WEBCAM-BASED CHECKOUT AT THE SUPERMARKET

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Abstract

Usually, we visit supermarkets to buy our daily necessities, such as food and cleaning supplies, and we see that billing is carried out by scanning the product code that appears on the product; this billing process takes a long time, and customers have to wait even longer in queue at the counter if there are any problems with the barcode scanner. Thus, to solve the issues, a webcam-based billing system that integrates several extra features not seen in traditional grocery billing has been introduced. Using a camera, the system is able to take pictures of the goods, provide details like its name and price, and generate a bill in a flash. With this method, we can save time while improving precision.

Keywords: Supermarket, Barcode scanner,Webcam.

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1. INTRODUCTION

These days, consumers have both more disposable cash and less free time to spend it. Therefore, while shopping for food, people prefer to go to supermarkets. The supermarket is where people go to get the things they need on a regular basis and then pay for them. The number of things sold must be tallied, and then clients must be billed for their purchases. There is clear evidence that barcodes are frequently employed for checkout purposes numerous supermarkets. Customers bring their shopping carts to the checkout lanes, where clerks scan the goods' barcodes to determine the final cost. It takes a long time to scan each product individually, and it also takes up a lot of the buyers' time. Especially at large businesses where thousands of items have to be scanned every day for the hundreds or even thousands of consumers who come in to browse. Because of this, human employees have it tough, and consumers have to wait in huge lines. Sometimes the barcode is damaged, and sometimes it's difficult to see the barcode due of factors like poor lighting or a lack of clarity in the image. Due to the need for light from lasers for all items, barcode-based invoicing is therefore rather expensive. The webcam-based checkout system at supermarkets is all about supermarket automation. Users will appreciate being able to get their job done in a setting that is both productive and pleasant. Customers invest far less time and effort in the billing process. This method is put into action by taking into account the locally stored, predetermined photographs of items that are delivered to the supermarket. This system uses computer vision along with additional python packages for image recognition. The goods will be captured by a camera when a customer comes in for billing. The software component will do the maths after taking pictures of items by looking for pre-set objects and comparing them to previous pictures. The webcam-based billing system for grocery stores was developed to provide more rapid and accurate bill generation and display, as well as improved customer service. This means the consumer won't have to hang around for too long while their bill is being processed. The purpose of developing a webcam-based supermarket billing system is to improve the system's dependability, ease of use, speed, and transparency.

2. RELATED WORK

New Object Detection, Tracking, and Recognition Methods for Camera Network Video Surveillance

Multicamera surveillance relies heavily on two tasks: object recognition and tracking. In this research, we present a framework for accomplishing these goals via a network of several cameras that do not overlap. We provide a novel object recognition approach based on mean shift (MS) segmentation, and use depth information from stereo vision to further distinguish between occluded items. A unique, new object tracking technique uses the Bayesian Kalman filter with reduced Gaussian mixture (BKF-SGM) to track objects once they have been identified. It employs a novel direct density lowering method along with an approximate Gaussian mix (GM) representation to describe the state or noise densities in order to avoid the exponential complexity development of classic Kalman filters (KFs).A novel BKF-SGM with an enhanced MS algorithm and enhanced tracking performance is achieved by combining the two. To further facilitate item tracking across a non-overlapping network, a non-training-based object identification method is used. From our experiments, we can conclude two things: 1) While our proposed tracking method is able to handle complex circumstances with exceptional performance and minimum arithmetic complexity, the suggested

object detection approach outperforms the state-of-the-art in terms of segmentation. The findings of our identification and tracking may also be used to increase the accuracy of training-based and non-training-based object recognition systems.

Fruit Yield Prediction and Automatic Fruit Segmentation Using OpenCV in Image Processing

In harvesting systems, automatic fruit output counting is a significant issue. Utilising image processing techniques eliminates the need for manual fruit inspection and counting. In this study, we describe a fruit yield forecasting method that uses colour and shape information to automatically classify fruits. Fruit tree images that are received first go through pre-processing. After that, the image is converted from RGB to HSV so that the fruit may be separated from its background.. In order to hide the unwanted hues, colour thresholding is used. Eliminating background noise using a Gaussian filter. A copy of the image's outline is made. The captured photos are then put via an image processing programme. The result shows the total number of fruits counted depending on their colour and form. Automatic segmentation and counting of fruits in a picture is achieved by the use of edge detection and conjunction with a circular fitting technique. Automatic counting utilises a variety of fruit kinds, including oranges/tangerines, pomegranates, apples, lemons, mangoes, and cherries. To carry out the necessary image processing tasks, the Open CV Python programme is employed.

Performance Comparison of weed Detection Algorithm

Weeds are a major agricultural pest that must be eliminated for crop success. Traditional techniques of weed control are labour-intensive and time-consuming. This procedure has to be automated for this reason. The suggested system's goal is to use machine learning techniques to distinguish weeds from crops. Weeds like Para weed and Nutsedge are included in the comprehensive dataset alongside four common commercial crops. The dirt is hidden and the desired area is extracted using the Excess Green Technique and Otsu's Thresholding. Image shape characteristics are retrieved to give weed/crop discrimination properties. With varied degrees of effectiveness, a Support Vector Machine, an Artificial Neural Network, and a Convolutional Neural Network, or CNN, have all been used to classify weeds and crops. Python is used on the CV Open and Keras platforms to compare the effectiveness of various weed identification methods.

3. METHODOLOGY

Multi-camera surveillance primarily serves two purposes: object detection and tracking. Median shift (MS) is a novel approach for detecting objects. A novel object tracking technique (based on a Bayesian Kalman filter with enhanced Gaussian mixture, or BKF-SGM) then tracks their movements after detection. We are able to improve the new BKF-SGM's already remarkable tracking performance by applying the MS algorithm to it. The results of the experiments show that the proposed object identification algorithm beats cutting-edge methods and that the proposed track algorithm can successfully handle complex tastes. sProcessing images digitally reduces the amount of work that must be done by hand. Here, we offer an image processing system that uses colour and shape characteristics to do autonomous segmentation and prediction. The necessary image processing procedure is carried out with the help of OpenCV python programme. Understanding surroundings and making decisions relies heavily on object detection and identification, making it a cornerstone of intelligent services. In this work, we present an end-to-end deep learning-based

object detection and identification method to improve the accuracy and real-time performance of identifying and recognising objects in service of complex scenarios. The model's feature-capacitation ability is improved with the help of CNN that works by way of its improved convolution module function.

4. RESULT

Here's how it works: In order to take pictures of the goods, a webcam must first be activated. Changing the product's orientation in the camera saves different photos of the product in the local system. Product information like its name and price are included. Simply click the "Add Product Details" button if you'd want us to include the goods in your order. After collecting product photos, one clicks the "train model" button to teach the model. Using a camera to identify items when they are presented for payment. Now that the buyer has been educated and has made a purchase, you may display the product in front of their camera. The basket add/remove button is clickable. The goods are then recognised by the system, and their names and prices are displayed in the designated space. Presents the final price to the buyer. If a buyer has changed their mind and no longer needs the item in their shopping cart, they may simply delete it. When the webcam is ready, the item is shown once again. Use the "Basket" tab to add or delete items. The item is then successfully deleted from the shopping cart. Shows the buyer their entire cost.

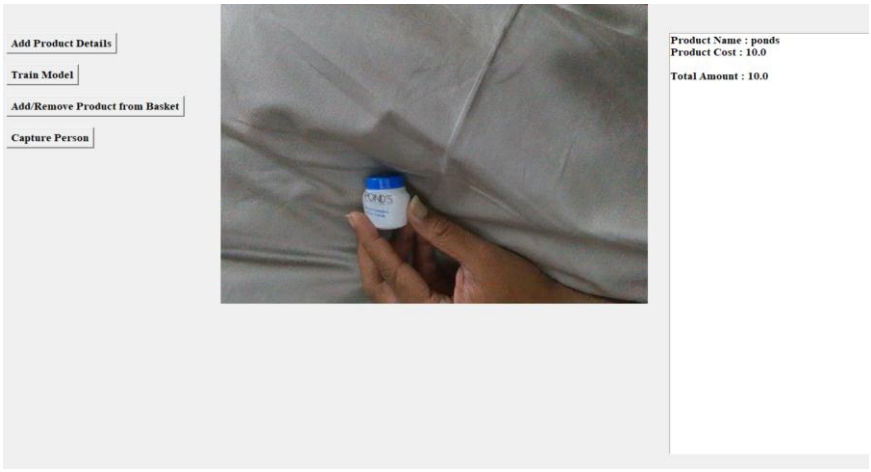

Fig 2-Bill generated screen

5. CONCLUSION

The goal of the webcam-based billing system for supermarkets is to create an apparatus that is beneficial to the retail business by speeding up the charging process. There is no need for expensive or rare gear to set up the system in the classroom. You only need a camera and a computer to put everything together. This method is superior than the outdated barcode billing technique. This technique is precise and trustworthy. In this project, we do object detection using TensorFlow. There are benefits and drawbacks to every possible approach. But we aimed to improve upon the shortcomings of the prevailing system here. The suggested method is more secure and advantageous than the existing one since we are merely altering the billing procedure. With this system in place, everyone involved in the retail transaction, from customers to managers, will benefit. It has been shown via experimentation that the system is capable of very accurate counting and recognition. Interests in Conflict Regarding the current work, the authors

state they have no conflicts of interest to disclose.

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