[EDGE COMPUTING]

[DIGITALEMINENC]

Team Name : Code_Snipers

Team Details

Participant Name	CT /DT Number	Role (Team Leader / Member)	Bachelors Discipline	Expected Year of Passing	Gender
Charudatt Dhamanekar	ct201823 80124	Team Leader	Comp Science	2020	M
Dheeraj Bijjargi	ct201823 80141	Team Member	Comp Science	2020	F

1. Problem Statement

Kirana is a retail store looking for more digitalized way of expanding their business. They want to use a more systematic way of checkout system and reduce their human work force at billing counters.

Help Kirana devise a system that allows automatic detection of product using camera. The detection of product must be wrt the size of the product, type of product and automatically take the cost of product to make a bill of materials at checkout. This has to be done in real-time without sending the data to cloud for processing as some of these stores can be in remote areas with intermittent connectivity and Kirana do not want customers to wait due to latency issues for connectivity.

2. Use Case Overview

The proposal is titled as "Automatic product recognition and Billing System" and the goal of our project is to automatically detect the product using camera and generate bill using image processing , machine learning, and data analytics .

There are various reasons the Kirana stores must adapt this Model. Be it the problem with long waiting Queues because of slow manual billing .Even with the process of Billing using barcode with the help of barcode scanner consumes a lot of time .

After identifying the problem mentioned above, there is a need for a model called "Automatic product recognition and Billing System" which would help the cashier to quickly process the bill and save the time of the customers

3. Details Of Technologies Used

The different technologies used are:

-Machine Learning and Image Processing

-keras

-Convolution Neural Networks

-skimage

-scipy

-matplotlib

-Tenserflow

4. Required software/hardware's

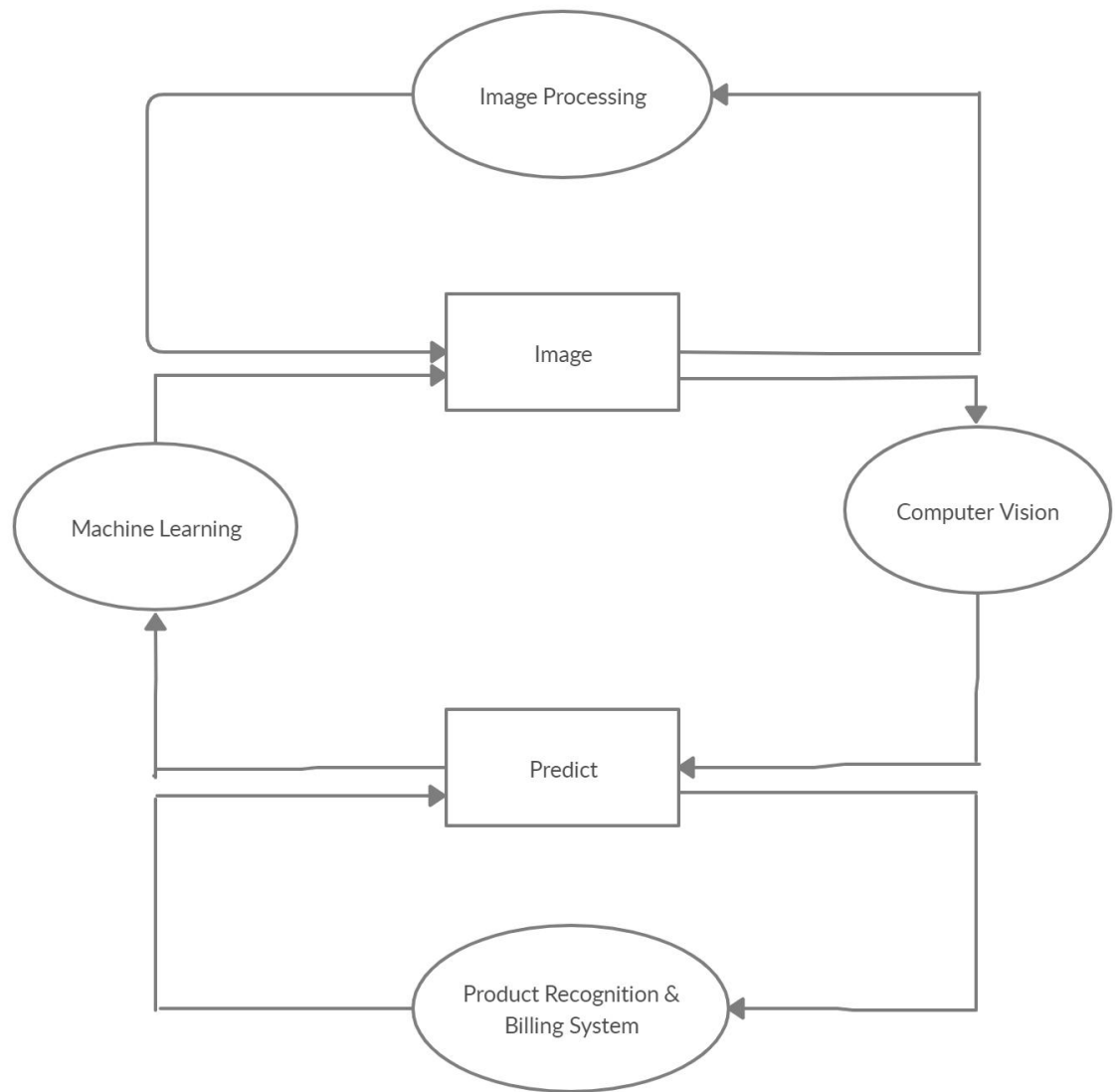Software Requirements:

- Operating System : windows 8/10 or MAC OS

-Software : Anaconda

-Spyder

Hardware:

-Working Camera

5. A high level architecture

```
                    ┌─────────────────┐
          ┌────────▶│ Image Processing │◀────────┐
          │         └─────────────────┘          │
          │                  │                    │
          │          ┌───────────────┐            │
          ├─────────▶│     Image     │───────────▶│
          │          └───────────────┘            ▼
  ┌───────────────┐                        ┌──────────────┐
  │ Machine       │                        │ Computer     │
  │ Learning      │                        │ Vision       │
  └───────────────┘                        └──────────────┘
          ▲                                        │
          │          ┌───────────────┐             │
          ├─────────▶│    Predict    │◀────────────┘
          │          └───────────────┘             │
          │                                         │
          │    ┌──────────────────────────┐         │
          └────│ Product Recognition &    │◀────────┘
               │ Billing System           │
               └──────────────────────────┘
```

6. Solution approach :

Solution approach:

our model has 3 stages:

1. product recognisation
2. product size recognization
3. Billing

1. product recognization:

Our model works on Image Classification using Keras. Image Classification is a Machine Learning module that trains itself from an existing dataset of multiclass images and develops a model for future prediction of similar images not encountered during training. Developed using Convolutional Neural Network (CNN).

Basically our model is trained for mainly 3 products wheel,colgate,parle
training dataset comprises of images of products from angles and views

2. Product size recognization:

we have developed a new method to detect the size of the the recognized product,
ie the product is kept on a textured pattern background

using a skimage ,scipy,matplotlib we can count the number of backround textures
depending on this the product larger in size covers more textures than the smaller product
thus this factor allows us to detect the product size
so the product which is large covers
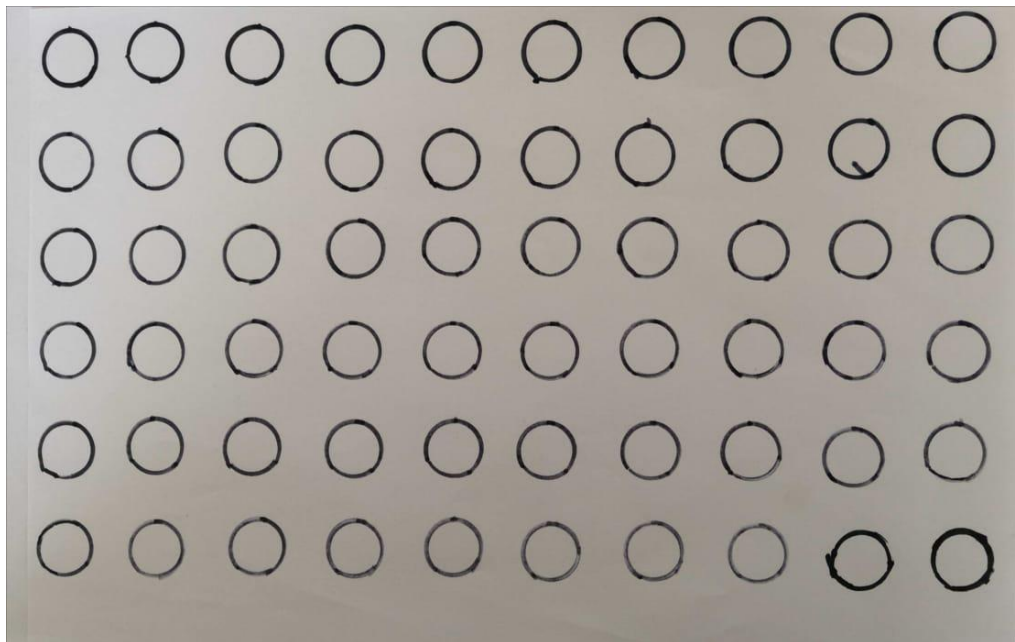
3. Billing:

When the object is recognized based on the object type and object size with the help of last 2
stages,a html bill prompt pops up which generates a bill accordingly with the price.

7. Conclusion:

1 The main advantage of this model over the present billing system is that it doesnt require extra specific instruments like bar code scaner.

https://www.youtube.com/playlist?list=PLtVz-1Ag611_ejtAC4CvvL_zpOUFN1nnd

https://github.com/db2049/INFRAMIND--EdgeComputing/tree/master