National University of Computer & Emerging Sciences
Karachi Campus

TITLE OF PROJECT

Custom Deep Convolutional Neural Network for Freshness Classification of Fruits and Vegetables

Artificial Intelligence [AI]
Section: BCS-6F

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Introduction

Our proposed system aims to develop a custom deep convolutional neural network (CNN) specifically designed for freshness classification of fruits and vegetables. Unlike existing systems that rely on transfer learning, we will create our own CNN architecture from scratch to address the unique challenges of freshness assessment.

Existing System

While existing image classification models provide a foundation, they may not be optimized for freshness detection. Our system will depart from this approach by building a custom CNN tailored to the task at hand.

Problem Statement

The primary issue with existing systems lies in their generic nature. They lack the specificity required for accurate freshness assessment. Our goal is to create a model that considers freshness-related visual features and achieves high accuracy.

Proposed Solution

Our approach involves the following steps:

1. Data Collection and Preprocessing:
    - Gather a diverse dataset of fruit and vegetable images, including fresh and stale samples.
    - Preprocess the images by resizing, normalizing, and augmenting the dataset.
2. Custom CNN Architecture:
    - Design a deep CNN architecture from scratch.
    - Incorporate convolutional layers, pooling layers, and fully connected layers.
    - Experiment with different layer configurations to optimize freshness classification.

3. Training and Validation:
    - Split the dataset into training, validation, and test sets.
    - Train the custom CNN using stochastic gradient descent and backpropagation.
    - Monitor performance metrics during training.

4. Evaluation and Testing:
    - Evaluate the model's accuracy, precision, and recall on the test set.
    - Fine-tune hyperparameters if necessary.

5. Deployment:
    - Deploy the trained custom CNN as an API or web service.
    - Users can upload fruit and vegetable images for real-time freshness classification.

Salient Features

- Freshness Assessment: Our model will accurately classify produce as fresh or stale.
- Custom Architecture: We avoid transfer learning and create a unique CNN.
- Robustness: The model will handle variations in lighting, background, and quality.
- Scalability: Extendable to include additional produce types.

Tools & Technologies

- Programming Language: Python
- Deep Learning Framework: TensorFlow or PyTorch
- Operating System: Linux (preferred for development and deployment)

By developing a custom CNN, we aim to enhance food quality assessment and contribute to reducing food waste. 🍎🥦🌽