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Product Searching and real time object detection using Machine learning.

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Abstract : Accurate Product Detection was always a big deal and an important part of the Information Technology era. After the arrival of Machine Learning and Deep Learning technologies, the efficiency and accuracy for Product Detection increased significantly. These technologies greatly assisted in the evolution of the computer vision systems. This project focuses to integrate state-of-the-art technique for Product detection with the aim of the achieving high accuracy. There are few other libraries used which helped in Product detection to make the system more accurate and reliable in the long run. We trained the network on various Products which are ordinary and easily available in the market. This projects aim to reduce the billing time in super markets with fast and accurate detection.

Keywords : Object Detection, Product segmentation , Data preprocessing

I. INTRODUCTION

In recent years, the world of e-commerce and online retail has witnessed a profound transformation, with an increasing number of consumers turning to online platforms for their shopping needs. This shift has prompted the exploration of innovative technologies that can enhance the shopping experience, and one such technology is real-time product searching using machine learning. [1]**.** By seamlessly integrating computer vision and natural language processing techniques, this cutting-edge approach aims to simplify and accelerate the way we find and purchase products online. Traditionally, online product searches have often relied on keywords, manual categorization, and filters, which can be time-consuming and imprecise. Real-time product searching, on the other hand, empowers users to search for products based on images or textual descriptions, making it more intuitive and user-friendly. Whether you spot a product on the street, in a magazine, or at a friend's house, you can now simply capture an image or provide a description, and the system can instantly identify or recommend similar products in real time. The applications of real-time product searching are far-reaching[2]. It can revolutionize online shopping by improving the accuracy and efficiency of product discovery. Whether it's fashion items, electronic gadgets, home decor, or virtually any other product, users can find what they're looking for more quickly and with less effort. This introduction sets the stage for an in-depth exploration of real-time product searching using machine learning, encompassing the underlying technologies, methodologies, challenges, and potential applications[3].It represents a significant step toward transforming the way we shop online, making it more seamless and enjoyable for consumers and more profitable for businesses.

II. LITERATURE SURVEY

A literature survey on real-time object detection for product searching involves reviewing existing research and publications in the field. Researchers examine various techniques and methodologies for quickly and accurately detecting objects, such as groceries or fashion items, in real-time. They explore algorithms, datasets, and performance metrics to identify trends, challenges, and advancements. The survey aims to provide a comprehensive understanding of the state-of-the-art methods and propose directions for future research. Key steps include defining scope, searching databases, reviewing papers, analyzing data, and reporting findings in a structured manner[4]. The table provides a concise overview of four papers focusing on different aspects of object detection. "Real-time Object Detection Using Machine Learning" by K. Vaishnavi and T. Balram Reddy emphasizes detection, data processing, and model selection, achieving a notable 94% accuracy. Its strengths lie in customization, personalization, and security, but it is limited to detecting a single object at a time and exhibits lower efficiency[5]**.** "Object Detection Using Deep Learning" by D. Pawan and K. Sai Naveen employs training, preprocessing, and evaluation techniques, resulting in a 90% accuracy rate and offering automated visual recognition. However, concerns regarding privacy and challenges related to varying sizes are noted. "Overfit Model" by P. Reddy and K. Vishwanatha employs fine-tuning and iterations to address challenges, achieving an 80.88% accuracy rate. It enhances security and efficiency but requires substantial data and poses complexity issues[6]. Finally, "Detection and Identification of the Environment" by S. Rakesh Sain and P. Raut emphasizes ethical and legal considerations, achieving an 80% accuracy rate. While ensuring accessibility and providing interpretable results, it faces challenges with accuracy and interpretability.

III. METHODOLOGY

This model is based on object detection, product searching and then tracking the identified product. First to get various inputs from the environment camera is been used and various objects are been detected using various machine learning algorithms. After detecting and identification of various objects preprocessing is done using various algorithms to get the product identity. The detected product is been further been tracked.

Efficient Retail Operations: In retail, object detection and product searching enable inventory management, helping stores keep track of stock levels, reduce stockouts, and optimize supply chain operations.

Enhanced Customer Experience: Customers can use these technologies for in-store or online shopping to easily find and locate products, improving their overall shopping experience.

Reduced Shopping Time: Object detection and product searching systems can significantly reduce the time it takes for customers to locate items in large retail spaces or e-commerce websites.

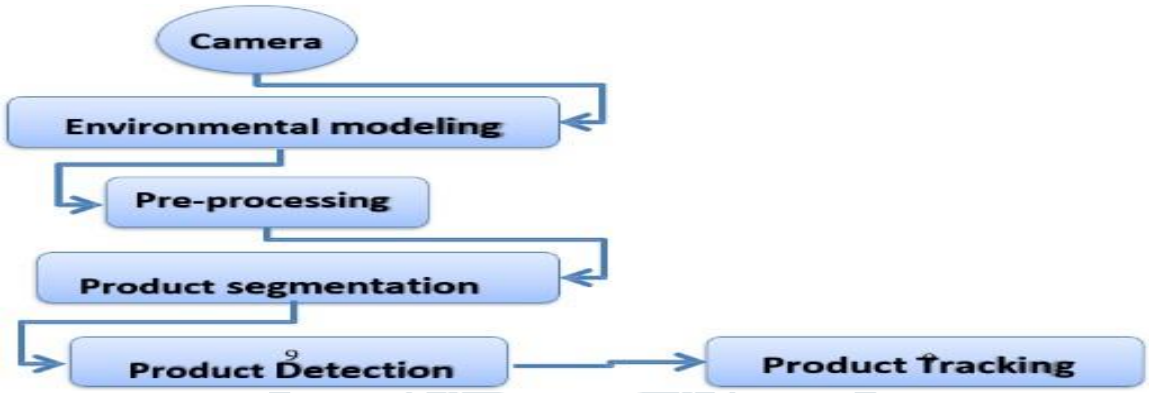

Fig.1 Working of proposed System

IV. SYSTEM SETUP

SOFTWARE SETUP:

Android Studio - This system recognizes any Product(s) that is trained from the data sets available (or by creating our own data sets) and the model built after the training. The data sets are generally available in the web where we can use those data sets, build the model and then perform any task on that data according to our requirements.

Chrome or Any Other Browser - Chrome is a web browser developed by Google, known for its speed, simplicity, and security. It features a clean user interface with tabbed browsing, allowing users to open multiple web pages within a single window. Chrome prioritizes security with features like Safe Browsing to protect users from malware and phishing attacks. It offers customization options through extensions and themes, and integrates seamlessly with other Google services. Chrome is available on multiple platforms, including Windows, macOS, Linux, Android, and iOS, providing a consistent browsing experience across devices.

HARDWARE SETUP:

- **Processor –** Intel core i5-1335U
- **RAM** -16GB
- **Sytem-** Dell Inspiron5430 13th gen laptop

V. Results

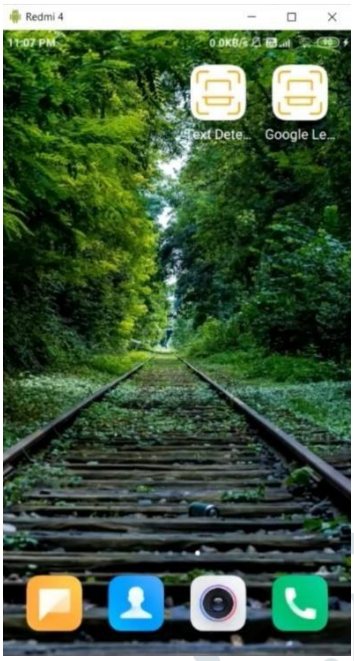

Fig.2 Home Screen and app.

Fig.3 Home page of application.

The above is the home page of the application where the user should be able to get the snaps with real time detection of the objects. We have a logo and two buttons which consist of snaps where the camera opens and another is get search results where we could be ble to search the product

Fig.4 Snap of an Image 1

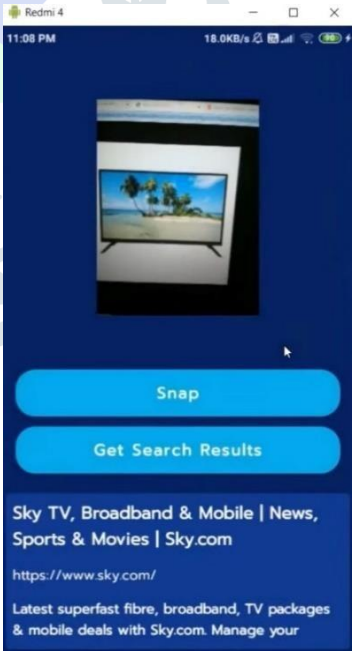

Fig.5 Get the Result of Button1

In the above figure, after clicking on the snaps button camera opens and ask to get a snap. After getting the snaps we can see the results of the image. This is for another product just like above.

Fig.6 Snap of an Image 2

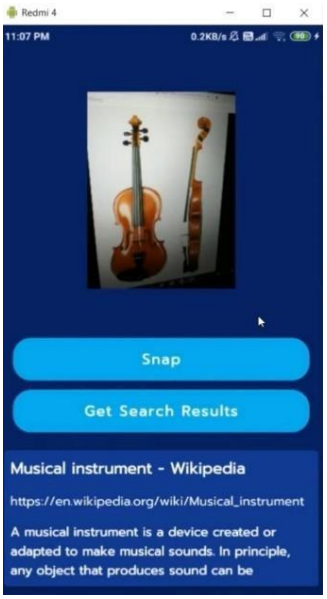

Fig.7 Get the results by button 2

In the above figure, after clicking on the snaps button camera opens and ask to get a snap. After getting the snaps we cansee the results of the image.

VI. Conclusion

This work aims to incorporate state- of-the-art technique for Product detection with the goal of achieving high accuracy with a real-time performance. A major challenge in many of the Product detection systems is the dependency on other computer vision techniques for helping the deep learning based approach, which leads to slow and non-optimal performance. In conclusion, Product searching using object detection models represents a critical and versatile component of computer vision and machine learning applications. They enable machines to understand and interact with the visual world by identifying and locating objects within images or video frames. These models combine the tasks of object localization and classification, achieving a range of important objectives. Product searching using by Object detection models plays a pivotal role in various domains, driving innovation, automation, and improved user experiences. As the field of computer vision continues to advance, we can expect object detection models to become even more accurate, efficient, and adaptable to a wide range of practical applications.

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