Computer Vision-Based Food Calorie Estimation Model Using Deep Learning for Health Monitoring and Nutritional Analysis

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ABSTRACT

By allowing users to recognize meals and calculate calories, the Computer Vision Based Food Calorie Estimation system is a web-based platform that makes nutritional tracking easier. Conventional calorie tracking techniques take a lot of time and are not automated. Users can upload food photos for analysis with ease thanks to this clever system's useful solution. Predicted food labels and calorie data are visible to users. The model can quickly and reliably identify objects and calculate calories. TensorFlow is used for food categorization tasks and Python Flask for backend processing in the system's development. HTML, CSS, and Bootstrap are used to create an interface that is easy to use. User data is handled safely thanks to security measures. The platform increases awareness and lessens manual labor. All things considered, the method increases productivity and encourages healthy lifestyle choices worldwide.

Keywords: ***Food Recognition, Calorie Estimation System, Computer Vision, Deep Learning Model, Flask Framework, Web-Based Application***

INTRODUCTION

A Due to human calorie tracking techniques, imprecise estimations, and the absence of automated nutritional analysis tools, tracking daily food intake can be difficult. People typically rely on time-consuming and ineffective food diaries or smartphone apps to keep track of meals.

Intelligent health monitoring systems that enhance convenience and dietary awareness are becoming more and more necessary in the digital age. By offering a clever image-based analysis platform, the Computer Vision Based Food Calorie

Estimation system seeks to solve these problems. Users can upload photos of food to the system for calorie estimation and automatic recognition. It makes effective nutritional analysis and real-time food recognition possible. The platform allows users to keep track of their food

intake. TensorFlow and Python Flask are used in the system's development to guarantee scalability and dependability. Interaction and usability are enhanced with an intuitive interface. Sensitive user data is safeguarded by secure processing. This study encourages better lifestyle choices and increases the effectiveness of nutritional monitoring.

LITERATURE SURVEY

Numerous research demonstrate how computer vision and deep learning models can enhance nutritional awareness and food management. Current food identification systems minimize effort in health monitoring applications and reduce manual calorie tracking. According to research, computerized food classification models assist consumers in making more informed dietary choices. The adoption of nutrition monitoring programs is significantly boosted by user-friendly interfaces. Numerous studies place a strong emphasis on user information security and privacy, particularly when managing personal dietary records. Instantaneous calorie estimation and nutritional feedback are made possible by real-time food recognition technologies. Web-based apps increase system availability and accessibility. The application of convolutional neural networks for precise food identification and calorie calculation has also been investigated recently. The requirement for an effective, dependable, and user-friendly food calorie estimating system is supported by all of these investigations.

RELATED WORK

Automatic calorie calculation and dietary monitoring have been successfully enhanced by image-based food identification systems. Research demonstrates that effective deep learning models improve recognition accuracy and lower prediction errors, underscoring the need of precise picture processing. Data security and privacy are still crucial, guaranteeing the safe management of user data via regulated access and authentication. Studies on food datasets highlight the importance of nutritional

databases and tagged photos in enhancing prediction accuracy. Real-time food classification reduces processing delays and increases analysis efficiency. Deep learning algorithms are being utilized more and more to estimate calories and identify complex dietary products. Applications that are enabled by the cloud provide scalability, dependability, and effective management of numerous user demands.

EXISTING SYSTEM

The majority of food calorie tracking systems in use today are manual and rely on food diaries or smartphone apps where users input meal information. People are forced to rely on approximations and estimates because nutritional information is dispersed over several sources. Errors, erroneous portion estimation, and inconsistent records are common outcomes of manual calorie tracking. Users find it difficult to obtain trustworthy nutritional information and calorie details due to the lack of transparency. Food recognition cannot be automated using conventional techniques or poorly integrated digital tools, leading to inefficiencies. The lack of intelligent models and image-based analysis continues to cause a lack of immediate input. In general, consumers monitoring daily dietary intake find the current systems to be inconvenient, incorrect, and inefficient.

PROPOSED SYSTEM

The suggested Food Calorie Estimation system is a web-based tool intended to enhance nutritional awareness and dietary tracking. It offers a clever platform that makes it simple for users to post and examine photos of food. Food items can be automatically recognized and classified by users. Nutritional feedback and real-time calorie estimation are supported by the system. Instantaneous viewing of calorie information and anticipated food labels is available to users. The program effectively uses deep learning models to process photos. Manual calorie tracking and estimating inaccuracies are decreased by the platform. Python Flask is used in its development for backend functions. For precise food classification, TensorFlow is utilized. JavaScript, HTML, CSS, and Bootstrap are used in the frontend's construction. User data is handled safely thanks to secure processing. Image uploads and prediction results are supported by the system. Scalability and dependability are enhanced by cloud deployment. In general, the approach improves the effectiveness of

health monitoring and nutritional awareness.

SYSTEM ARCHITECTURE

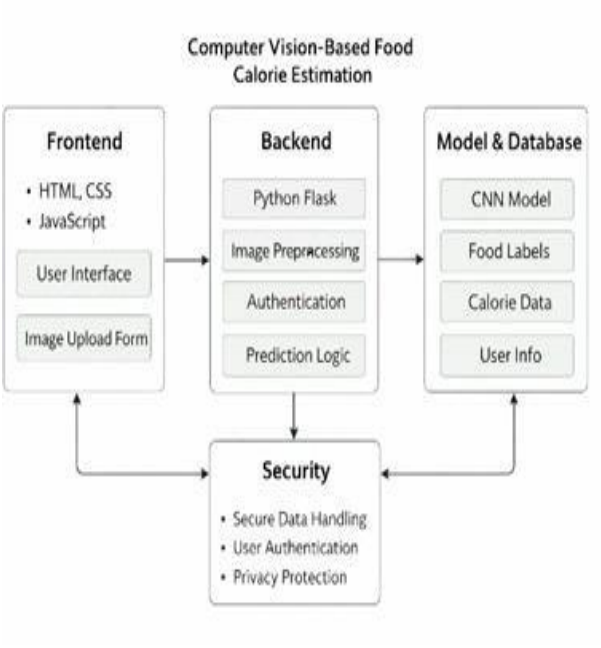

Fig 1: Computer Vision-Based Food Calorie Estimation System: Intelligent Dietary Monitoring

Frontend: Food Calorie Estimation System includes frontend components such as home page, user registration page, login page, user dashboard page, image upload page, prediction results page and finally nutrition information page.

Backend: Food Calorie Estimation System uses a backend that communicates with frontend and processing modules; the backend is developed using Python and Flask for handling image uploads, preprocessing, and prediction tasks. Model and

Database: The deep learning model analyzes food images and predicts food categories, while calorie data and user information are stored securely and efficiently for nutritional analysis.

RESULTS AND DISCUSSION

Fig 2: Home Page

This is the home page of the Computer Vision-Based Food Calorie Estimation system. It acts as the entry point of the application and provides navigation to login and registration pages.

Fig 3: Register Page

This page allows new users to create an account in the system. Users must enter

required details such as username and password.

Fig 4: Login Page

This is the login page where registered users enter their credentials to access the system. Authentication ensures that only authorized users can upload food images and view calorie estimation results.

Fig 5: User Dashboard

After successful login, users are redirected to the dashboard. The dashboard acts as the central interface where users can navigate to upload food images and perform calorie estimation tasks.

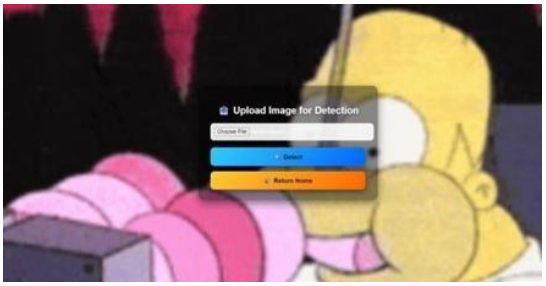

Fig 6: Image Upload Page

This page allows users to upload food images in supported formats such as JPEG or PNG. The uploaded image is sent to the backend for preprocessing and classification using the deep learning model.

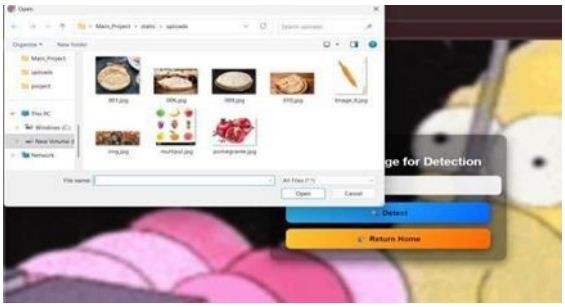

Fig 7: Image Upload Process

This stage shows how the selected food image is uploaded and processed by the system.

Fig 8: Food Detection and Calorie Estimation Result

This page displays the prediction results generated by the system. It shows the detected food item, the confidence score of the prediction, and the estimated calorie value.

CONCLUSION

The Computer Vision-Based Food Calorie Estimation system offers a clever, approachable way to keep track of food consumption. TensorFlow, Python Flask, and contemporary web technologies were used in its development to enable autonomous food detection and calorie estimation. All things considered, the system is useful, effective, and advantageous for practical health monitoring applications.

FUTURE SCOPE

The Food Calorie Estimation system uses an advanced image-based platform to make dietary monitoring easier. Through a dynamic interface, users may upload photos of food for automatic detection and calorie estimation. TensorFlow was used for deep learning processing, and Python Flask was used for the backend. For usability, frontend technologies include HTML, CSS, Bootstrap, and JavaScript. The system encourages healthier lifestyle choices, increases nutritional awareness, and lessens manual labour.

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