# Face Recognition with OPENCV and Smart Shopping in Cloud Computing

**Katherashala Ajay Kumar, G. R. Sakthidharan**

*Abstract: The present data time targets digitizing data and executing effective, instinctive and easy to understand frameworks to unravel human life. Making a canny truck that deals with quick charging is a jump towards an advanced and totally computerized shopping knowledge. Buying thing in enormous supermarkets with a gigantic assortment of things is time taking procedure. It can be optimized through motorizing the charging framework. A shopping truck contains a versatile computational gadget (like raspberry pi) and a customized thing recognizable proof innovation (like the radio recurrence distinguishing proof innovation). Minute charging without long lines at counters and monitoring consumption constant are the two goals of this canny truck. This paper depends on building up a venture through the intend to lessen point in time used up on shopping of regular things and make the procedure less repetitive. Besides, it empowers the customers to use their point in time on other gainful and increasingly huge exercises.*

*Keywords: Digitizing, Raspberry Pi, RFID, Smart Cart..*

## I. INTRODUCTION

The staple business is critical and various progressive developments in this field have satisfied shopping simpler and an encounter. The ongoing development in innovation and people groups comprehension and acknowledgement of the specialized. A progression has made it conceivable to create comfort in the basic food item business by making it orderly and speedy paced. More over customers' view of security and trade in frameworks highlight the trade expansion and advances hugely changed in organizations. As of now, things are arranged in stores and customers need to pick the things they need. Customers select the items and keep them in their shopping trucks and wait for billing. Which makes customer to waste his precious time. We introduce a new approach for trucks dependent on sharp truck configuration to address the going with issues.

- Client disappointment because of long suffering point in time throughout the ensure procedure.
- Inclusion of a group of work and assets at the charging counter, which is costly.

To deal with the previously bring up issues, we have concocted a splendid shopping truck structure that mechanizes the charging methodology along these lines saving the clients' time similarly as lessening the stores yearly

consumption and streamlining its asset the executives. Robotization has its own special issues. Nonattendance of human administrators can conceivably prompt bother when the basic innovation misses the mark. It may in like manner lead to exploitative conduct of the clients. We propose and talk about the execution of an answer that has excess fused with it to lessen the probability of disappointment and hold any disparity within proper limits. The proposed keen bleeding edge shopping framework consolidates existing innovation like RFID marks with scanners bringing about extremely low execution cost. This thought is fiscally reasonable and manageable. It will in general be executed quickly without the need of any related learning by the storekeeper and client.

## II. RELATED WORK

In [1] the author have introduced a concept where item in the store attached with RFID and every cart joined with zigbee. By using zigbee module the item will be scanned and placed them in cart. In any case, there is no UI and henceforth it's definitely not an easy to understand framework.

Vrinda et al in [2] highlighted the truck outfitted with Zigbee and display screen. When item is scanned, the item will be displayed. In any case, this framework doesn't have a UI and ZigBee is utilized rather than a Wi-Fi module. The complete bill will be displayed on the screen. The customers no need to wait in the line at the billing counters for the payment in light of the fact that by the utilization of online installment entryways by methods for versatile application they would have the option to cover the tab online with no line. Clients contain a further option for bill installment using their credit or platinum cards. In any case, similar to the work in [2], this structure isn't easy to use and productive as it expect clients to be totally direct and has no worked in confirmation framework.

Makers in [3] included that, the point in time tired at the lines for the bill installment in the shopping edifices can be cut off by oneself checking strategies. Generally speaking, current frameworks have the going with obstructions:

- Here present a regular truck.
- No showcasing the items on truck.
- They take into account filtering of items just at the exit.
- Workers or owner of the store ought to physically check for demand or depreciation in load of a specific item.
- Manpower is compulsory to guide the customers through the bazaar to discover the result of the item required.

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## III. PROBLEM DEFINITION

Our answer address the problem of long holding up times and eliminates the constraints of existing arrangements discussed in related work by offering three primary benefits. Initial one is it creates a better, faster and better shopping experience for the customers. Secondly it minimizes the labor required at the shopping center, as the charging procedure at the check-out counter is eliminated altogether. FIT screens and notifies cases of discrepancy and cheating, assuming any, thereby manufacture the good-looking not exclusively to the customers yet in addition to the store owners.

## IV. IMPLEMENTATION METHODOLOGY

**A.Mobile Barcode Reading the products**

Mobile barcode checking applications can improve the everyday purchasing decisions of a large number of users. Application providers need access to excellent item master information for correct item descriptions. Information quality problems are emerging as item master information designated for modern stock.

This thesis contributes to the research on mobile barcode filtering applications and item master information quality. We describe the development of a mobile barcode examining application that enables consumers to share comments and evaluations on items. The application has been deployed to a huge number of Android and iPhone smart phones and the software has been released under an open source license.



**Fig 1: Select the product**



**Fig 2: Reading the products of barcode**

Examination of utilization information shows that clients are more averse to share remarks and assessments when thing depictions are missing. We utilize amassed thing expert data for in excess of 120,000

things to build up a strategy for recognizing off base thing names. We assess the presentation and convenience for purchaser bund stock organizations and measure the accuracy of thing expert data from openly accessible sources.
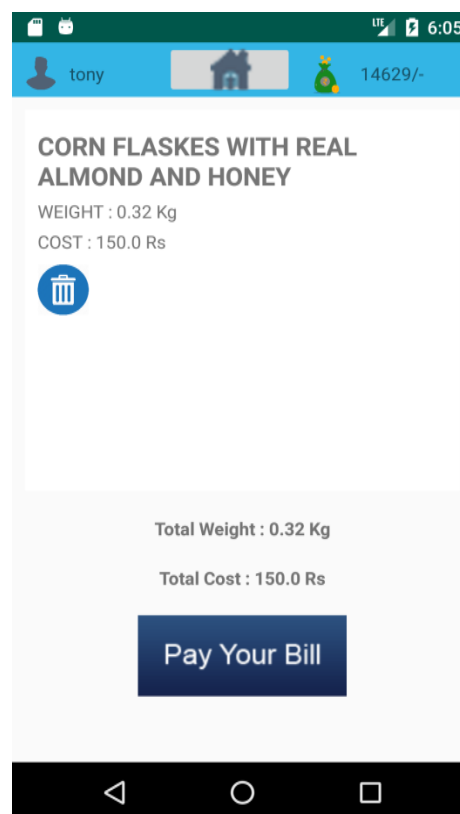


**Fig 3: Details of Products added in cart**

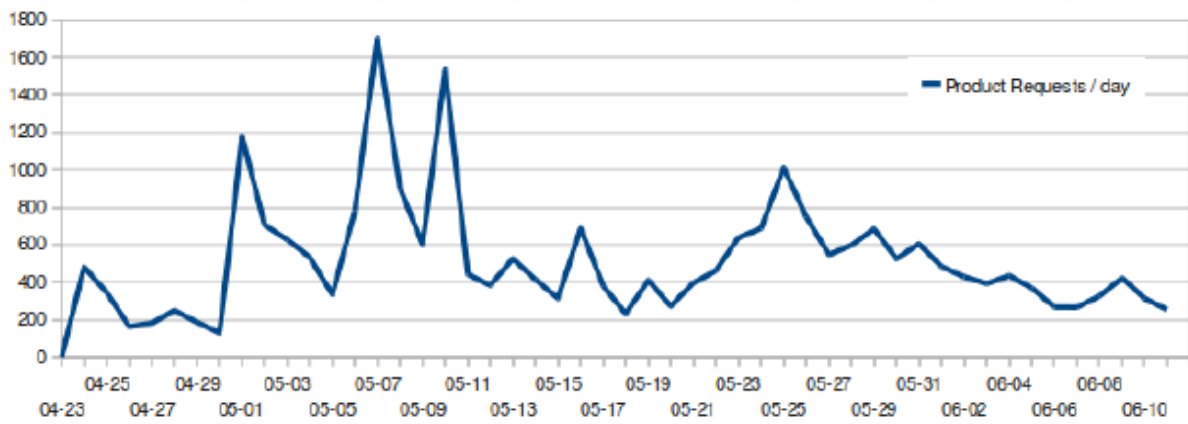**Fig 4: Number of products per day**

Our outcomes exhibit that around 2% of thing name is wrong. The strategy created knows how to be utilized to successfully screen plus control thing expert information excellence in outside sources. Actualized in ace data the board forms, it is able to get better the general idea of thing expert data for versatile standardized tag looking at applications.

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### B. RSA Algorithm for Transactions

The RSA framework utilizes one route elements of an increasingly unpredictable nature [7]. In particular, the framework utilizes measured math to change a message into confused cipher text.

4= (10+6)mod12

4= 16mod12

One can do augmentation in secluded number-crunching similarly expansion is done in the above model:

4= (8*2)mod12

4= 16mod12

This procedure is now and then known as modular decrease. Because, 16 is 'decreased' to 4 in the above example, one can say that 16 is diminished modulo 12.

Framework utilizes multiplication in modular arithmetic. Framework multiplies one number by itself various occasions and the item is then divided by a modulus. The occasion a base is increased by itself is known the type and procedure is known modular type.

4 = (2*2*2*2)mod12

4= 24mod12

In encryption, 'M' is multiplied by itself 'e' times and the product is then divided by a

modulus 'n', leaving the remainder as a cipher text 'C':

C = M(mod n)

In decryption, d is used to convert the cipher text back into the plain text:

M = Cd(mod n)

The product of two prime numbers, 'p' and 'q' gives 'n',

n = p*q

Also, φ(n) is Euler's Phi-Function

φ (n) = (p-1) (q-1)

The e encryption exponent

gcd (e, φ(n))= 1,

Thus, the RSA having 3 steps

1. **Key generation:** in which the components of the modulus 'n' are picked and increased together to shape 'n' and 'φ(n)', an encryption example 'e' is picked, and the unscrambling type 'd' is determined utilizing 'e' and 'φ(n)'. The open encryption key is {e, n} and the private unscrambling key is {d, n}".
2. **Encryption:** 'M' is raised to the power 'e', and afterward diminished modulo 'n', so the figure content 'C' can be determined as 'M' mod 'n'.
3. **Decryption:** 'C' is raised to the power 'd', and after that decreased modulo 'n'. So the plaintext 'M' is recovered utilizing the equation 'c' mod 'n'.

### C. Face Recognition with Haar Cascade Algorithm

PC vision is a field of study which targets expanding a profound comprehension from cutting edge pictures or recordings. Joined with AI and ML systems, today various businesses are putting resources into inquires about and courses of action of PC vision. Think about the going with model: various examinations are being carried on to execute surveillance cameras with item identification abilities. Without a doubt, envision a camera in a train station which, contingent upon the development caught, can recognize whether a fight is occurring: it could quickly send a sign to the nearest cop and keep that fight from deteriorating.
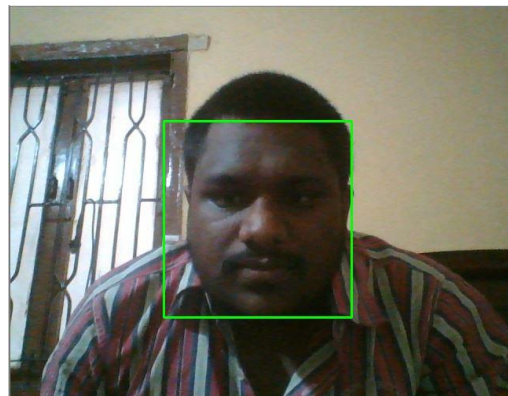


**Fig 5: Input capture image**

Item discovery is a ground-breaking instrument and, all through this article, I will clarify the structure behind the calculation we will utilize, similarly as give a practical model (explicitly with face confinement). For this reason, I will utilize OpenCV and also utilized the Haar Cascade calculation.
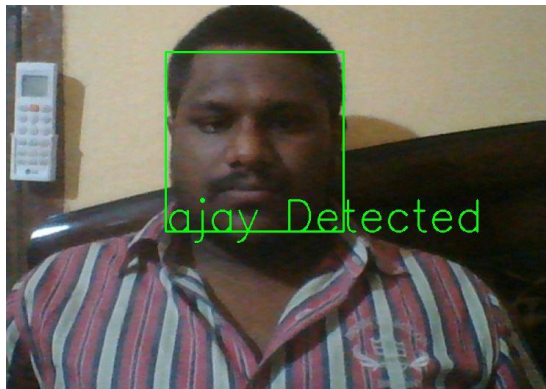


**Fig 6: Face Detection Image of a User**

Haar Cascade is a machine learning object detection algorithm proposed by 'Paul Viola' and 'Michael Jones'. In their paper, Quick Object Detection uses a Boosted Cascade of Simple Features in 2001. It is a machine learning based philosophy where a cascade work is trained from a great deal of positive and negative images. It is used to identify objects in images. Fortunately, OpenCV offers pre-trained Haar cascade trained for face detection.
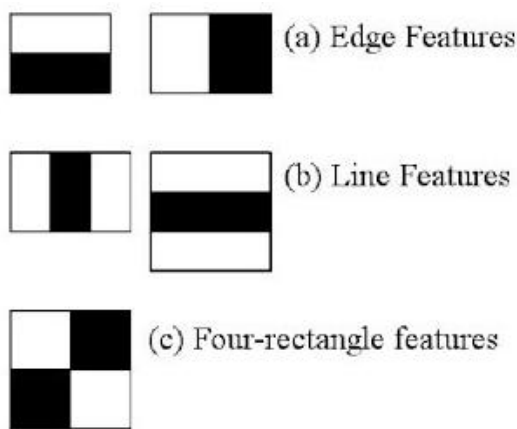


**Fig 7: Features Detection**

### 1. LBP Algorithm

Local Binary Patterns Histograms is a facial recognition algorithm which is a efficient texture operator used to label the pixels of an image by threshold the neighborhood and show the result of a pixel as a binary number**.** Since the it is most powerful and has very good computational speed LBP approach has became more popular and it's been using in the many applications for facial detection. Later part it is combined with Histograms of oriented gradients(HOG) which improves the facial detection. There are few Step to follows:

- First we need to convert the input facial image with gray scale.
- By taking center of matrix to calculate the threshold of neighboring of the pixel.

- For each threshold we set a binary value. We represent 1 for higher or equal value,0 for lower values. For each threshold we set a binary value. We represent 1 for higher or equal value,0 for lower values.
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- Now contains binary values and it need to be concatenated from the matrix line by line into new binary values.
- After this we need to convert binary values with decimal values and consider it as central value which is a pixel of original image. Now we have image with better.
- After this we need to convert binary values with decimal values and consider it as central value which is a pixel of original image. Now we have image with better.
- Then we need to divide the image into grid to extract histogram of the LBP patterns. Since the image is grayscale it contains 256 positions. Then concatenate each histogram to create bigger histogram to get the final histogram.

Implementation of LBP is done by area of various sizes by using bi-linear interpolation range and quality of pixels to act naturally. Let us consider 'R' as center of pixel on hover 'p' and determine focus communication with (P, R).
Below is a cycle (8, 2) neighborhood while the fundamental LBP operator is (8,1) neighborhood.
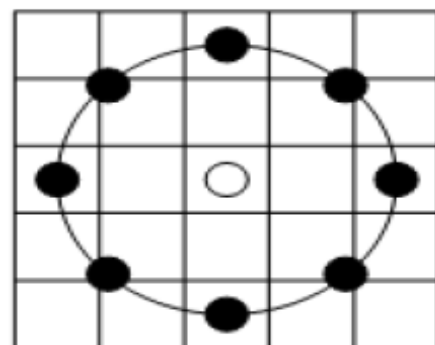


**Fig 8: Dimension (8, 2)**

F (x, y) of label picture can be distinct as follows:

$$H = \sum_{x,y} I\{f_i(x,y)=i\}\, i = 0,1,\ldots,n-1$$

Equation (2) of the histogram incorporates the whole image of the small scale structure of the circulation, (for example, edges, focuses and smooth area), where n is the quantity of various
marker generate by the LBP operator, for example, R=8, at that point n=256.

### D. Database

The database which contains the information of the considerable number of things those are available on cloud.

## V. RESULTS AND DISCUSSION

For object recognition, makers used Convolutional neural network. CNN is mainly used for extracting features in a image or video. Neural networks give the optimized output regardless of low light or different positioned images because we are training our model with 40 images so that feature extraction will be more accurate.

On seventeenth February 2019, a research is made on 45 individuals of different behavior. The reason for the research is to know the time each individual spent on shopping and how to enhance the shopping experience with the usage of computerization for making the procedure to a lesser extent a hassle for the two clients similarly as the businesspeople. The research is carried out in two stages. In the first stage analyzing the customer details and their shopping behavior. Which includes client's age, demographics and shopping timings.

The subsequent part portrayed to clients were asked to rate the computerization procedure, give their inputs and how it can be improved. From the information gathered, the most important bits of learning are according to the accompanying. 90% of the review takers were undergraduates who either lived on grounds or off grounds, remaining 10% were working professionals. 27% wanted to arrange online by means of portable applications like gigantic basket [7] and different administrations. 73% favored purchasing food supplies.

**Table: Reading the data and stored into database**

| User_id | PrimeNo_1 | PrimeNo_2 | N=p*q | Phi=(p-1)(q-1) | Public key_e | Private key_d |
|---------|-----------|-----------|-------|----------------|--------------|---------------|
| 10001 | 107 | 167 | 17869 | 17596 | 13889 | 15441 |
| 10002 | 181 | 103 | 18643 | 18360 | 7747 | 16483 |
| 10003 | 199 | 127 | 25273 | 24948 | 12041 | 9017 |
| 10004 | 131 | 149 | 19519 | 19240 | 7713 | 7017 |
| 10005 | 163 | 139 | 22657 | 22356 | 5905 | 7057 |
| 10006 | 151 | 173 | 26123 | 25800 | 1939 | 23059 |
| 10007 | 199 | 47 | 9353 | 9108 | 8963 | 6407 |

## VI. CONCULSION

The aim of the project is to reduce the shopping time of the customers in the supermarkets by giving a smart shopping solution for customers. In this project we have used AI and also web to give the seamless shopping experience to the customer who values their time. This project will automate the process of store owners there by reducing the workforce and increasing the productivity rate in the stores.

This projects also enables the store owners to know deep insights about their customers by analyzing the data they are getting through many avenues which helps to know more about effective consumer behavior which can ultimately help them to increase their business.

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