International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 12 ǁ December 2022 ǁ PP. 07-11

Jit Supply Chain - To Predict Stockouts

Abhilash Movva[1], Voruganti Naresh Kumar[2]
[*1] *B. Tech Student, Department of Computer Science and Engineering, CMR Technical Campus, Hyderabad, Telangana, abhilash.movva@gmail.com*
[2]*Assistant Professor, Department of Computer Science and Engineering, CMR Technical Campus Hyderabad, Telangana, nareshkumar99890@gmail.com*

Abstract
Stock Out situations are common across India. Indian mom-and-pop stores (Kirana stores) do not have the ERP systems that big chains like Apollo Pharmacy or Medplus or Burger King or Mcdonald's etc have. These mom-and-pop stores can't afford the huge infrastructure (Computers and the Internet) required to run these ERP systems in their tiny stores. But all the store owners now own an android phone, and also have a 4G internet (Jio), A computing device and internet are the basic prerequisites to run any s/w application. I wish to use these systems to place a very simple and intuitive stock management app in the hands of these small Kirana stores and a dashboard at the distributor's end to view the updates provided by all these stores spread across the city. 7-Eleven developed this basic premise in the 80s. I took inspiration from the 7-Eleven success and wish to replicate similar success in the Indian Kirana Stores.
Keywords: Machine Learning, Inventory Management System,Predictive analysis

---

Date of Submission: 22-11-2022 Date of acceptance: 06-12-2022

I. INTRODUCTION

The goal of the project is stockOut prediction. It is a field of research that aims at defining and experimenting new techniques able to automatically recognize stock values in future. Recently, a significant amount of literature concerning machine learning techniques has focused on automatic recognition of activities..

1.1 PROJECT SCOPE

This project is titled "JIT SUPPLY CHAIN - TO PREDICT STOCKOUTS". In traditional methods, there is a need to manually inspect the Kirana stores to check the status of stock available. Through this project, this process will be automated with Big data & ML.

1.2 PROJECT PURPOSE

A Store owner has all the SKUs (Stock Keeping Units) and their current stocks in his mind. This is not recorded anywhere. When the owner realizes that his stock is getting over. He would call up the relevant distributor and ask him for a visit. This usually happens when a customer comes to the store and the store owner realizes that the tin is empty or has come very close to being empty. The Distributor (typically on TVS XL 100) loads 10 -30 SKUs with huge stocks and starts driving on a fixed path to all the retailers, and offloading the items depending on the current stock levels. With this scenario, there are huge inefficiencies in the system. The Consumers also have no clue about all the items in the vicinity so they go to Amazon or Flipkart or other e-commerce stores where catalogs are available, even when the item they need is in a store next door, they can't find it. In the existing system there are flaws at every step of the process, with this app we can correct a few of them.

1.3 PROJECT FEATURES

The main features of this project are that The app would allow us to gather huge data (Big Data) and derive insights with the data using analytics (AI/ML) and predict the exact number of units that would be sold in the future (Predictive Analytics). This project would have a huge societal impact and a huge scope if we can include a modulus that allows the store owners to make purchases through the app. Place orders and invoices also through the app.

1.4 DISADVANTAGES OF EXISTING SYSTEM

- The distributor does not traverse through the ideal path, he just goes randomly or in a straight line without any clue about the requirements of the Kirana stores. (traveling salesman problem).

- The distributor also does not know about the exact needs of each Kirana store, i.e. he does not know how many units he has to pack before starting the journey. (logistics/fuel waste)
- Neither the store owner nor the Distributor know or can predict how many items would be sold the next day or the next week or the next month (no predictive analytics).
- All this knowledge is imbibed inside the heads of the people, so when a store owner dies/quits, all this knowledge vanishes and the next store owner has to start from scratch. (persistent knowledge)
- The Store owner often loses sales due to stock-out situations to other stores when the user leaves when he realizes that there is no stock. (lost sales and opportunity cost)
- The Consumer has to move from one shop to the next till he finds what he needs. The Consumer also has no clue about the stock levels of any store in his vicinity till he goes there and finds it out for himself. (Search and find costs)

II. PROPOSED SYSTEM

(i) Introduction

We do not wish to target all the Kirana stores, to begin with. A Typical store has more than 100 SKUs from 10 different distributors, which would become a huge challenge to solve. We have decided to go after stores that stock less than 10 SKUs only. These are a few use cases, such as milk stores, which have less than 10 SKUs and all these SKUs are sourced by a single Manufacturing unit for a city. We wish to limit ourselves to solving this problem in the first version of the app. We deliberately stay away from solving the multiple distributors, i.e. M: N problem in the first iteration. In the first iteration, we want to focus on 1:N - One single distributor for many retailers and with stores of less than 10 SKUs.

Choosing minimal SKU units also removes the overhead of the store owners creating the catalog for the store. Choosing the store chain strategy also allows the distributor to create catalogs for all the stores at the same time. Common SKU units are a prerequisite to simplify this project.

The Store owner updates the stock levels once an hour or two, i.e. when he gets some leisure. These stock levels are color coded as follows.

100% - 80%: GREEN
80% - 60%: YELLOW
60% - 40%: ORANGE
40% - 20%: MAGENTO
20% - 00%: RED

These stock levels can be seen along with the store names and locations on the dashboard of the Distributor/Supplier. This will help the distributor plan not only the stock that needs to be replenished for each store but also helps the distributor plan the optimal route to reach all the stores that are going to run out of stock soon. This will also help the distributor target the stores that are going to run out of stock soon (i.e. RED/MAGENTO), and avoid the green stores. This will help the distributor prevent stock-out situations for all their store chains and win over competitors. Earlier, a distributor only replenished the stock once per day, but now the distributor can replenish with precision and accuracy multiple times a day. The Kirana stores now have an added ability, all their stock levels across various points in time are saved. Using this data in the future we can predict how many units will be sold on a particular day, going ahead in time, through various algorithms. As more data is obtained, the more precise will be the prediction. With 5 - 10 years of data in a locality, this system will become perfect. Taking this project ahead in the future, we can reveal this data to the customers, who can see the stocks across all the stores in their locality from their home and know exactly which store to visit and thus save a search and find costs. Further, the user can see all stock levels across many stores and thus will make more local purchases and not go online for things that can be found in his locality. This will enable the local stores and provide them the much-needed edge to compete with the E-Commerce giants. The societal impact of this project is massive.

(ii) Requirements

The major requirements include the logical characteristics of each interface.

- Processor: Intel Dual Core I5 and above
- Hard disk: Minimum 8GB of space
- RAM: Minimum 8GB
- Input devices: Keyboard, mouse.
- Operating system: Windows 7 and above.
- Tools: Java IntelliJ, Android Studio, XANO, Joomla

(iii) Architecture

This project is totally based upon a 3-tier web architecture. The 3 main layers are the presentation layer, the business logic layer, and the database layer. The presentation layer deals with User Interfaces(UI) and the front

end. Java and WebApp using JOOMLA were used as tech stacks for this layer. The business logic layer contains complex application logic that controls the flow of data from the scrapped website to the database and back to the end user. It is responsible for the backend tasks including session handling and cookies management. Java (Android, Web) and XANO have been used in this layer. For the database layer, XANO DB (SQL) has been used to perform Create, Read, Update and Delete (CRUD) operations. XANO documentation is available at https://docs.xano.com

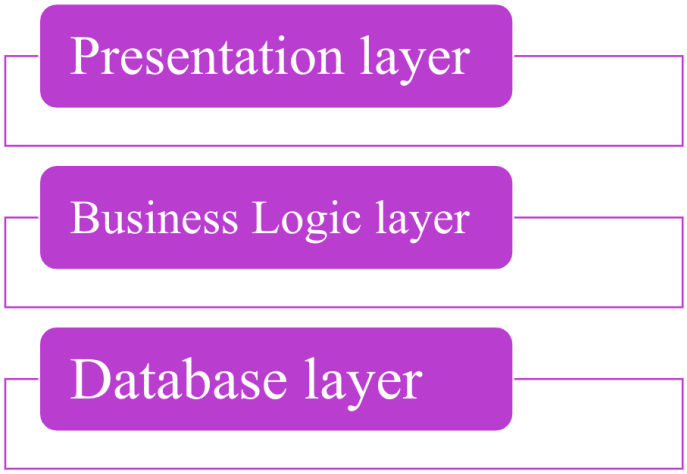

Figure1: Architecture of the proposed system

III. RESULTS

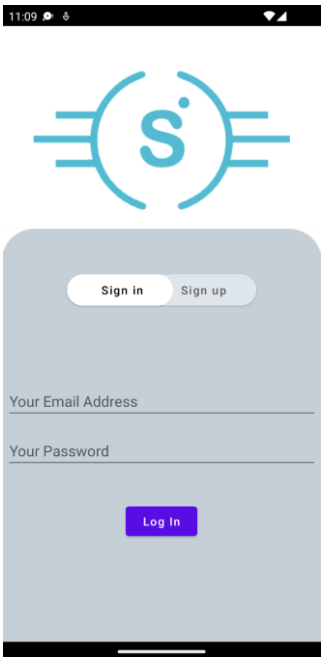

Figure2: Login screen

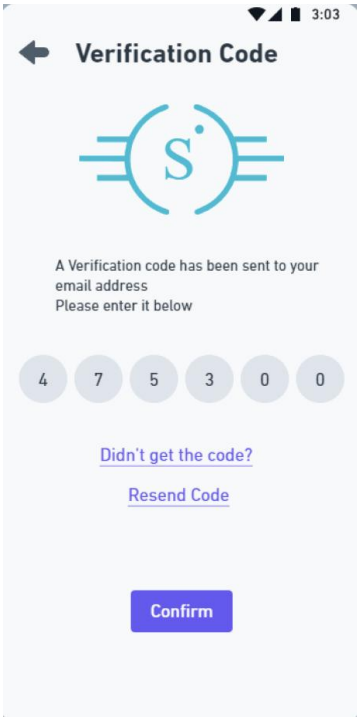

Figure3: Signup verification

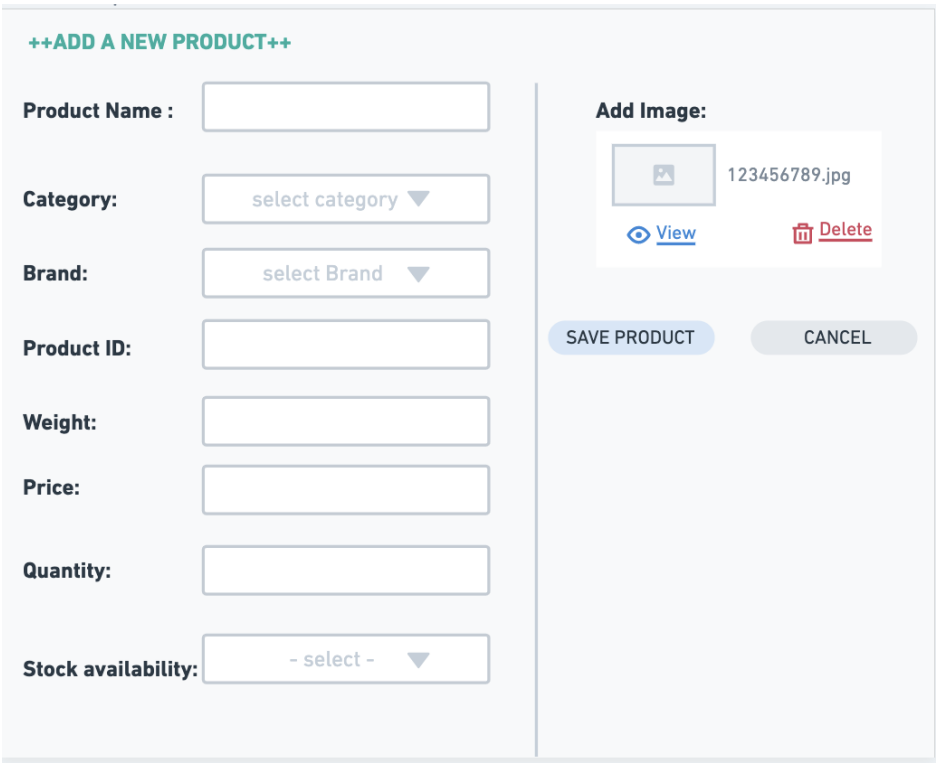

Figure4: Adding product in Web by Distributor(ADMIN)

IV. CONCLUSION

The app would allow us to gather huge data (Big Data) and derive insights with the data using analytics (AI/ML) and predict the exact number of units that would be sold in the future (Predictive Analytics).

ACKNOWLEDGEMENT

We thank CMR Technical Campus for supporting this paper entitled "JIT SUPPLY CHAIN - TO PREDICT STOCKOUTS", which provided good facilities and support to accomplish our work. We sincerely thank our Chairman, Director, Deans, Head of the Department, Department of Computer Science and Engineering, Guide

and Teaching and Non-Teaching faculty members for giving valuable suggestions and guidance in every aspect of our work.

REFERENCES

[1]. Max Muller, "Essentials of Inventory Management, Third Edition," Max Muller (P)2019 Gildan Media, LLC
[2]. https://docs.xano.com
[3]. https://developer.android.com/docs
[4]. https://dev.java/learn