

# KIRANA PRODUCT BILLING

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## **ABSTRACT**

Taking time to identify expected products and waiting for the checkout in a store are common scenes we all encounter in our daily lives. The realization of automatic product recognition has great significance for both economic and social progress because it is more reliable than manual operation and time-saving. Product recognition via images is a challenging task in the field of computer vision. It receives increasing consideration due to the great application prospect, such as automatic checkout, stock tracking, planogram compliance, and visually impaired assistance. In recent years, deep learning enjoys a flourishing evolution with tremendous achievements in image classification and object detection. This article aims to present how an ML model works in recognising image of a product and billing the corresponding product .

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## **INTRODUCTION**

The intention of product recognition is to facilitate the management of products and improve consumers' shopping experience. At present, barcode recognition is the most widely used technology not only in research but also in industries where automatic identification of commodities is used. By scanning barcode marks on each product package, the management of products can be easily facilitated. However, due to the uncertainty of the printing position of the barcode, it often requires time to manually find the barcode and assist the machine in identifying the barcode at the checkout counter. RFID (radio frequency identification) has been applied in business fields with the growth of computer technology to enhance the automation of product identification. This technology automatically transmits data and information using radio frequency signals. Definitely, RFID has shortcomings. Identifying multiple products still has a high error rate due to radio waves being blocked or influencing each other.

Enterprises are increasingly focusing on how to use artificial intelligence technology for product recognition.

Product recognition refers to the use of technology which is mainly based on computer vision methods so that computers can replace the process of manually identifying and classifying products.

## **DATASET CREATION**

we developed an AI-powered application for image recognition and billing. It is based on modified state-of-the-art machine learning algorithms for feature detection and description. Such approach allowed us to create a large and high-quality labelled image dataset in a fast and efficient manner.

## **DEEP LEARNING-BASED MODEL TRAINING**

Accurate object detection and classification is often the trickiest part . We achieved real-time product detection accuracy as high as 99% by training a custom deep learning-based model using the prepared dataset. The major breakthrough of our approach is that we overcame the usual limitation of deep learning – the inability to accurately detect densely-packed small objects.

The requirement here is to make ML model that should be capable of recognising product from the images and then generating the bill for that product.

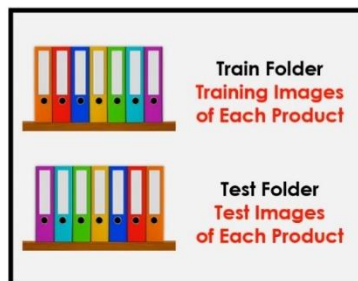
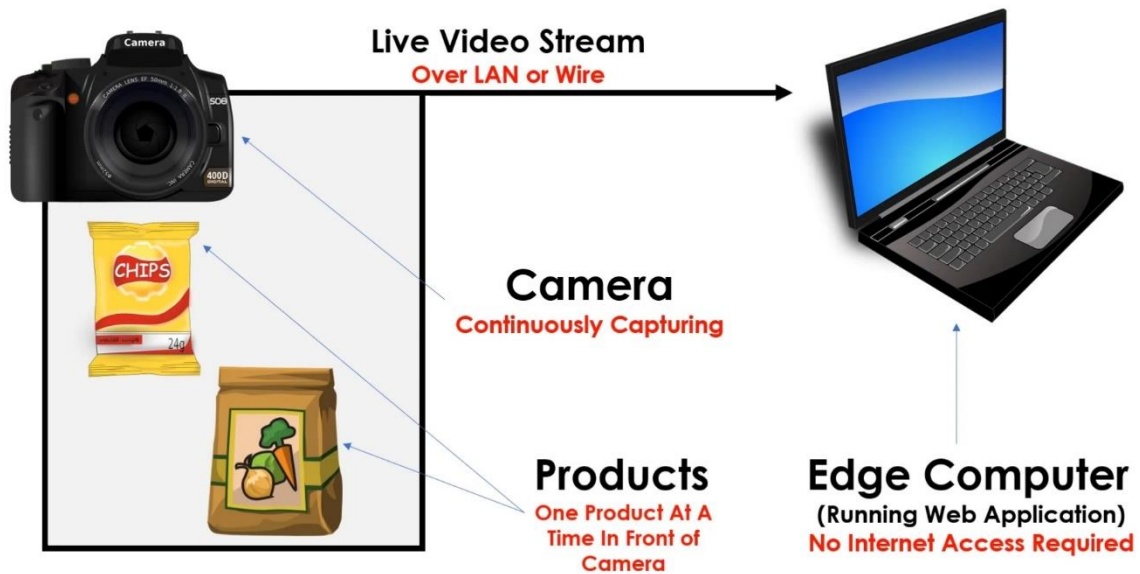
- For this process a web application named Kirana Product Billing is used.
- It simply detects the product on the basis of its appearance and size.
- There are 2 folders – one is the test folder and another one is train folder.
- Inside train folder there are several folders which represents the product.
- Each folder contains different images of the product taken from different angles because the ml model must be able to detect the images in whatever direction the shopkeeper places the product.
- In test folder we have some test product images which will be used while training the model to get the value of accuracy.
- Google colab is used for training the data for faster processing of the data and ImageAI Python is used. Apache server and MySQL server is required to run this application.
- Api.php is used to capture image, sends it to python API for prediction, receives prediction from python API, and response back JSON product data. MySQL Database contains product details such as prize and name.
- We use three programming language :

1. Python – used to predict the product image

2. PHP- used for API responses and for web page loading.

3. javascript- used for fetching product .

# ARCHITECTURE OF THE ENTIRE PROCESS



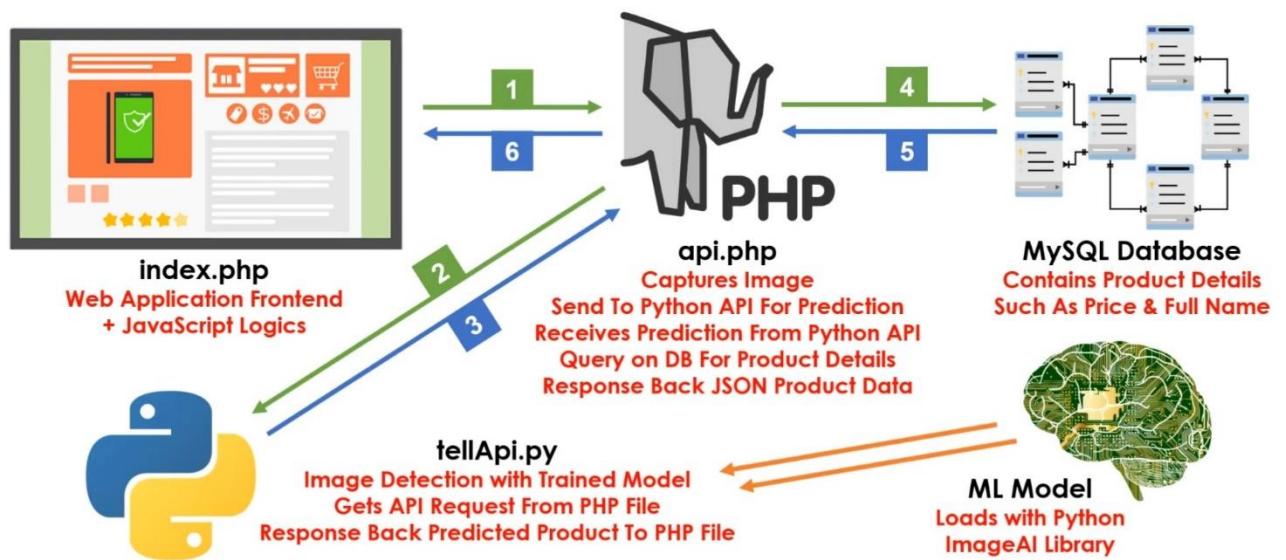
**Collected Data Folder**  
Folder Named **Rashan**



**Model.h5**  
Trained Model



**Class.json**  
Model Specific Products



## **BENEFITS**

- **Fast and convenient in-store checkout**  
We can scan over 130 items in a minute and spare the customers the frustrations often encountered with traditional point-of-sales and self-checkouts. Therefore our approach ensures the growth of the store attendance, the checkout conversion rate, and the average shopping cart price that increases the overall store profit.
- **Responsive store management**  
Our solution allows switching between cashier operating mode and computer vision-assisted checkout-free mode. The manned checkouts may be optimized to handle exceptions, scan big items or new products while computer vision mode can free the staff to do more service-oriented tasks in the store.
- **Zero risks to consumers data privacy**  
Since our approach does not require customer identification it does not pose threats to consumers privacy and does not track their purchasing behavior.
- **Reduction of transaction time and operational costs**  
Our technology allows your store to be always open, with the right staffing at the right time. It reduces losses from checkout shrink, attracts more customers and improves the overall retailer-customer relationship.
- Implementing automatic product recognition in grocery stores through images has a significant impact on the retail industry. The research demonstrates that customers' waiting time has a negative influence on their shopping satisfaction, which is to say that applying a computer-vision-based product recognition in SCOs benefits both retailers and customers.



- Product recognition technology can assist people who are visually impaired to shop independently, which is conducive to their social connectivity . Traditional shopping methods usually require assistance from a sighted person because it can be difficult for a person who is visually impaired to identify products by their visual features (e.g., price, brand), making purchase decisions difficult .

GITHUB LINK

<https://github.com/Megha542001/kirana-billing-system.git>

VIDEO LINK

<https://youtu.be/P6h0kVFMIL4>

THANK YOU