KnowYourCalories: A Food Recognition and Calorie Estimation System

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Abstract – This system offers a robust solution for recognizing foods and estimating their calorie content using the MobileNetV2 deep learning model. Renowned for its speed and efficiency, MobileNetV2 is used to identify different foods from images and calculate their associated calorie counts. The system is designed to be intuitive and easy to access through a web interface developed with Flask. Users can upload pictures of their meals and the app uses a pre-trained MobileNetV2 model to classify the food. The identified food items are then used to calculate the total calorie content based on a predefined database of food calorie values.

Keywords: Robust Solution, Food recognition, Calorie estimation, MobileNetV2, Deep learning model, Speed and Efficiency, Identify foods, Images, Calorie counts, Intuitive, Web interface, Flask, Upload images, Pre-trained model, Classify food, Identified food items, Total calorie content, Pre-defined database

I. INTRODUCTION

In today's fast-paced world, maintaining a healthy diet is more important than ever. With the increasing prevalence of dietary-related health issues, there is a growing need for tools that can assist individuals in making informed food choices. This project addresses this need by providing a robust solution for food recognition and calorie estimation using the MobileNetV2 deep learning model.

The motivation for this work stems from the growing prevalence of dietary-related health issues such as obesity, diabetes, and cardiovascular diseases. These conditions are often linked to poor dietary habits and a lack of nutritional awareness. By leveraging the power of artificial intelligence and deep learning, this project seeks to empower individuals to make healthier food choices and manage their dietary intake more effectively.

The MobileNetV2 model, known for its speed and efficiency, is leveraged to accurately identify various food items from images. The system is designed to be user-friendly and accessible, featuring a web interface built with Flask. Users can easily upload images of their meals, and the application processes these images to classify the food items using the pre-trained MobileNetV2 model.

The identified food items are then used to calculate the total calorie content based on a predefined database of food calorie values. Additionally, the system incorporates a feedback mechanism, allowing users to provide correct food names if the prediction is

inaccurate, thereby continuously improving the model's accuracy.

This system not only helps users keep track of their dietary intake but also empowers them to make healthier food choices effortlessly. By combining cutting-edge deep learning technology with an intuitive web interface, this solution offers a comprehensive tool for dietary tracking and health management.

This system not only enhances individual dietary management but also contributes to broader public health objectives by promoting nutritional awareness and healthy eating habits. The integration of a user feedback mechanism ensures continuous improvement of the system, making it more reliable and accurate over time. Ultimately, this project aims to bridge the gap between dietary awareness and practical implementation, providing a valuable tool for anyone seeking to improve their nutritional health.

II. OBJECTIVES

[1] **Develop a Food Recognition System**: Implement a deep learning model to identify food items from images.

[2] **Estimate Caloric Content**: Calculate the total calorie content of recognized food items using a predefined database of food calorie values.

[3] **Enhance User Experience**: Build a user-friendly web interface to facilitate easy image uploads and display the results.

[4] **Incorporate User Feedback**: Allow users to provide feedback on the accuracy of the predictions to improve the system over time.

III. METHODOLOGY

[1] **Model selection**: MobileNetV2 Chosen for its balance between accuracy and computational efficiency, making it suitable for deployment on resource-constrained devices.

[2] **Data preparation**:

- **Dataset collection**: A diverse set of food images was collected and annotated to train the model.
- **Preprocessing**: Images were scaled to 224x224 pixels, normalized and tensorized.

[3] **Model training**: The MobileNetV2 model was trained using transfer learning with a set of foods. The last layer was adjusted to match the number of food classes in the dataset.

[4] **Development of the web interface**:

- Flask Framework: Used to create a responsive web interface.
- HTML, CSS, JavaScript: Implemented for front-end design and functionality.
- File Upload: Users can upload images of their meals through the web interface.

[5] **Prediction and estimation of calories**:

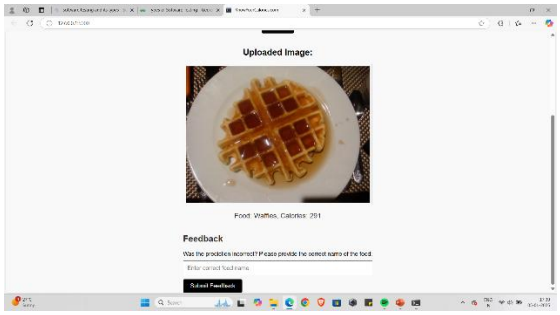
- Image processing: Uploaded images are pre-processed and fed into the MobileNetV2 model to obtain predictions.
- Calorie database: A predefined database of food calorie values is used to calculate the total calorie content of predicted foods.

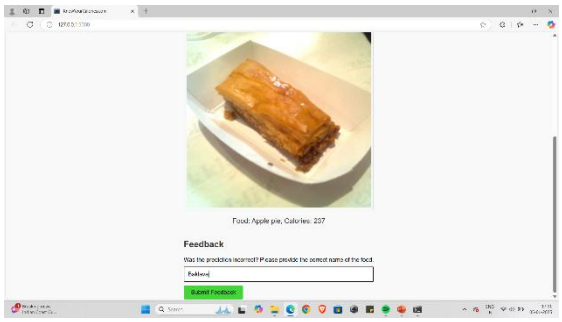
[6] **User feedback mechanism**: Users can provide feedback if the prediction is incorrect. This feedback is stored in a database and used to refine the model over time.

IV. RESULTS

- **Accuracy**: The MobileNetV2 model achieved a high accuracy in recognizing various food items from images.
- **Efficiency**: The system demonstrated fast and efficient processing, suitable for real-time applications.
- **User Interface**: The web interface was well-received by users for its ease of use and intuitive design.

- **User Feedback**: The feedback mechanism allowed for continuous improvement of the model's accuracy.





V. CONCLUSION

This system successfully demonstrates the application of MobileNetV2 for food recognition and calorie estimation. The system provides an efficient and user-friendly tool for dietary tracking and health management. The integration of a feedback mechanism and real-time processing capabilities ensures the system remains accurate and reliable, meeting the needs of various users.

VI. FUTURE WORK

[1] **Expand Calorie Database**: Include more food items and their calorie values to enhance the system's comprehensiveness.

[2] **Model Improvement**: Continue to refine the model based on user feedback and additional training data.

[3] **Mobile Application**: Develop a mobile application to increase accessibility and convenience for users on the go.

VII. REFERENCES

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