Determination of Weight of Vegetables and Generate Bills for Supermarkets in Sri Lanka using Image Processing and Deep Learning Approaches

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Abstract: Automatic billing systems have emerged as a powerful tool to enhance the efficiency of the food industry through the utilization of information technology and artificial intelligence. Sri Lankan supermarkets often face long queues during peak hours due to the overwhelming number of customers exceeding their capacity. However, the unique characteristics of vegetables in Sri Lanka have posed challenges in developing accurate identification datasets. This research addresses these challenges by incorporating real-time image recognition techniques into the billing process. By leveraging a camera to capture real-time images of vegetables at the checkout counter and a weighing system to get the weight of the vegetables, an image recognition model automatically generates an invoice, eliminating the need for manual price calculations. The effectiveness of such systems depends on the recognition capabilities of the employed models. A dataset comprising 5844 images was created, which served as the basis for training, validation, and testing of the image recognition model. This larger dataset enhances the model's accuracy and practicality, further contributing to the efficiency of the system during the checkout process. The image recognition model was trained, validated, and tested using the dataset. Experimental results showcase an impressive recognition accuracy of approximately 92% for individual vegetables. The research employed a model trained on a dataset consisting of images accurately detecting vegetables within a picture frame. The presented research introduces an automated billing system for Sri Lankan supermarkets, integrating deep learning techniques, real-time image recognition, and an intuitive user interface. The system's substantial improvements in recognition accuracy significantly enhance operational efficiency and customer satisfaction, effectively filling the gap in existing approaches.

Keywords:Automatic billing systems, Food industry, Artificial intelligence, Real-time image recognition, Vegetable identification, Checkout process automation

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