

SMART SHOPPING CART

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Abstract—Smart Shopping Cart is an application where it combines IoT Core and Machine Learning Engine. This project is targeted to reduce the Queue at a billing counter in a shopping complex. Thus, making shopping an easy process for Customers. We are deploying this project on a shopping cart using techniques such as image processing, machine learning and use of RFID for smart billing. By image processing techniques like scale AI for Image Analytics, it provides information about various products present in the cart. Machine learning API like tensorflow will help to predict the next item to be added in the cart based on the past history of the shoppers. A Tensor flow is an open source software library for dataflow programming across a range of tasks. It is a symbolic math library which is used for machine learning applications such as neural networks. Focusing other issue of going beyond budget while shopping is also addressed; this problem can be resolved intimating customer with cart buying limit and also provide RFID based billing process for faster checkout. RFID uses electromagnetic fields to automatically identify and track tags attached to objects. The system displays the total price of the product kept inside the cart. In this way the customer can directly pay the amount at the billing counter and leave with the commodities he/she has bought. It eliminates the traditional scanning of products at the counter and speeds up the entire process of shopping. With this system the customer will know the total amount to be paid. In this way customer can plan his shopping by buying the essential commodities resulting in savings. Hence this project will also help in reducing the operational cost and make shopping efficient..

Keywords—Sensor Networks, Internet of Things, Smart Transducer, IEEE 1451, ISO 11783, 6LoWPAN..

I. INTRODUCTION

An integrated device and fully autonomous shopping cart which helps you in your everyday shopping dilemmas. In this report we have proposed an application in which the customer can shop in an efficient way by using a shopping cart which will have a display attach on it. Each item will be having a RFID attach to it which will be used for billing. The customer will place the items in the cart. The detail of all the items will be displayed on the display attached on the cart. Also this display will show the customer recommendations based on past shopping history of the customer and you can easily find special offers, products and new recipes. The system displays the total price of the product kept inside the cart. In this way the customer can directly pay the amount at the billing counter and leave with the commodities he/she has bought. Focusing other issue of going beyond budget while shopping is also addressed, this problem can be resolved intimating customer with cart buying limit and also providing RFID based billing process for faster checkout. It eliminates the traditional scanning of products at the counter and speeds up the entire process of shopping. In recent years a deep structural change has occurred, with consequences on economic growth and society, especially in factors such as territorial occupation, urbanization, openness to global markets, demography, family structures and cultural and consuming patterns. Innovation in communication and information technologies have caused a revolution in values, knowledge and perceptions in practically all areas of human understanding, deeply carving the so-called "Age of Information and Knowledge". The grocery industry sector in nowadays extremely important in worldwide economy, with its recent evolution in technological, political, social and economic terms making it one of the most convenient and diverse businesses across the globe. The emergence of new technologies such as radio frequency identification device (RFID) and wireless network makes the traditional shopping processes faster, transparent and efficient. The technology represent to retails and opportunity to reduce costs and to impure services, allowing attaining clients quickly, precisely and supplying personalized services.

II. IMPLEMENTATION DETAIL

A. Components required: Hardware

1. Raspberry Pi 3
2. Raspberry Pi Camera Module
3. SD card
4. HyperPixel
5. RFID Reader Tags
6. Shopping Trolley

B. Components required: Software

1. Google Storage JSON API
2. IoT API
3. BigQuery API
4. Machine Learning Engine

III. METHODOLOGY

C. Object detection and prediction

1. Image analytics:

Image analysis (also known as —computer vision) is the ability of computers to recognize attributes within an image. Image analytics can also identify faces within photos to determine sentiment, gender, age, and more. It can recognize multiple elements within a photo at the same time, including logos, faces, activities, objects, and scenes. The technology can automatically caption images —man and woman standing outside wearing Patagonia shirts with bike and mountains in the background. And that's just the basic details.

2. Tensorflow:

TensorFlow is an open-source software library for dataflow programming across a range of tasks.

Steps:

Step 1: Generating CSV files from Images

Step 2: Generating TF Records

Step 3: Training the Model

Step 4: Evaluating the model

3. Object recommendation:

Object stored in csv file is used for recommendation. These recommendation are done using affinity scores. The affinity scores are the number of times customer has bought that item, based on that record next item is predicted or recommended. This affinity score would be a binary score whether the user bought the item or not.

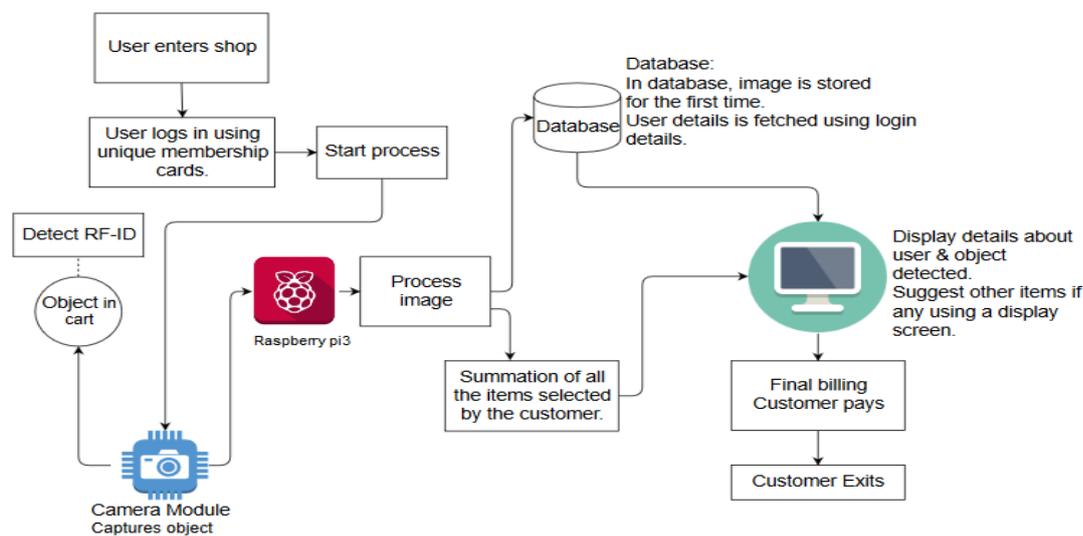


Fig. 1 Architecture diagram of proposed system

D. Payment

Radio-Frequency Identification (RFID) is the use of radio waves to read and capture information stored on a tag attached to an object. A tag can be read from up to several feet away and does not need to be within direct line-of-sight of the reader to be tracked.

IV. ALGORITHMS USED

Pseudo code for RFID reading

```
Algorithm (Id,Set)
//Scan_list::List of Currently Scan Item
//Bill_list::Bill id List
//Find_Newid::Compare two list and find //new id
//Fetch Data::Get Data from Server
//Delete::Delete item
Set=1;
Repeat While set=1 {
Scan();
Scan_list();
If (Scan_list==Bill_List)then
Don't Do Anything
Exit();
Else if (Scan_list>Bill_list) then
Find_Newid();
Fetch_Data();
Display();
Add_Bill();
Update();
Else if (Scan list<=;Bill list) then
Find Newid();
Delete();
Update();}
```

Object Recommendation

```
Get List of users who bought this item 1.
item1Users=userItemData[userItemData.ItemId==itemlist[ind1]]["UserId"].tolist()
#item1Users1 = userItemData[userItemData.UserId==userList[ind1]]["User Id"].tolist()
#print("Item 1 ", item1Users)
#Get item 2 - items that are not item 1 or those that are not analyzed alr eady.
for ind2 in range(indi, len(itemlist)):
if ( ind1 == ind2):
continue
#Get list of users who bought item 2
item2Users=userItemData[userItemData.ItemId==itemList[ind2]]["UserId"] .tolist()
# item2Users1 = userItemData[userItemData.UserId=-userlist[ind2]]["User Id").tolist()
# print("Item 2", item2Users)
#Find score.
#Add a score for item2, item 1. The same score would apply irrespectiv e of the sequence.
itemAffinity.loc[rowCount] = [userList, itemList[ind2], itemList[ind1],s core]
rowCount +=1
#Check final result itemAffinity.head()
```

V. CONCLUSION

The proposed project Smart Shopping Cart is easy to use and does not require any special training. As the whole system is becoming smart, the requirement of manpower will decrease,thus benefiting the retailers. Theft in mall will be controlled using this smart system.Furthermore, we have proposed a System which will be benefited to customers as well asretailers. The system displays the total price of the product kept inside the cart. In this way thecustomer can directly pay the amount at the billing counter and leave

with the commodities she/she has bought. It eliminates the traditional scanning of products at the counter and speeds up the entire process of shopping. With this system the customer will know the total amount to be paid. In this way customer can plan his shopping by buying the essential commodities resulting in savings. Hence this project will also help in reducing the operational cost and make shopping efficient.

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