**Smart Cart : An AI powered shopping app for effortless product recognition**

**Problem Statement:**

It aims to solve the problem in supermarkets where customers wait in long queues for checking out. Therefore, there is a a lot of time and resources being wasted. Therefore, customers are seeking ways to avoid manual billing by exploiting the ever-evolving technology. Our solution provides an automated billing system, making use of image recognition, which improves customer satisfaction.

**Abstract:**

In the realm of supermarket operations, the persistent challenge of long checkout queues imposes significant strains on both time and resources. To tackle this issue, prior research has initiated the development of an automated billing system, laying the groundwork for innovation in supermarket checkout processes. Expanding upon this existing work, our proposed system endeavors to revolutionize the checkout experience through the integration of advanced image recognition technology.

Our solution seeks to streamline the checkout process by automating the billing procedure, thereby reducing the need for manual intervention and expediting the overall transaction time. By harnessing the power of image recognition algorithms, specifically convolutional neural networks (CNNs) and other deep learning techniques, our system aims to accurately and efficiently identify products as they are scanned at the checkout counter. This integration of cutting-edge technology not only enhances operational efficiency but also contributes to heightened customer satisfaction by minimizing waiting times and optimizing service delivery.

Through the utilization of state-of-the-art algorithms, our system endeavors to achieve superior accuracy and reliability in product recognition, ensuring seamless transactions and minimizing errors. The beneficiaries of this technological advancement extend to both supermarket operators and customers alike. Supermarket operators stand to benefit from increased efficiency and reduced labor costs associated with manual billing processes, while customers can enjoy a more convenient and expedited checkout experience, ultimately enhancing overall satisfaction and loyalty.

**Objectives:**

* To provide an efficient shopping experience which enables customers to identify products without manual search, using image recognition through machine learning.
* To develop a streamlined checkout process which enhances a smoother transaction by directly adding items to the cart, and managing the bill, by making use of compact mobile applications.
* To enhance customer satisfaction associated with reducing the time spent waiting in long queues, and avoiding cashier interaction.
* To promote convenience and accessibility in retail environments, by automating the billing process.

**Data-set Link**

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**Technology used**

* Convolutional Neural Networks (CNN)
* Recurrent Neural Networks (RNN)
* Support Vector Machines (SVM)

**Language**

* Python
* Flutter
* Dart

**Modules used:**

* Tensorflow (Python) – Used with Keras module to create a neural network with multiple layers and train it. Provides utilities for machine learning models.
* Keras (Python) – Consists of multiple kinds of neural network layers and machine learning model templates.
* Numpy (Python) – A module that provides support for multi-dimensional arrays for use in data set operations for machine learning models.
* Pandas (Python) – It is often used in co-ordination with numpy to perform data manipulation and analysis to help in effective pre-processing and inferences.
* OpenCV (Python) – A module used to work with image processing to modify the input image into a suitable format.
* MatPlotLib (Python) – Used to generate mathematical graphs of different types to visualize data points and images.
* OS (Python) – Provides operating system functionalities such as file read, write, access and other methods.
* Flutter (Flutter) – Used as the main backbone module for developing flutter apps and provides an environment to build full-fledged user interfaces.
* Dart (Flutter) – Allows the use of the dart programming language that is primarily used in flutter apps.
* TFLite (Flutter) – Provides capability for the integration of machine learning models with the flutter app.