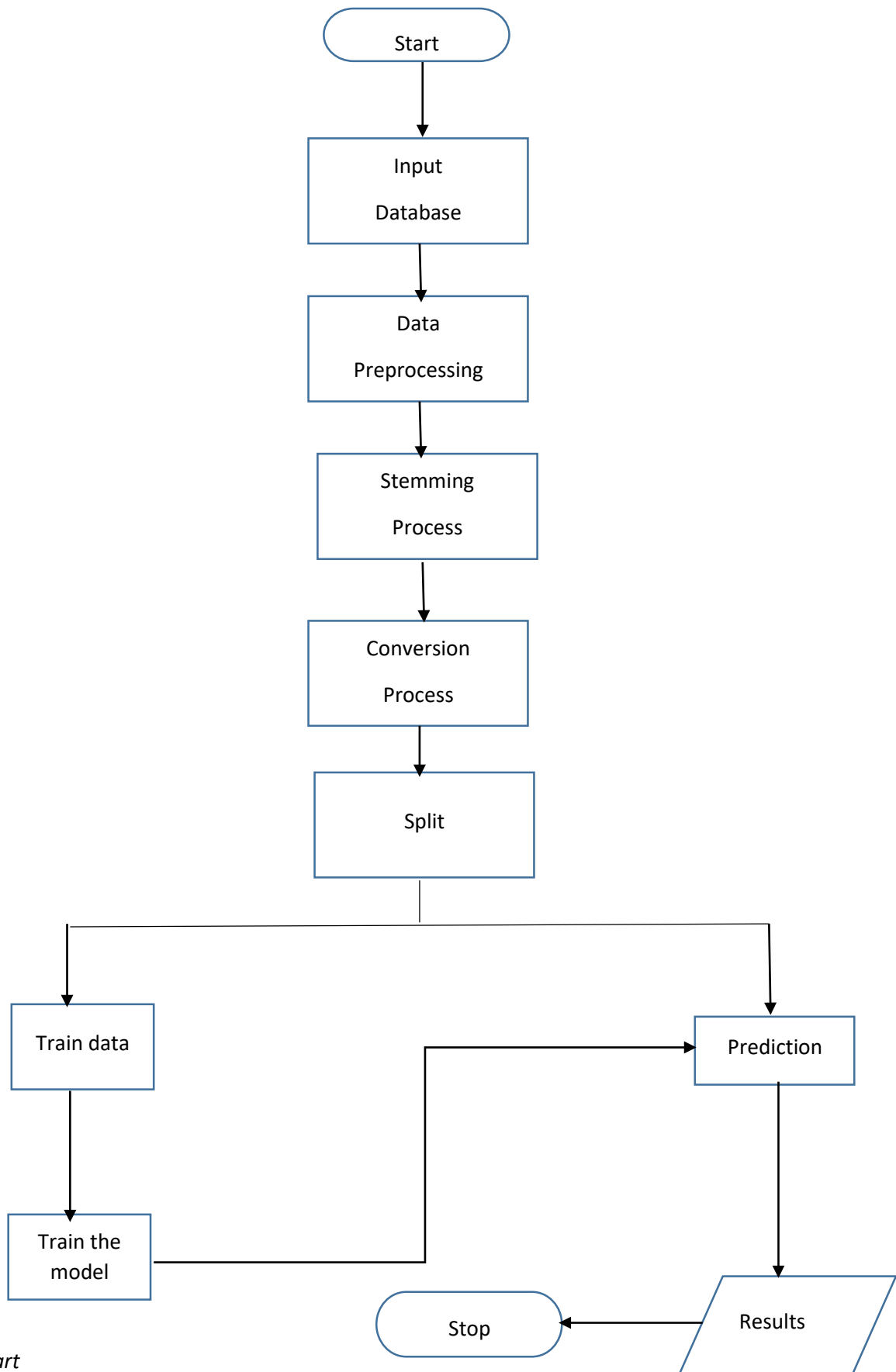
Following the stemming process, the textual data must be converted into numerical data. This conversion procedure is carried out since a computer can only interpret binary data, so this method will convert the data so that the computer can grasp it in a new way.

The Victimizer will be used to convert the data using its libraries, which can be obtained in the python libraries package.

3.8 SPLITTING THE DATA AND TRAIN THE MODEL

The data must now be divided into training and test sets. The Train Test Split module is where the Train Test Split method will be implemented. For the model, the numerical data is divided into test data and training data. Now it's time to train the final model.

The test data will be used to test the system, while the training data will be used to train the model using the numerical data from the provided dataset



Flowchart

3.9 TOOLS

3.2.1 Programming Language

The proposed system we be developed using Php programming languages because of its easiness and fastness in developing machine learning models through utilization of libraries which are built to simplify the development process.

```
<div class="main">
  <?php
echo " <H3>WELCOME ADMIN</H3></h1>" . $_SESSION["username"] . ".</h1><br>";

?>

<center><h2>Sales </h2></center>

<form action="index.php" method="POST" name="details" enctype="multipart/form-data">
<input type="checkbox" name="product" value="Vegetables">    Vegetables
<br>
<input type="checkbox" name="product1" value="oranges">    Oranges
<br><br>

<input type="checkbox" name="product2" value="tomatoes">    Tomatoes
<br>
<input type="checkbox" name="product3" value="apples">    Apples
<br><br>
<input type="submit" name="Enter" value="Enter">
</form>
</div>
```

In this project we are using vs code to write our php code that work hand in hand with html so that it will be easier to us to manage this code coz the language is a little bit similar and differs in some of the syntax that can be used to run programs.

This is how we create our sales page in our project that can be show in our system to be done separately with this document but they should be related so that if one ready this document can easily go and use the system without a complication.

```
if(isset($_POST['Enter'])){
$product=$_POST['product'];
$product1=$_POST['product1'];
$product2=$_POST['product2'];
$product3=$_POST['product3'];
$count=$_POST["count"];
$id=$_POST["id"];
$date_time=$_POST["date_time"];

$creat="INSERT INTO sales (product, product1, product2,product3,count,date_time) VALUES
('$product','$product1','$product2','$product3','$count',NOW());
if(mysqli_query($connect_user_Acc,$creat)){

if ($product && $product1 && $product2 && $product3) {

    $sql = "UPDATE `report` SET `count`=count+1 WHERE id=1";
    if(mysqli_query($connect_user_Acc,$sql)){
        echo "<h2>Thank you for purchasing our product</h2>";
    }
}

elseif ($product && $product1 && $product2 && $product3) {
```

```

$sql = "UPDATE `report` SET `count`=count+1 WHERE id=2";
if(mysql_query($connect_user_Acc,$sql)){
echo "Thank you for purchasing our product";
}

# code...
}
elseif ($product && $product3 && $product1 && $product2) {

    $sql = "UPDATE `report` SET `count`=count+1 WHERE id=3";
    if(mysql_query($connect_user_Acc,$sql)){
echo "Thank you for purchasing our product";
}

# code...
}

if ($product1 && $product2 && $product && $product3) {

    $sql = "UPDATE `report` SET `count`=count+1 WHERE id=4";
    if(mysql_query($connect_user_Acc,$sql)){
echo "Thank you for purchasing our product";
}
}
elseif ($product1 && $product3 && $product2 && $product) {

    $sql = "UPDATE `report` SET `count`=count+1 WHERE id=5";
    if(mysql_query($connect_user_Acc,$sql)){
echo "Thank you for purchasing our product";
}
}

```

3.2.2 DATA

We feed data to the database through buying the given products from the system we have this can be shown in the following system in chapter 4 where we can show how our system is going to do.

The Approach

The task was reformulated as a binary prediction task: Given a user, a product, and the user's prior purchase history, predict whether or not the given product will be reordered in the user's next order. In short, the approach was to fit a variety of generative models to the prior data and use the internal representations from these models as features to second-level model.

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CHAPTER 4

4.0 DATA PRESENTATION AND ANALYSIS

Following the successful construction and installation of the system, it must be thoroughly tested under various settings and scenarios in order to determine how the system will respond to data supplied into it. The researcher aims to identify the system's strengths and flaws, as well as other aspects, in this chapter, and the suggested system will be compared to current Fake News Prediction systems. Following the successful construction and installation of the system, it must be thoroughly tested under various settings and scenarios in order to determine how the system will respond to data supplied into it. The researcher attempts to identify the system's strengths and flaws in this chapter. The suggested system will be tested against current Fake News Prediction systems, among other things.

4.1 TESTING TECHNIQUES

For his consumer behavior system, the researcher conducted many sorts of testing. The accuracy rate of the system and the failure rate were the two main areas of concern. After several system activities have been completed, all of the system's results will be displayed. Accuracy testing, relevancy testing, acceptability testing, and system testing were among the methodologies utilized.

4.2 SYSTEM FUNCTIONALITY AND CORRECTNESS

4.3 OBJECTIVES

Before doing any other tests related to how it reacts or even behaves, the system was tested to check if it could run. It was put to the test to check if it worked according to the proposed system's specs. The researcher wanted to determine if the system could detect all of the fruits and veggies being purchased at the same time, giving them more time to make better selections about which fruits and vegetables to order.

4.4 SYSTEM TESTING

For system testing, the researcher gathered a variety of fruits and vegetables, which were fed into the system to see if the system could identify products that are purchased together more frequently than others. The system's results aided the supervisor, or anybody else in the firm who used it, in making good and better decisions.

4.5 RELEVENCE TESTING

The relevance test was carried out to assess if the research could be carried out. The developed system was put through its paces in terms of use and availability.

- Accuracy

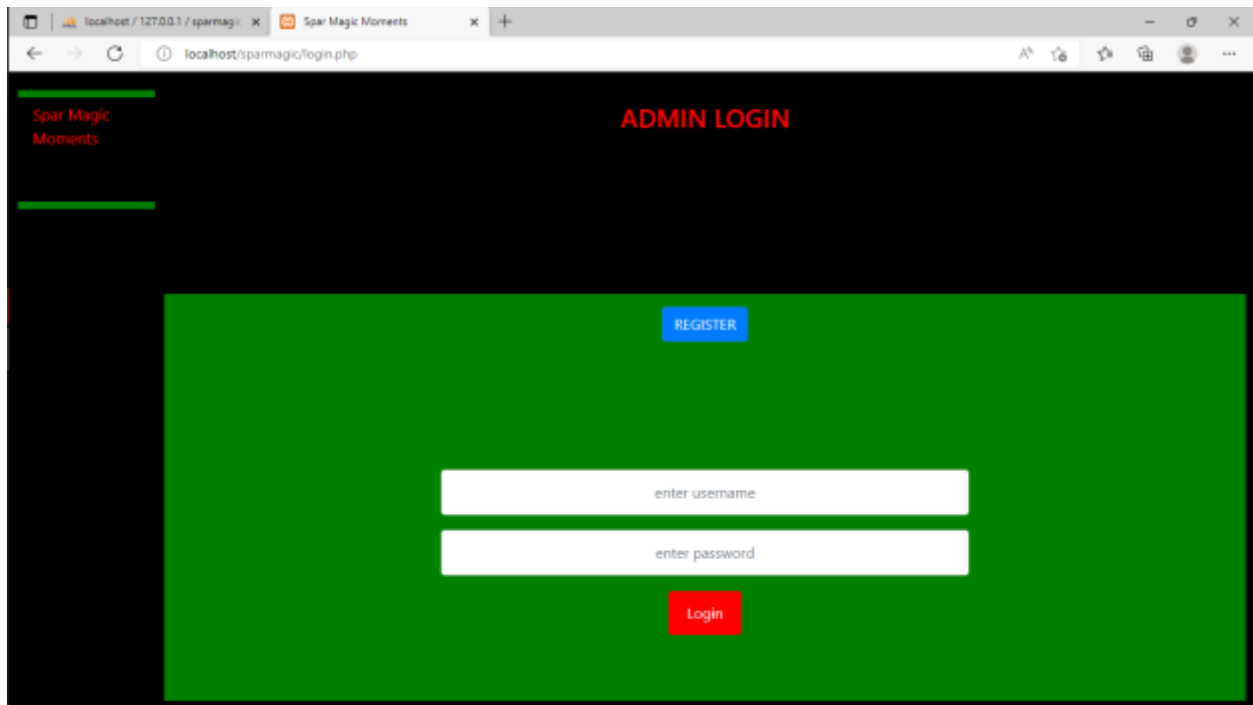
- Responsiveness

- Functionality

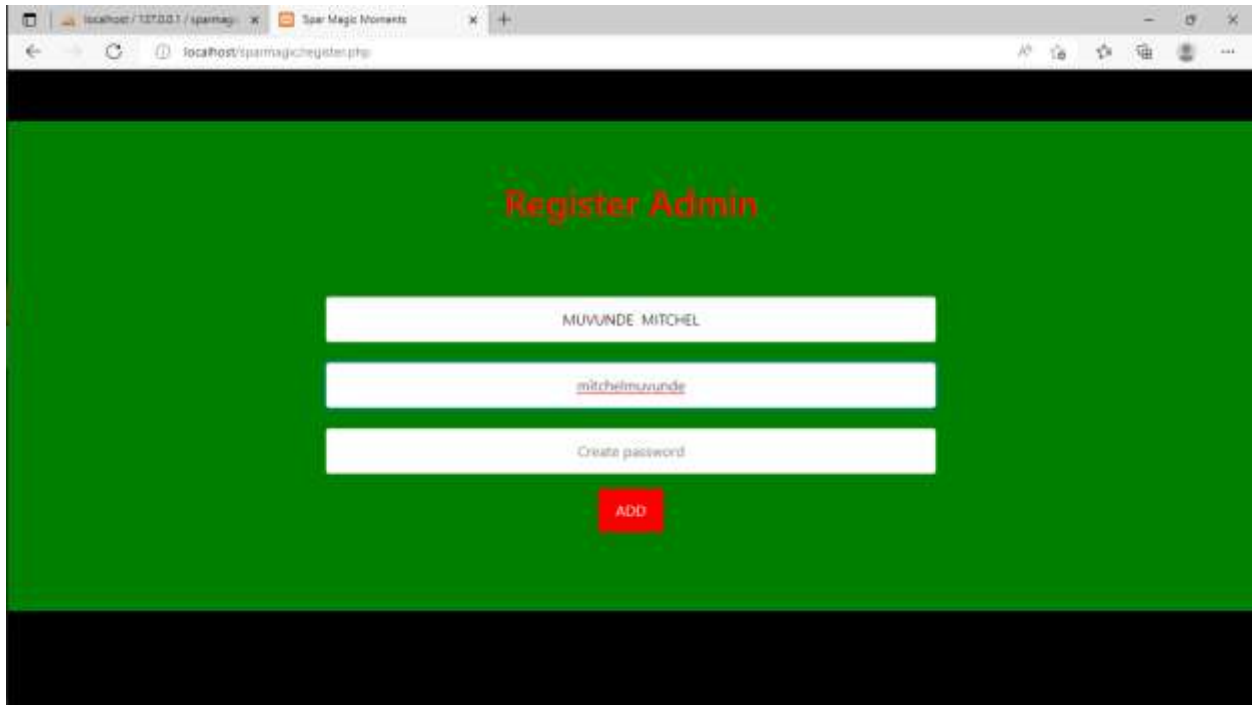
4.6 RESULTS

This chapter is going to show the results of the final project we have been working for and is going to explore everything we have been talking about in the above chapters.

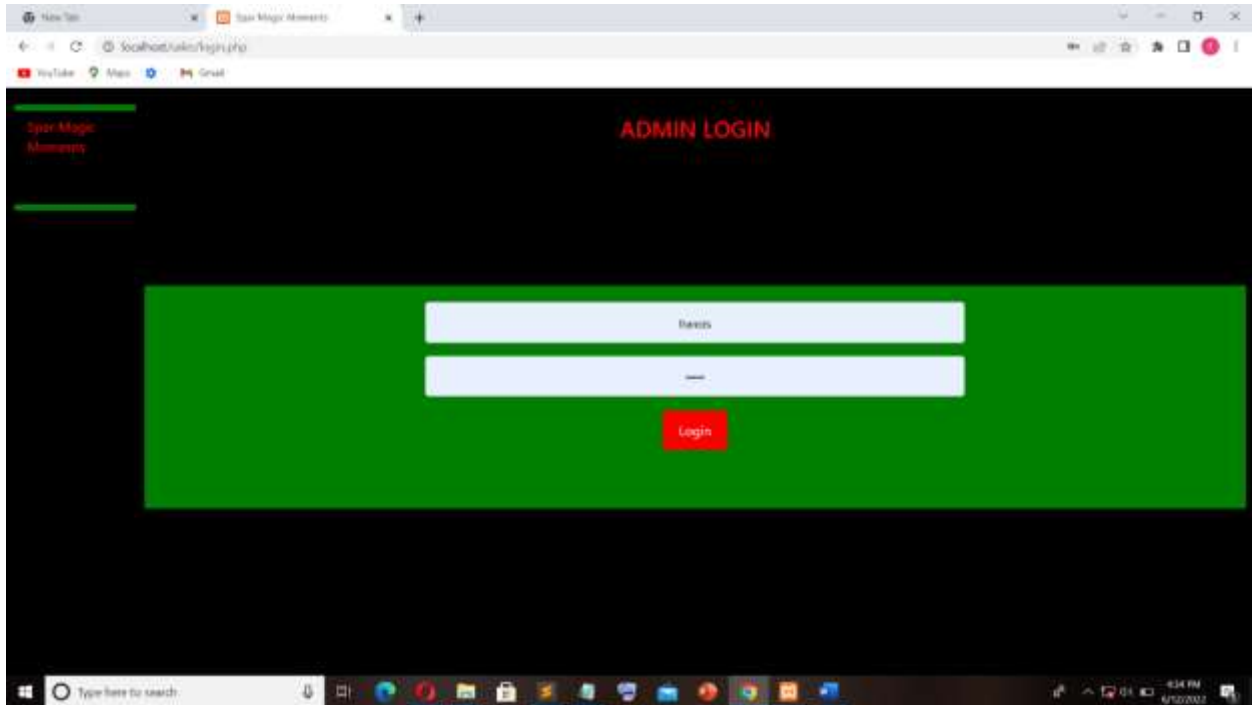
4.7 A picture to show the registration page



This is the registration form for the management where they are supposed to click register so that they will be able to register into the system so that they will manage to see how the system works and able to manage the system after registration. So when they click register the user interface will be as follows.



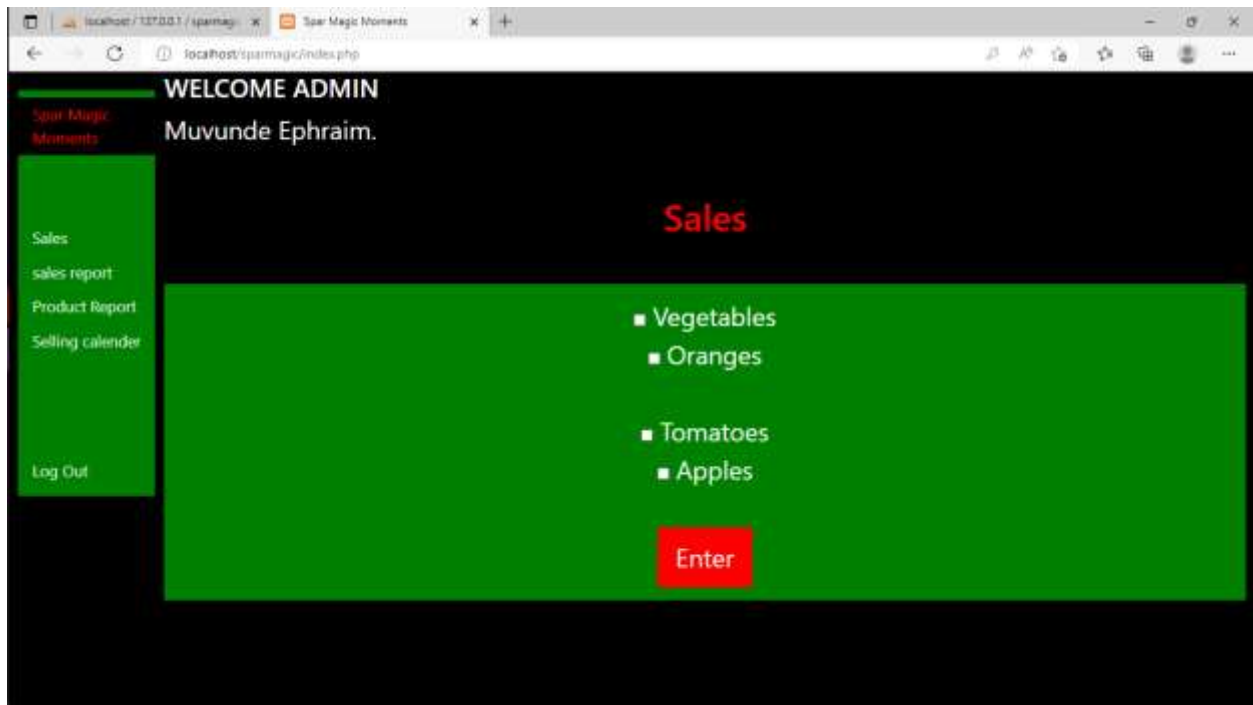
4.8 A picture to show the login page



This picture shows a login page where the admin is supposed to login and see how the system is going to work and get all the information that he or she might need to know and make their decisions if they got the information they need to know through the system available.

Then after the management have managed to register and also managed to login into the system we can see the inter face that show what our system is like and able to see different icons to work with. The display is as follows.

4.9A picture to show the system display

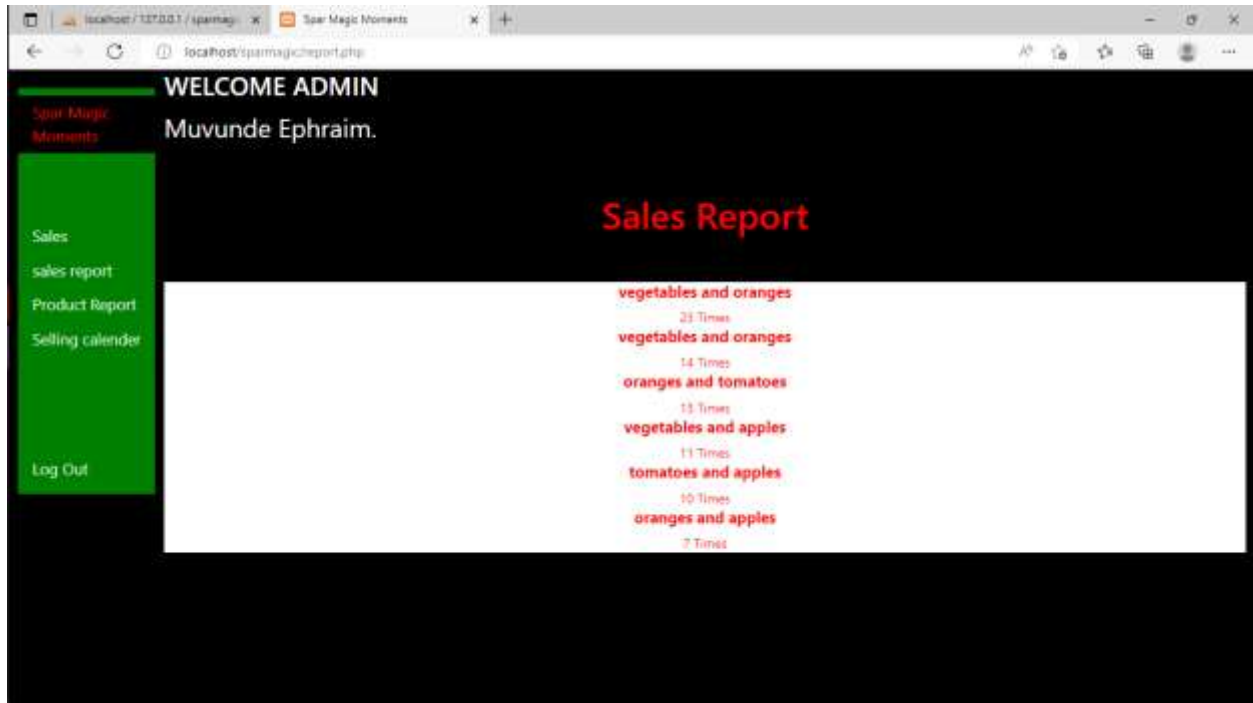


This is the view of our system that shows the company name which is Spar Magic Moments and also shows the person who log into the system at that moment.

It also shows the sales where the department manager is going to enter the product which have been sold hand in hand in the previous day or after some hours.

We can also come up with the display where we are going to display sales report that shows the number of times two or more products are being bought hand in hand so that we can easily identify that which products to order more so that we can reduce losses and increase our sales in the near future.

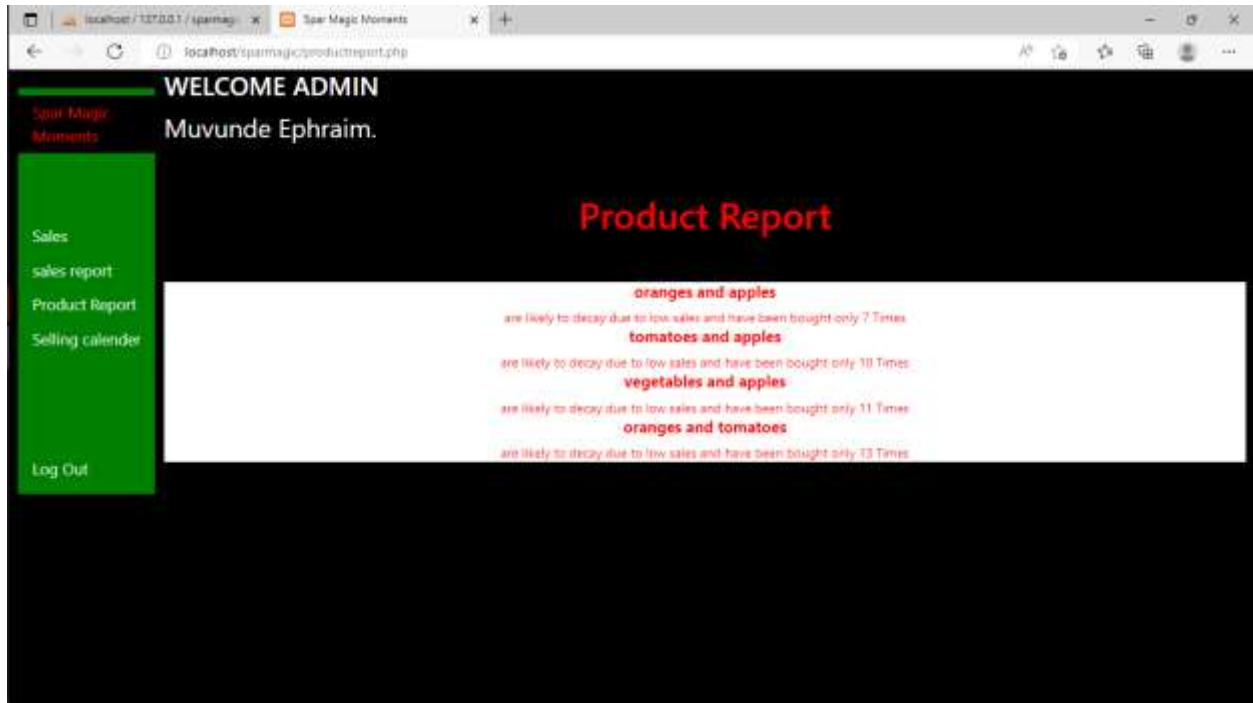
4.1.0A picture to show the sales report



The picture shows clearly the number of times that products have been bought hand in hand in our fruit and vegetables department in a retail organization.

This one is where the department supervisor or manager is able to know and figure out what fruits and vegetables to order much than others in the time to come so that he or she can increase his or her sales in the department to keep the department functional and profitable to the company.

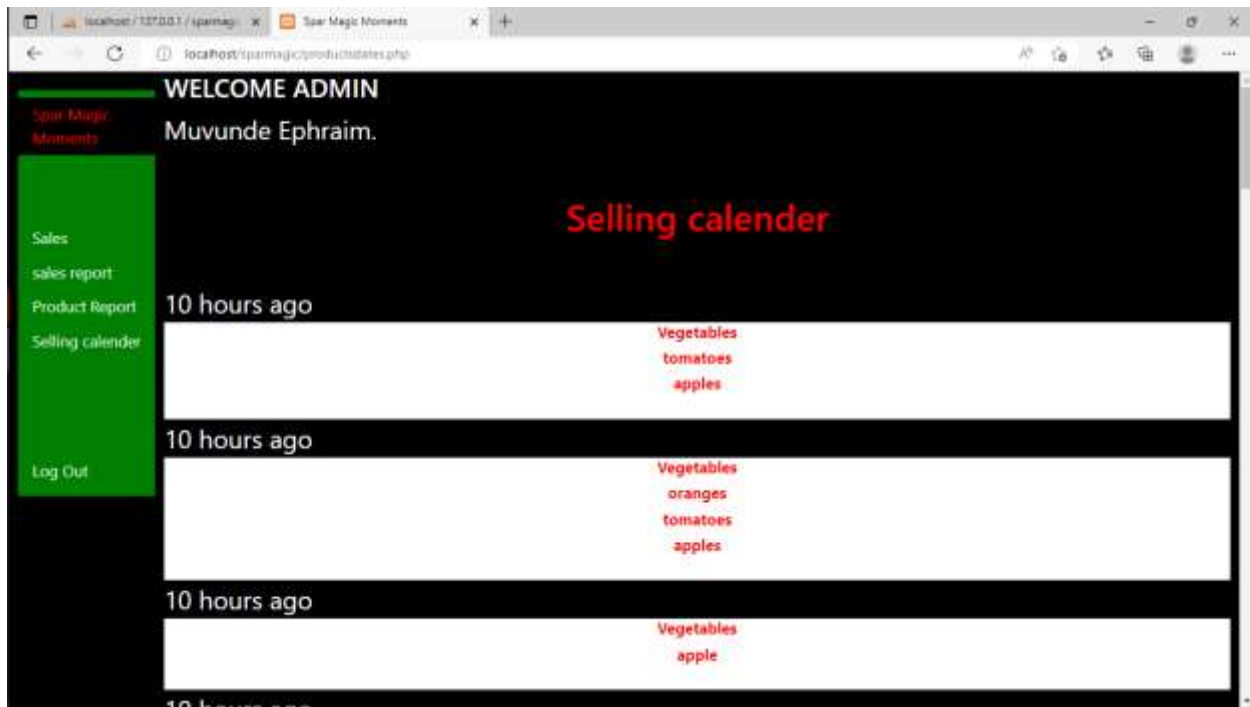
4.1.2 A picture to show the product report



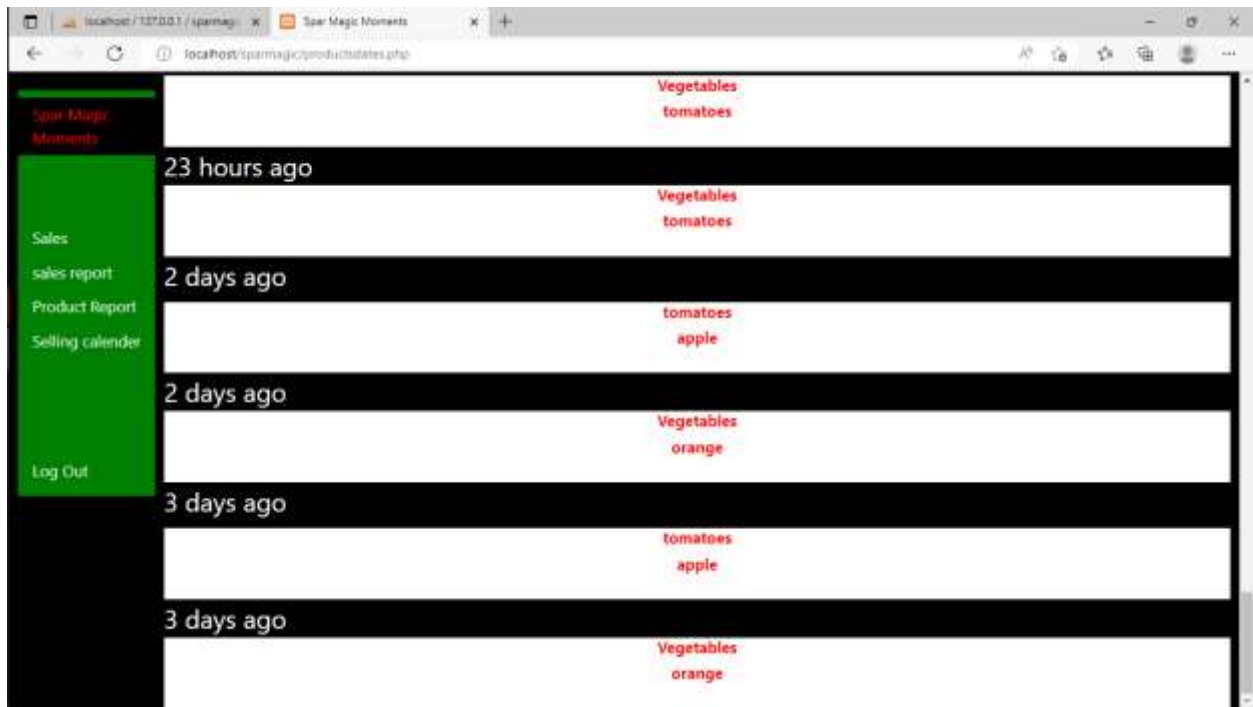
As we can see product report shows the products that are being bought less hand in hand in the department so the supervisor should be able to see what he or she should do fast to avoid those products to be rotten and he or she must also be able to arrange his or her products in the way that he customer can easily manage to pick his or her favorite without any complications due to that fact that he knows what customers really like and bought according to the last expenditures done by other customers.

The system is telling the supervisor of the department that these products are likely to decay due to the fact that they are being bought less times than others since the system is showing those products that are sold less hand in hand.

4.1.3A picture to show the selling calendar



Our system is able to tell that these products are being bought like 5 hours ago. This can easily tell the supervisor the rate at which each products or a number of products are being bought so that he can manage his front filling following the merchandising rule which says “first in first out” that only means the first products to be ordered are supposed to be displayed first so that they can be sold and those who are ordered last can be sold last to avoid products go rotten since these products are regarded as perishables.



CHAPTER 5

CONCLUSION AND RECOMENTATIONS

5.0 INTRODUCTION

In this chapter, I will summarize all of the research undertaken and completed in the research project, as well as the findings and objectives derived from the research. I'll also discuss the difficulties encountered during the development of the customer behavior detection system, as well as all potential work that can be done to improve the project in the future.

5.1 AIMS AND OBJECTIVES REALISATION

The study was successful in developing a consumer behavior system that detects client behavior based on previous spending. The system was successfully built, and it was tested to see if it could categorise fruits and vegetables that were purchased together based on previous client expenditure. The researcher was able to create a highly scalable algorithm that will suggest quantity reordering based on historical customer behavior at a supermarket. In addition, I was able to create a highly accessible web-based application that will be connected with the model, allowing the end user to interact directly with the model.

5.2 CHALLENGES FACED

During the development of the system, the researcher ran into certain difficulties. During the creation of the system, the researcher suffered power outages. The researcher also faced some network issues, which made it difficult to conduct study at times because my location has a network difficulty. The other issue was that the researcher did not have the funds to host the application on the internet, which was a significant disadvantage because the researcher did not have the means to do so.

5.3 RECOMENTATIONS

The system must be put online so that anyone, at any time, can access it. This will provide the researcher with an understanding of how the application is doing and the most important areas in which to look for ways to improve it. A huge dataset containing a large number of fruits and vegetables as well as a diversity of data would improve the system's classification of fruits and vegetables that can be purchased together and produce better results. The researcher also believes that the program might be created to be connected with the browser for simple access, which would be a fantastic idea.

To run the system more efficiently and without any delays, it is recommended that one use a powerful and more efficient computational processor. According to Barkley (2016), recommendations are speculative proposals and thoughts that support the optimal course of action in a given situation. Despite the fact that the system achieves all of the pre-determined goals, there is still opportunity for development if better modules are implemented.

5.4 FUTURE WORK

It would be a fantastic idea to develop Android applications for consumer behavior detection systems, since this would provide a big benefit to all users, as practically everyone these days possesses a smartphone or tablet. People can access the application via browser on their phones, but others are upset by browser applications. For example, the YouTube application is better and easier to use than the browser.

AI will achieve leapfrog progress thanks to platform, algorithm, and interface innovations. Building an intelligent platform that can serve a wide range of enterprises and meet a wide range of needs will be a prominent trend in future technological development.

Brain science research has influenced the development of AI to varying degrees. The inexplicable "black box" aspects of human brain intelligence's operation are directly linked to the fact that brain research has not yet fully grasped the operating rules and mechanisms of human brain intelligence. To unlock AI's "black box" feature, progress in brain research is required. Will man's biological intelligence ever be surpassed by artificial intelligence? This viewpoint argues that machine

intelligence has a lot of space for growth, but it overlooks the fact that brain science has already demonstrated that human intellect is superior. Brain intelligence has a long way to go in terms of being completely utilized and released, and there is still a lot of space for growth. The amount of human intelligence that can be simulated or extended is only the tip of the iceberg above the sea in terms of AI, with only the conventional, logical, explicit, and universal awareness and intelligence included.

5.5 CONCLUSIONS

The Model was successfully applied, and the researcher gained new information and expertise as a result of the project's successful completion. To summarize, the research study was a success.

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