FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

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THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

1. TITLE OF THE INVENTION

AUTOMATED RETAIL CHECKOUT SYSTEM USING YOLOv5 IN COMPUTER VISION

2. APPLICANT(S)

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3. PREAMBLE TO DESCRIPTION

COMPLETE SPECIFICATION -

The following specification particularly describes the invention and the way it is to be performed.

AUTOMATED RETAIL CHECKOUT SYSTEM USING YOLOv5 IN COMPUTER VISION

Field of the Invention

[0001] The present invention is related to Computer Science field.

[0002] This innovation refers to an automated checkout system that can generate the bill of the items purchased by the customer. This system can help to improve customer satisfaction by providing a fast and convenient checkout experience. Furthermore, it can also help to reduce labor costs for retailers by automating tasks that would otherwise require staff members or setting up of expensive machines.

Background

[0003] The background description provided here includes all the relevant information that may be beneficial in understanding the present invention. It is not an acceptance that any of the information or a fact provided herein is prior invention or relevant to the currently claimed invention, or that any publication categorically or implicit referenced is prior art.

[0004] The pursuit of generating this system was cultivated after comparative observations of the real-life events that are occuring in and around the globe. With the advent of technology, it has been noticed that tasks are now performed without human intervention at a larger scale. In grocery stores, it has been observed that there are longer queues for customers to checkout and pay the bill for the bought items. Besides there has been increased cases of theft and it causes great loss for the

retailers. Though security cameras and high-level automated machines that scans the barcode are present in today's market, these are cost ineffective. Hence there needs to be a system that can easily generate the bill in cost effective way. This system can be helpful not only to the retailers but also to the customers who can easily cross check the products that have been bought.

[0005] As practiced in the description as such and across the claims that come after, the meaning of "a," "an," and "the" involves plural reference unless the context clearly instructs otherwise. Apar from this, as used in the description here, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise.

[0006] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non- claimed element essential to the practice of the invention.

[0007] Groupings of alternative elements or embodiments of the invention disclosed herein are not to be construed as limitations. Each group member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more

members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all Markush groups used in the appended claims.

Objects of the Invention

[0008] An objective of the present disclosure is:

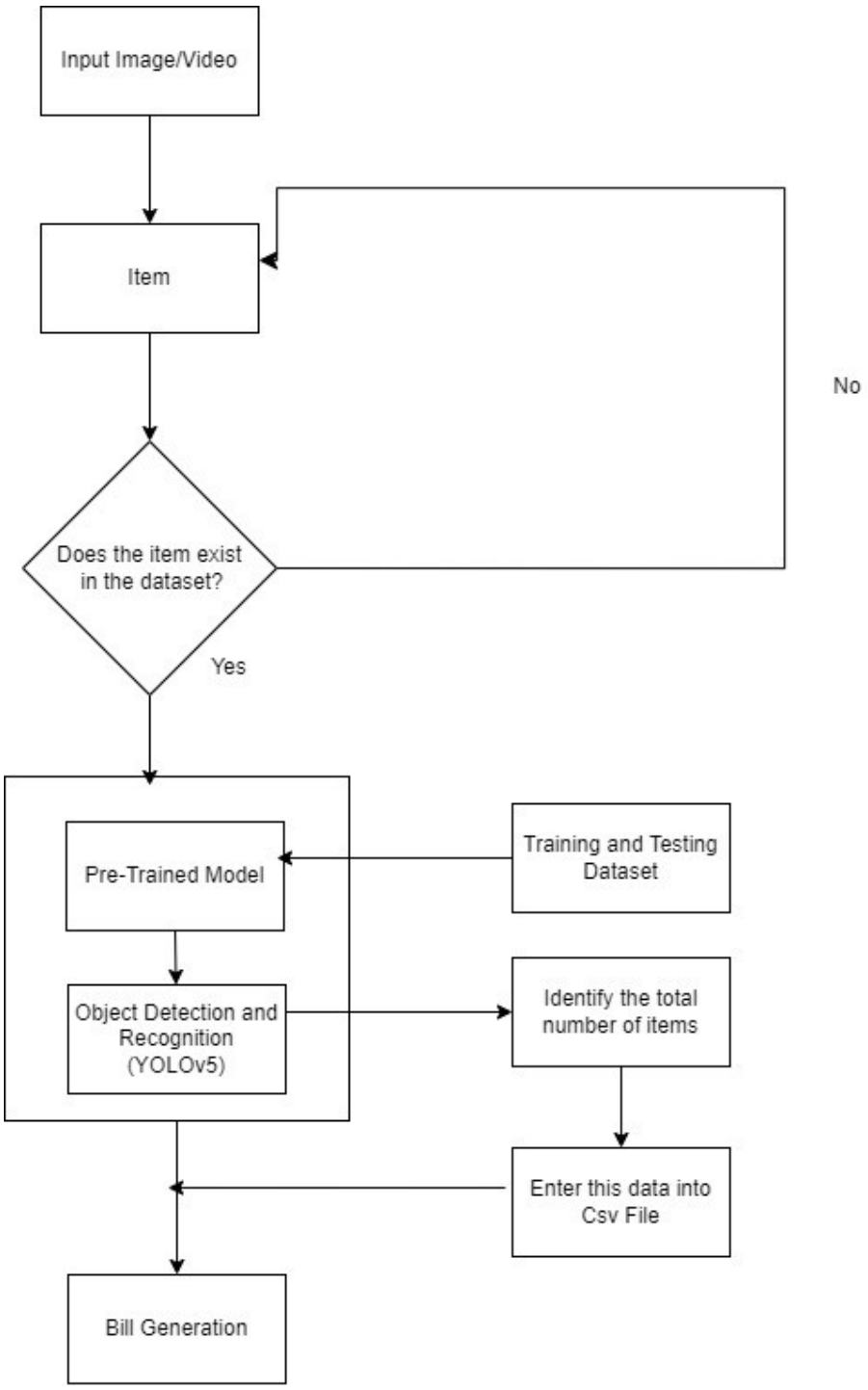
- To pre-process the dataset and convert it into required CSV format.
- To prepare YOLOv5 model using Roboflow.
- To empirically evaluate the outcomes of the proposed model.
- To assess the outcomes of the proposed model with previous models.

Summary

[0009] This system can detect multiple objects:

- The end user can upload the video or image of the bought products.
- An automated bill is generated.
- The bill contains the name of the individual product, its quantity, and its price.
- The total amount of the products bought gets calculated.
- The size of the dataset can be increased in order to get higher accuracy.

Flowchart:


Input Image/Video
Item
No
Does the item exist in the dataset?
Yes
Pre-Trained Model
Training and Testing Dataset
Object Detection and Recognition (YOLOv5)
Identify the total number of items
Enter this data into Csv File
Bill Generation

Advantages of the Invention

[0010] An advantage of the present invention is

- Efficient product recognition as YOLOv5 can recognize multiple products simultaneously and efficiently with high accuracy and speed.
- Establishment of seamless checkout experience for customers by eliminating manual labor and longer queues.
- Reduce in the costs of manual labors as well as expensive machines for retailers.
- Reduced errors in scanning the items and preventing thefts in stores.
- Can track inventory in real-time, helping retailers monitor stock levels and improve supply chain management.

Claims

We Claim:

1. A system and method for automated checkout through wearables comprising of:

Language:

- Python

Toolkit:

- Roboflow
- YOLOv5

User Interface:

- Tkinter

2. A system in Claim 1, uses Roboflow. It is a Computer Vision developer framework used for better data collection, pre-processing, and model training techniques.

3. A system in Claim 1, the user can upload a video or an image of the bought products. The system checks whether the items present in the image/video are present in the dataset or not.

4. In pre-processing, there is an inbuilt feature in Roboflow for giving annotations. We put labels on each of the photos. Along with this, Roboflow increases the dataset by rotating every image with different angles. After processing the dataset from Roboflow we get 1 API key that can be used to import data in YOLOv5 for further detection.

5. Object Detection and Object Recognition is performed through YOLOv5 which is trained on COCO Dataset. YOLOv5 is used to achieve better accuracy in object detection. It is trained on

custom dataset.

6. The system can then generate an automated bill that includes the information like name of the product, its quantity, and its price.

7. The final amount of all the bought items is also written at the end of the report.

Abstract

The present invention is a system and method which can enhance the process of checkout at small and large grocery or retail stores. It is a novel idea that can help the retailers to reduce the costs required to install expensive machines to smoothen the process of automated checkout.

This system is cost friendly and can be easily used by both the customer and the retailers to calculate the costs of the purchased items. Thefts and loss of items can be reduced to a great extent.

It Uses Robo Flow for image annotation, pre-processing, and augmentation. YOLOv5 model, which is trained on COCO dataset is used to get better accuracy in object detection. Tkinter is used for GUI. Video get detected after a video or an image gets uploaded.

This system can help to reduce the manual labor on grocery stores and can contribute to the overall savings of the owners or retailers.

Besides, this system can allow the customers to review the items they have bought and what the total amount and quantity of each item is. Thus, it is customer friendly allowing customers to cross check the purchased items.

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