

INTELLIGENT CART

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ABSTRACT - TODAY'S WORLD THRIVES ON MAKING THE HUMAN LIFE EASIER THAN IT ALREADY IS WITH EVERY PASSING MOMENT. THE PROPOSED SMART CART, WHILE SHOPPING, IS ANOTHER STEP TAKEN IN SAME DIRECTION. THE PROJECT IS BASED ON DEVELOPMENT OF A PROJECT WITH THE AIM TO REDUCE THE TIME SPENT IN THE STORE AND TO MAKE SHOPPING OF DAY TO DAY ITEMS AN EXPERIENCE INSTEAD OF A HEADACHE. IN ORDER TO AVOID LONG QUEUES AND UNNECESSARY HASSLE TO FIND ITEMS IN THE SHOPPING MART ONE CAN EASILY SHOP EASILY AND CONVENIENTLY USING THE SMART CART WITH NAVIGATING FEATURES. IT HELPS THE CONSUMERS TO UTILISE THE TIME SAVED IN OTHER FRUITFUL ACTIVITIES INSTEAD OF WASTING THEIR TIME BY STANDING IN LONG QUEUES AT THE CHECKOUT COUNTER

Key Words: Cart, barcode, billing, shopping, navigation.

1. INTRODUCTION

Today's world thrives on making the human life easier than it already is with every passing moment. The proposed smart cart, while shopping, is another step taken in same direction. The project is based on development of a project with the aim to reduce the time spent in the store and to make shopping of day to day items an experience instead of a headache. In order to avoid long queues and unnecessary hassle to find items in the shopping mart one can easily shop easily and conveniently using the smart cart with navigating features. It helps the consumers to utilize the time saved in other fruitful activities instead of wasting their time by standing in long queues at the checkout counter.

In present era, people are always in hurry due to their work, commitments etc. However, they land up spend their precious time in big shopping queues for billing and for searching the items inside the mall. Hereby, we as developers, are making this application so that customers get suggestions and they don't end up In big shopping queues. Our application will be suggesting items to the user, shows whole navigation of the area, i.e which thing is kept where, online billing section and bill calculation is done with scanning i.e as soon as item is scanned it is added into cart and bill.

A. Existing Systems and its comparison

Shopping in the present day usually involves waiting in line to get your items scanned for checkout. This can result in a great deal of wasted time for customers. Furthermore,

the technology currently used in checkouts, i.e, barcodes - is from another era, developed in the 1970s.

B. Relevance of the project

Help users to find products of their relevance and easy navigation of the users through the crowded busy super markets. Provide users an ease to find the products they need and match with their earlier bought history

Suggestions help in providing the users a vision of wiser variety of products for their use.

2. LITERATURE SURVEY

An innovative product with societal acceptance is the one that aids the comfort, convenience and efficiency in everyday life. Purchasing and shopping at big malls is becoming daily activity in metro cities. We can see big rush at these malls on holidays and weekends. People purchase different items and put them in trolley. After completion of purchases, one needs to go to billing counter for payments. At billing counter the cashier prepare the bill using bar code reader which is very time consuming process and results in long queue at billing counter. In this paper, we discuss a product "Intelligent Shopping Cart" being developed to assist a person in everyday shopping in terms of reduced time spent while purchasing. The main objective of proposed system is to provide a technology oriented, low-cost, easily scalable, and rugged system for assisting shopping in person. The developed system consists of 3 key components/modules (a) Server Communication component (SCC) (b) User Interface and display component (UIDC), and (c) Automatic billing component (ABC). SCC establishes and maintains the connection of the shopping cart with the main server. UIDC provides the user interface and ABC handles the billing in association with the SCC. These 3 modules are integrated into an embedded system and are tested to satisfy the functionality. The prototype developed is ready for commercial deployment with proper attention to security and network issues as discussed.

The recommendations given by User Based Apriori algorithm are more relevant and easy to obtain than the traditional recommendation system. Hence, using this algorithm in our project proved to be very useful for implementing the core feature of our project.

3. METHODOLOGY

The project uses concepts of Cloud computing and Machine Learning. The project aims at creating a smart shopping cart which will detect different items placed in it. This will be done with the help of a microcontroller say Barcode scanners. Barcode scanners will detect the items kept in the cart and their prices. The items are stored in the Cloud. Predictive analysis would be performed thus to determine the next move of the customer. Also the cart screen would show the total pricing of the items placed in the cart.

Android Development: An app is developed for the users to interact with the system by creating a interface with keeps track of all the items bought and determining the current position of the customer.

Indoor Map: An SDK of the indoor map consisting the data points and navigation of the interface system to the actual workspace of the supermarket is generated.

Machine Learning: For providing suggestions on various items to be bought and that can be bought is given by the Market Basket Analysis Algorithm, that is the Apriori Algorithm.

A. Proposed design

The figure below shows the block diagram of our system. We have a product where user can search for a item and navigate through the supermarket. The user can search for a product name directly or type the category of the product. This input is then given to the cloud and the server gives the results accordingly. In addition to this, the user can navigate through the super-mart to find the product or browse through the suggested options. The server then gives the appropriate results. After the user is logged in, the user can update his/her cart list depending upon the item he/ she has bought showing the entire item list of the products present in the cart.. Also, the user can have a look at the products recommended for him/her based on the previous search or history.

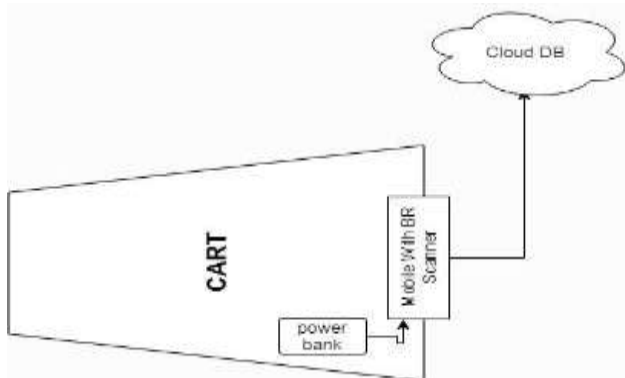


Fig. 1. Block diagram

B. Data Flow diagrams

The DFD Level 0 briefly shows the overall functionality of the system. It only has one process – the Mobile Application, which basically is the main component of the whole system. The user gives the input and in output, various products searched according to various filters or recommended.



Fig. 2. DFD level 0

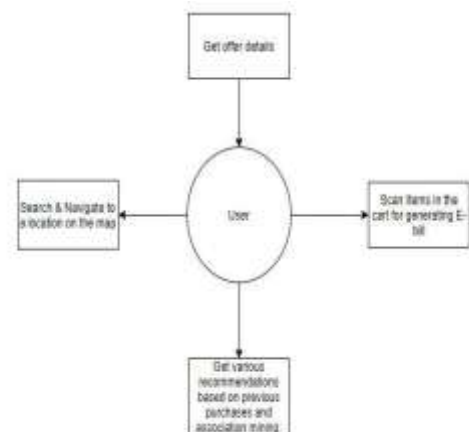


Fig. 3. DFD level 1

DFD Level 1 shows the functionality of system that user is benefitted from

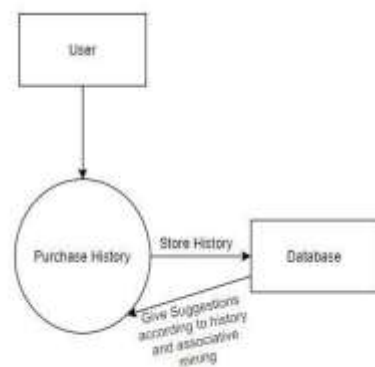


Fig. 4. DFD level 2

Level 2 shows the functionality of core feature of the system where suggestions to the user can be made. This is also done on the basis of the data processed of the several other customer behavior

C. Use-Case diagram

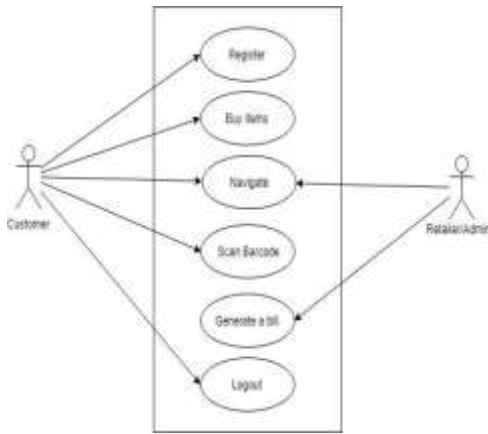


Fig. 5. use-case diagram

Features available to the users include that user registration can be done through Google or Facebook. Once the user enters the premises suggestions based on data processing can be provided. Also the user can search for an item within the Supermarket and the App can also be used to navigate the customer through the supermarket. Further for easy and quick processing of the bill at the checkout system the products are scanned before hand to estimate the bill calculation and provide an easy access to the customer. The admin can access the navigation the system and they are used to process and check the billing of the system.

D. Overall flowchart of the system

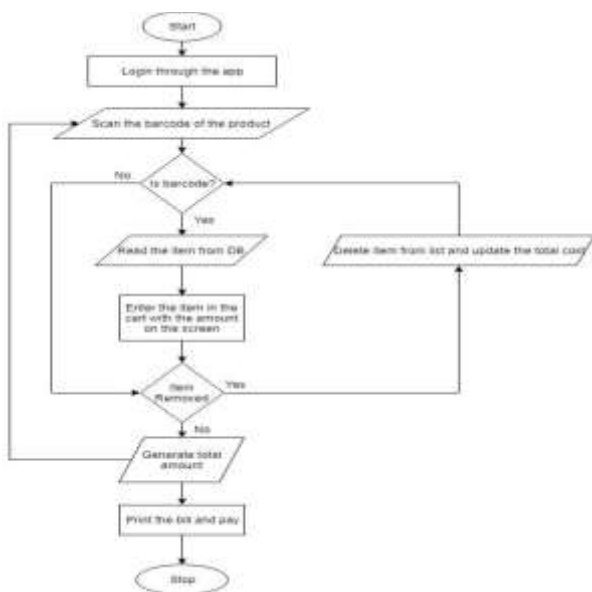


Fig. 6. System flowchart

E. Algorithms used

Apriori algorithm was used to implement the recommendations feature. The code for the same was written in Python. It is as follows:

Step 0. Start with item-sets containing just a single item, such as {apple} and {pear}.

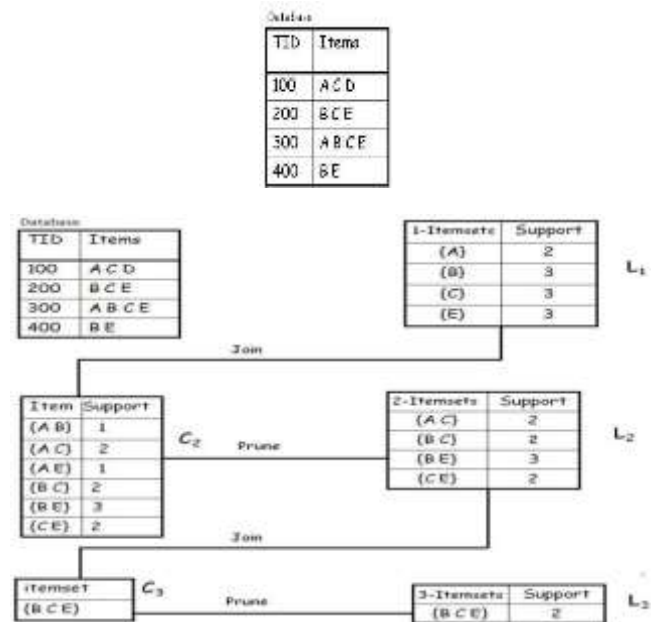
Step 1. Determine the support for item-sets. Keep the item-sets that meet your minimum support threshold, and remove item-sets that do not.

Step 2. Using the item-sets you have kept from Step 1, generate all the possible item-set configurations.

Step 3. Repeat Steps 1 & 2 until there are no more new item-sets.

Example

A database has five transactions. Let the min support = 50% and min confidence = 80%.



Rules	Support (X Y)	Support(X)	Confidence
[A] -> [C]	2	2	100
[B] -> [C]	2	3	66.66666667
[B] -> [E]	3	3	100
[C] -> [E]	2	3	66.66666667
[B] -> [C E]	2	3	66.66666667
[C] -> [B E]	2	3	66.66666667
[E] -> [B C]	2	3	66.66666667
[C] -> [A]	2	3	66.66666667
[C] -> [B]	2	3	66.66666667
[E] -> [B]	3	3	100
[E] -> [C]	2	3	66.66666667
[C E] -> [B]	2	2	100
[B E] -> [C]	2	3	66.66666667
[B C] -> [E]	2	2	100

Fig. 7. Example of Apriori algorithm

4. RESULT ANALYSIS

A) Navigation Module - In this module, Products are searched based on the product name or the category they belong to. It will also navigate the user towards different section.

B) Registration Module - Keeps track of all the users that are registered to the system and all the items bought by them and the items present in their cart.

C) Scanner Module - Customer can scan each product and them to their cart .

D) Bill Module - All the items present in the cart are updated in the app and the cost is calculated in parallel.

E) Recommendation Module - The app recommends the next item to be bought based on the previous data by applying algorithms.

5. CONCLUSION

The main aim of the project was to make it easy for the users to shop as per their requirements. They can search items by their name, location in the mail, on the basis of categories and similarities offered by the store. The users can review their previously shopped list in the history tab. They can search items on the basis of their current location. They can look for recommendations given to them. They can directly scan the item and put it into their shopping carts, once the item is scanned it is stored in database and it is shown to cart and billing section of the cart. Once the user is done with the shopping one can directly pay the bill via online payment. This was done by using Market based analysis Apriori algorithm. We have designed a application that provides all these features. Users can avail these features and accordingly chose an appropriate product.

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