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INVENTORY MANAGEMENT SYSTEM USING MACHINE LEARNING

Sindhuja CNC[1] , Vem Sahithi[2] ,Shivani Yadao[3]
Department of Computer Science and Engineering, Stanley College of Engineering and Technology for Women, Telangana, India

Abstract: The project Inventory Management System is a complete web-based application. An inventory management system is the combination of technology (hardware and software), processes and procedures that oversee the monitoring and maintenance of stocked products, whether those products are company assets, raw materials and supplies, or finished products ready to be sent to vendors or end consumers. Inventory Management System plays an important role because it reduces the stress, monitoring of products, making balance sheets and many more which was done manually. Simply Inventory Management System overtook the manual things and also it optimizes the cost and time constraint.
Inventory Management Software is an open-source project developed by procedural PHP, MySQL, bootstrap, and jQuery. This application is based on web application and develop with procedural PHP, MySQL database, jQuery, data tables plugins, and bootstrap. This application provides the users to manage brands, category, product, orders, and report. The special feature that we introduced in this project is that the admin can get predicts about the stock using the machine learning algorithms which helps him to mange the stock in warehouse. This system provides best inventory management software features. This system can be also used for small business. It is free web-based inventory management software. In product section, the admin can add the product information and manage the stock. In order section, the application will manage the stock of the product and generates the total amount of payment to be pay by the client.

***Keywords*:** Inventory, Warehouse, Stock, Random Forest.

INTRODUCTION

ABOUT THE PROJECT

Products are considered as the business resources for the organization. This includes managing the product with appropriate way to review any time as per the requirement. Therefore, it is important to have a computer-based IMS which has the ability to generate reports, maintain the balance of the stock, details about the purchase and sales in the organization. Before developing this application, we came up with Inventory Management System existing in the market, which helps to give the knowledge for the development of our project. This application software is only used by the large organization but so we came up with the application which can be used by the small company for the management of their stock in the production houses. After analyzing the other inventory management system, we management system. So, we decided to include those things that help the small organization in a way or other.

OBJECTIVE OF THE PROJECT

Primary objective

The primary objectives of the project are mentioned below:

To fulfill the requirement for achieving the Bachelor's degree of Information Technology.

To know the fundamentals of the Initially designed to perform little more than an accountant and a guestbook, PHP has experienced in a short time a real revolution and, from its functions, in these moments you can perform a multitude of useful tasks for web development. Little by little PHP is becoming a language that allows us to do everything.

Secondary objective

The secondary objectives of this project are mentioned below:

To develop an application that deals with the day-to-day requirement of any production organization.

To develop the easy management of the inventory. To handle the inventory details like sales details, purchase details and balance stock details. To provide competitive advantage to the organization.

To provide details information about the stock balance. To make the stock manageable and simplify the use of inventory in the organization.

SCOPE OF THE PROJECT

Inventory Management System (IMS) is targeted to the small or medium organization which doesn't have many warehouses i.e., only to those organization that has single power of authority. Some of the scopes are:

Only one person is responsible in assigning the details or records.
It is security driven.
Godown can be added as per the requirement.

Determination of economic order quantity: Economic order quantity or economic lot size refers to that number ordered in a single purchase or number of units should be manufactured in a single run, so that the total costs — ordering or set up costs and inventory carrying costs are at the minimum. So, the determination of Economic Order Quantity is also within the scope of inventory control.
Effectiveness towards running of store: The determination of policies of the location, layout and materials and storage handling equipment certainly help in the effective working of stores organization.

ADVANTAGES

It helps to maintain the right amount of stocks
It leads to a more organized warehouse
It saves time and money
Improves efficiency and productivity
A well-structured inventory management system leads to improved customer retention
Avoid lawsuits and regulatory fines
Schedule maintenance
Flexibility

DISADVANTAGES

Bureaucracy
Production problem
Impersonal touch
Production problem
Increased space is need to hold the inventory
High implementation costs

APPLICATIONS

The applications of IMS are usually in the areas where there is a single centralized admin and for small warehouses.
Mobile store
Super markets
Apparel stores
Medical store

HARDWARE AND SOFTWARE REQUIREMENTS

Software Requirements:

Front End: HTML, CSS, JavaScript
HTML: HTML is used to create and save web document. E.g., Notepad/Notepad++
CSS: (Cascading Style Sheets) Create attractive Layout
Bootstrap: responsive design mobile friendly site
JavaScript: it is a programming language, commonly use with web browsers. Back End: PYTHON, MySQL:
PYTHON: is a technology that allows software developers to create dynamically generated web pages, in HTML, XML, or other document types, as per client request. PHP is open-source software.
MySQL: My Sql is a database, widely used for accessing, querying, updating and managing data in databases. Operating System: Windows 10
For Documentation: Microsoft Office 2007

Hardware Requirements

Processor: - Intel core i5 RAM: - 1GB onwards
Free Hard Disk Space: - 2 GB or more

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LITERATURE SURVEY

PROPOSED SYSTEM

The proposed system is computerized and has been developed using advance language therefore it gives more facilities than present system. It provides quick access to any data.[1]
Features of project include aspects such as to make my software user friendly i.e., to make it so easy to use that the user will not dream of switching back to the original System.[2]
By user friendly we mean to make records available to the user at just the hit of a key-stroke.[3]
To maintain the list of Stock records, to maintain records of Customers and Event, to maintain records of Customer, to maintain the transaction details. To add/update/search them from the database-all these features have been considered for the management of the system.[4]
Besides maintaining the data in the database, the system also has the provision for printing various reports.[12]
The system helps reduce the paper work and provide an efficient environment that is user friendly to work in. [13]

EXISTING SYSTEM

In present non-computerized system, all jobs are performed manually. All records of Customer, and Customers details are written and stored in paper format in a file.[5] Prop writer maintains separate files for each new information. So, managing them is very complex and has become an impossible task to be performed manually systematic way.[6]
As the job is done manually, it has its own limitations and lots of paperwork.[7] Preparation of records on yearly basis becomes a tedious and time-consuming job still its authenticity is always debatable and can't be verified easily.[8]
The yearly records, which are done manually, are not easy to maintain in files, which can be destroyed anytime by any person.[9]
Time required for searching records of particular item is also difficult. [10]. Maintaining the records of each and every minute detail of every item is also very difficult. Any manual error can lead to wrong result. This system is unable to provide timely report information.[11]

PROPOSED ARCHITECTURE

ARCHITECTURE

This Web based application is based on 3-tier architecture. The 3-tier includes the three hierarchy of the flow of programming logic from user interface to database and again database to user interface with the desired information requested by the clients. In between there involves the logic layer for effectively and correctly manipulating the request. The 3-tier includes the following:

Client tier

The visual part is implemented using all kinds of swing components, which does not make database calls. The main function of this tier is to display information to the user upon user's request generated by user's inputs such as firing button events. For example, inventory list will display when user click "display" button if he or she wants to know the list of stock remaining in the organization.

Business tier

The middle tier, business logic, is called by the client to make database queries. It provides core function of the system as well as connectivity to the data tier, which simplify tasks that were done by the client's tier.

Data tier

Data layer is also the class which gets the data from the business tier and sends it to the database or gets the data from the database and sends it to business tier. This is the actual DBMS access layer or object layer also called the business object. The database backend stores information which can be retrieved by using the my sql database Connectivity. My sql database connectivity is used to manage the communication between the middle tier and the backend database by issuing Compiler.

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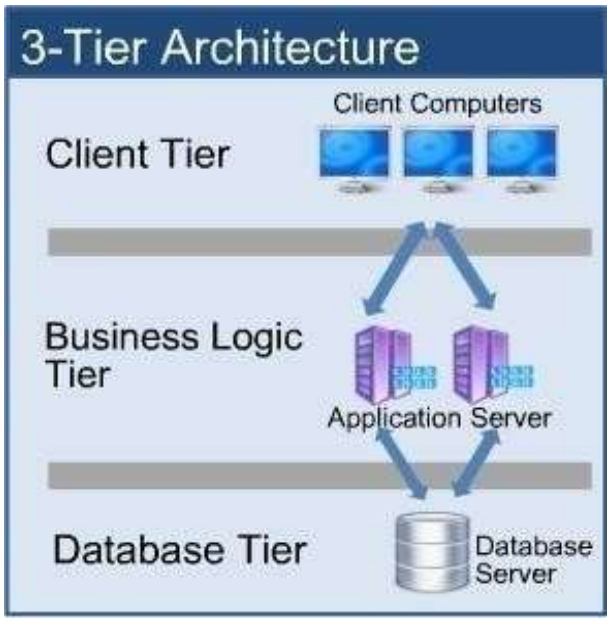

Fig 3.1: Tier Architecture diagram

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IMPLEMENTATION

ALGORITHM

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML. It is based on the concept of ensemble learning, which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model .Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset .Random Forest works in two-phase first is to create the random forest by combining N decision tree, and second is to make predictions for each tree created in the first phase. The Working process can be explained in the below steps and diagram:
Step-1: Select random K data points from the training set.
Step-2: Build the decision trees associated with the selected data points (Subsets). Step-3: Choose the number N for decision trees that you want to build.
Step-4: Repeat Step 1 & 2.
Step-5: For new data points, find the predictions of each decision tree, and assign the new data points to the category that wins the majority votes.

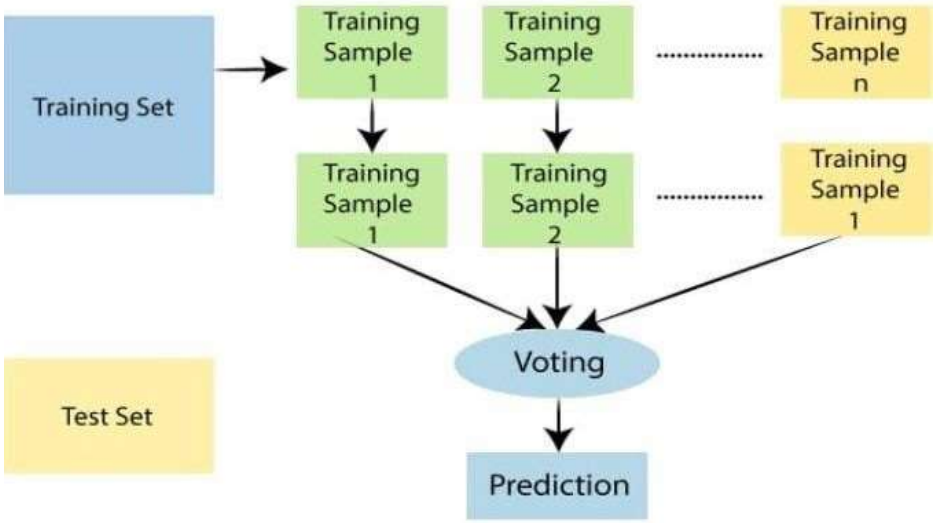

Fig4.2.1: Random Forest algorithm

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CODE IMPLEMENTATION

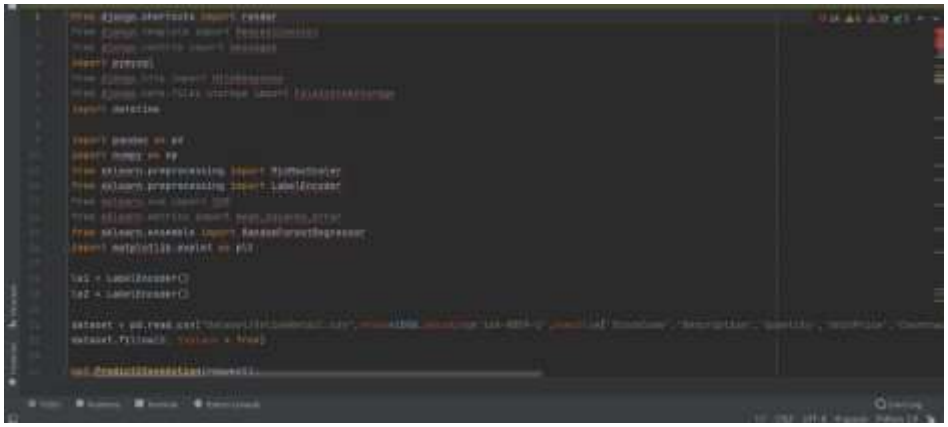

Fig 4.6.1

Here we are importing all the necessary modules and also the dataset.

Fig 4.6.2

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Fig 4.6.3

In these screens we can see the PredictStockAction function being defined it is used to implement the random forest algorithm and predict the stock availability.

Fig 4.6.4

In the inventory folder click on run file which is a windows batch file which is used to start DJANGO Server. Then open the browser and enter the URL 'http://127.0.0.1:8000/index.html' and press enter key to get below home page

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RESULTS

Fig : 6.1.1 Home Screen

Fig : 6.1.2

New User Signup Screen In above screen user will signup and press ‘register’ button to get below

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Fig : 6.1.3 User Login Screen

In above screen user will login and after login below screen is displayed

Fig : 6.1.4 Purchase Screen

In above screen user can view all products list and then click on 'Click Here' link to purchase that product

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Fig : 6.1.5 Payment Screen

In above screen user will view all details and then enter card number and CVV number and press submit button to confirm the order.

Fig : 6.1.6 Stock Prediction Screen

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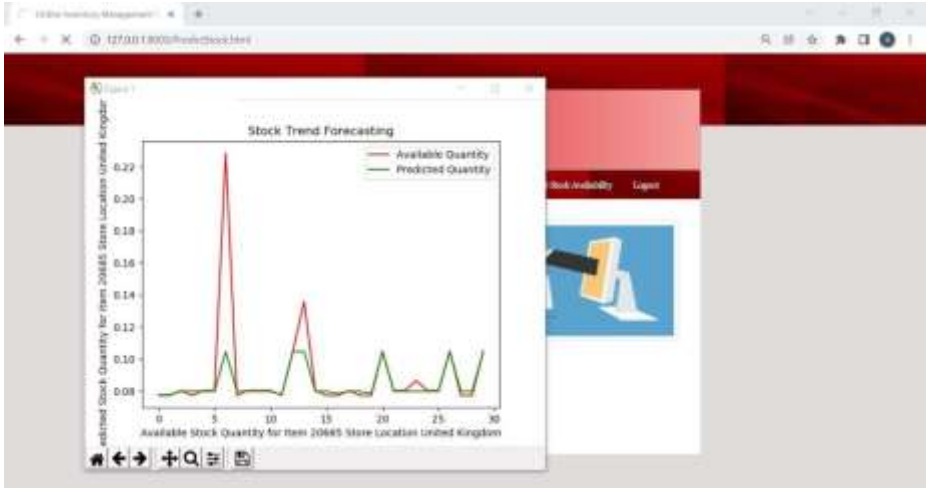

Fig : 6.1.7 Available And Predicted Stock

CONCLUSION

The survey of real-world small businesses helped me to understand current practices, problems and the possible solutions for them. We have evaluated and presented a low-cost Inventory Management System that also works efficiently for small businesses. This system was implemented in a way which can be managed by people who have basic knowledge about website's functioning. At the same time, the requirements of a basic store have been taken care of, and a few features that can make the application easier to use and easy to understand have been added. IMS helps small businesses to transfer their record from paper-based system to computerized system. The most important problem small businesses face is the understanding of demand and supply and upgrading their warehouse accordingly our system helps the business administrator to predict about the stock using our special features which helps to avoid dead stock and high demand products can also be always kept in stock. This system also helps management of resources easy and cost effective. The admin has full control over all the activities and he can easily track and manage the products available in his website. In this way we made many activities easy for the administrator.

FUTURE SCOPE

To accomplish inventory management tasks as the staff can access and update the data from anywhere. Incorporates inventory management with any existing warehouse backend system at one go. Ensures better control over remote and mobile asset data. Efficient receiving processes such as receipt inspections and asset verification. Better mobile inventory tracking and management by employing bar code and RFID. Manage and maintain inventory with cycle counting. Check and confirm inventory status. Cut short the data entry errors with barcode scanning. Enhances transaction accuracy with real-time data validation. Reduces inactivity due to the utility of mobile devices.

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