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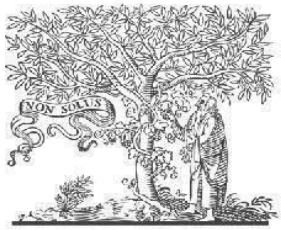

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A FOOD RECOGNITION SYSTEM FOR CALORIE MEASUREMENT

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Abstract- Food is an essential requirement for all living beings, and for humans, it is crucial that food is fresh, pure, and of standard quality. In recent years, there has been a growing awareness among people about the importance of a balanced diet, with an increasing number of individuals focusing on managing their nutritional intake. An unbalanced diet can lead to various health problems, such as weight gain, obesity, and diabetes. To address these concerns, several systems have been developed to analyze food images and calculate the calorie and nutritional content of meals. This paper presents an effective system for managing daily food intake, specifically designed to assist patients and dietitians in tracking and controlling their nutrition. The proposed system uses food images to estimate the calorie content and nutritional value by leveraging image processing, segmentation, and classification techniques. The system's core process involves capturing a picture of the food item, followed by segmentation to isolate the food portions. Next, the system uses skull stripping to enhance the image and then applies Support Vector Machine (SVM) classification to identify the type of food and calculate its nutritional and caloric content accurately. The food portion recognition system not only provides an accurate estimate of the total calorie intake but also identifies the type of energy in the food, such as carbohydrates, proteins, and fats. This approach improves the current methods of calorie measurement by automating the process and reducing the dependency on manual input, making it more efficient and user-friendly. the proposed system has the potential to greatly enhance food intake management, providing more precise and reliable data for individuals looking to monitor their diets. By incorporating image processing, segmentation, and advanced machine learning techniques like SVM, this system offers a promising solution to the challenges of nutrition and calorie tracking, contributing to better health and dietary management.

Keywords: Support Vector Machine, Body Mass Index, preprocessing

I.Introduction

Calories are a measure of energy, defined as the amount of heat required to raise the temperature of one gram of water by one degree Celsius. Nutrition is the process of providing or obtaining the necessary food for health and growth. In the context of food, calories represent the energy provided by the three main components: carbohydrates, proteins, and fats. While calories are essential for bodily functions and energy generation, an excess of calories can lead to fat storage and weight gain. Consequently, managing calorie intake is crucial to maintaining a healthy weight and preventing obesity.Obesity is a growing concern globally, with an increasing number of individuals affected by this condition. Obesity is often linked to various serious health problems,

such as hypertension, heart disease, diabetes, and high cholesterol. The primary cause of obesity is an imbalance between the amount of food consumed and the energy expended by the body. Overeating without sufficient physical activity leads to the accumulation of excess calories, resulting in weight gain. Body Mass Index (BMI), a widely used tool to assess whether a person is overweight or not, is calculated by dividing a person's weight (in kilograms) by the square of their height (in meters). A BMI higher than 30 kg/m² is considered obese.

Given the rise in obesity rates, there is an increasing need for systems that can monitor and control calorie intake, especially for patients undergoing obesity treatment. Managing calorie intake is crucial, but it is often challenging for individuals to accurately track their food consumption due to a lack of nutritional knowledge or self-control. In such cases, an automatic food intake monitoring system can be an invaluable tool for patients and dietitians to monitor food intake and provide effective treatment. This paper presents a novel system designed to measure the calorie and nutritional content of food based on images. This system provides an easy-to-use tool for patients and dietitians, enabling better management of obesity. Existing food intake measurement systems often suffer from significant drawbacks, such as large calculation errors and complexity, making them difficult for users to employ. To overcome these challenges, our proposed system eliminates the need for complex manual calculations by using advanced image processing techniques. The system employs color, size, shape, and texture features of food images to accurately estimate nutritional content. To further improve accuracy, we integrate a hybrid approach combining segmentation and classification techniques, using Fuzzy C-means clustering to enhance image processing. This approach ensures higher accuracy and efficiency in food portion recognition and nutritional assessment, making it a promising tool for managing obesity and promoting healthier eating habits.

II.LITERATURE REVIEW:

A daily diet is very necessary in day to day life. So it is necessary to manage our daily food item intake. In 2008 to 2010, more than one in ten of the world's adult populations were obese [1], but in 2012 this figure or range has risen to one in six adults [2], an alarming growth rate. The recent paper studies have shown that obese people are more likely to have serious health conditions such as hypertension, heart attack, diabetes, high cholesterol, breast and colon cancer, and breathing disorders, thyroid etc. The main cause of obesity is the imbalance between the amount of daily food intake and energy consumed by the individuals [3]. There is another system which is based on support vector machine but use the thumb for calibration of each and every food image but it require long calculation for measuring nutrition that measurement system also uses a photo of the food, taken with the camera of a smart phone, but uses the thumb of patient for calibration, which solves the problem of carrying cards or special trays. More specifically, an thumb image is captured and stored with its measurements in the first usage time (first time calibration). Now, this unique method will lead to relatively accurate results without the difficulties of other methods. Food images will then be taken with the user's thumb placed next to the dish, make it easy to

measure the real life size of the portions. We then apply image processing and classification techniques to find the food portions, their volume and area of the food and get the calorie and nutrition but the use of thumb is necessary[4]. So, in order to lose weight in a healthy way, as well as to maintain a healthy weight for normal people, the daily food intake measured is must [5]. That system's are uses image processing and segmentation to identify food portions (i.e., isolating portions such as chicken, rice, vegetables, etc., from the overall food image), measures the volume of each food part, and calculates nutritional facts of each part by calculating the mass of each portion from its measured volume[6]. Color is used in identifying objects for many years and also Texture is one of the most active topics in machine intelligence and pattern analysis since the 1950s which tries to discriminate the different patterns of images by extracting the dependency of intensity between pixels and their neighboring pixels [7], or by obtaining the variance of intensity across pixels [8]. Recently, different features of color ,texture, size are combined together in order to measure food nutrition more accurately [9]. The problem with this manual approach is obvious people not remembering exactly what they are ate, forgetting to take note, and needing to see an expert dietician on a very frequent basis so the dietician can guess how much calories and nutrient the patient has taken. To evaluate the shortcomings of these clinical methods, researchers have been trying to come up with new improved techniques. Some of these techniques require the person to take a picture of the food before eating food, so that the picture can be processed offline, either manually or automatically, to measure the amount of calorie. For example, the work in [10] proposes a method that uses a calibration card for an reference, this card should be placed next to the food when capturing the image, so that the dimensions of the food are known. However, this card must always be present in the photo when the patient or obese people wants to use the system. The drawback is of the system will not work without this card, which means that in the case of absence of the card, the system will not work. Another method which use the photo of the food and feeds that to a Neural Network developed by researchers in [11].

III.SYSTEM ARCHITECTURE

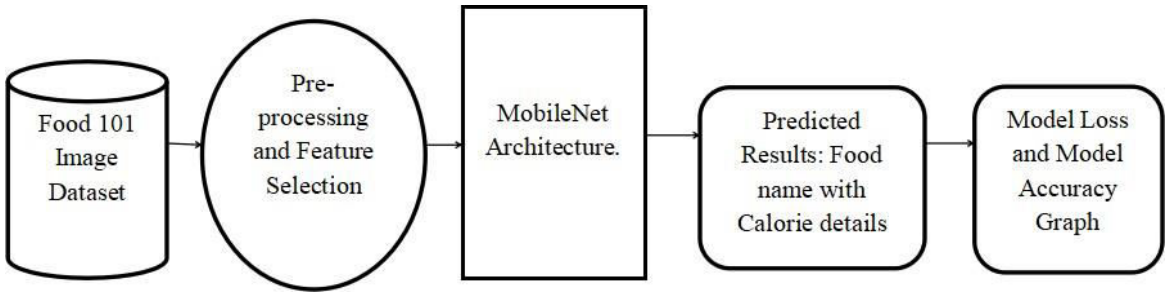

Fig 1: system architecture of food recognition and calorie measurement

DATA FLOW DIAGRAM:

1. The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
2. The data flow diagram (DFD) is one of the most important modeling tools. It is used to

model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system

3. DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.

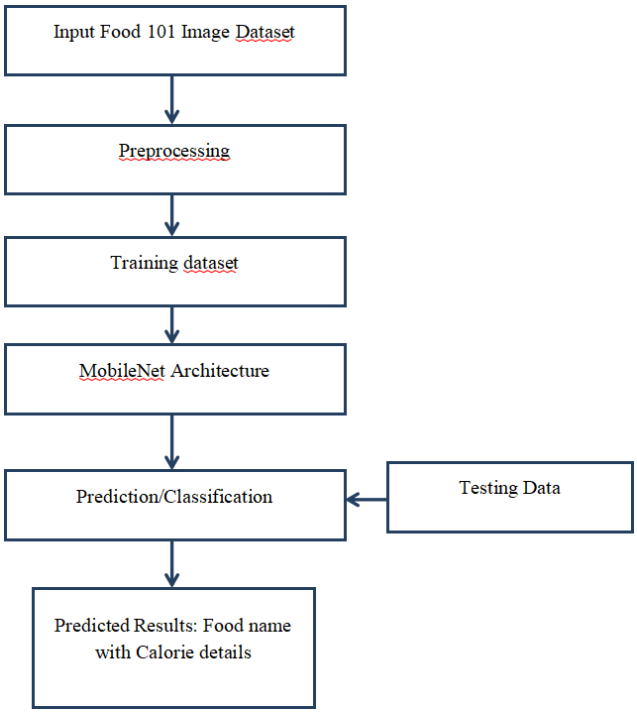

Fig 2: Data flow diagram of food recognition and calorie measurement

4. DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group. The goal is for UML to become a common language for creating models of object oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems. The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects. A use case diagram in the Unified Modeling Language (UML) is a type of behavioral

diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

SYSTEM REQUREMENTS:

HARDWARE REQUIREMENTS:

System	:	Pentium i3 Processor.
Hard Disk	:	500 GB.
Monitor	:	15'' LED
Input Devices	:	Keyboard, Mouse
Ram	:	4 GB

SOFTWARE REQUIREMENTS:

Operating system	:	Windows 10.
Coding Language	:	Python.
Web Framework	:	Flask.

IV.RESULT

Fig 3:Interface of the web app/website

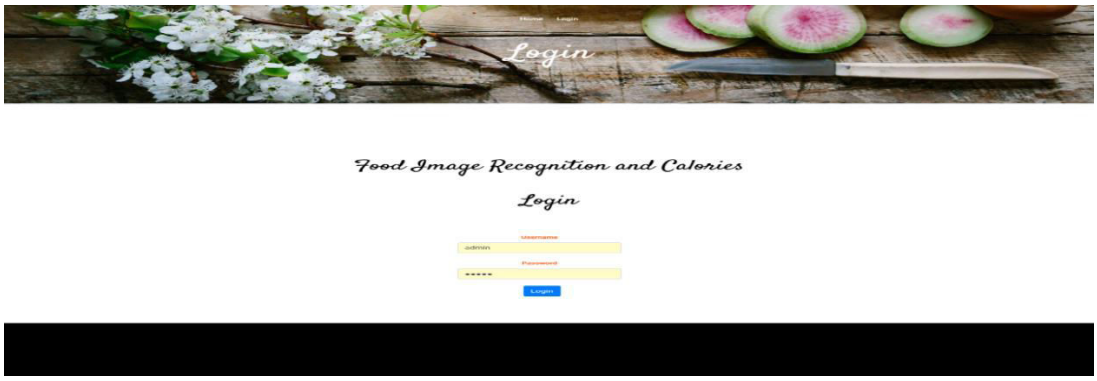

Fig 4: Login page of user

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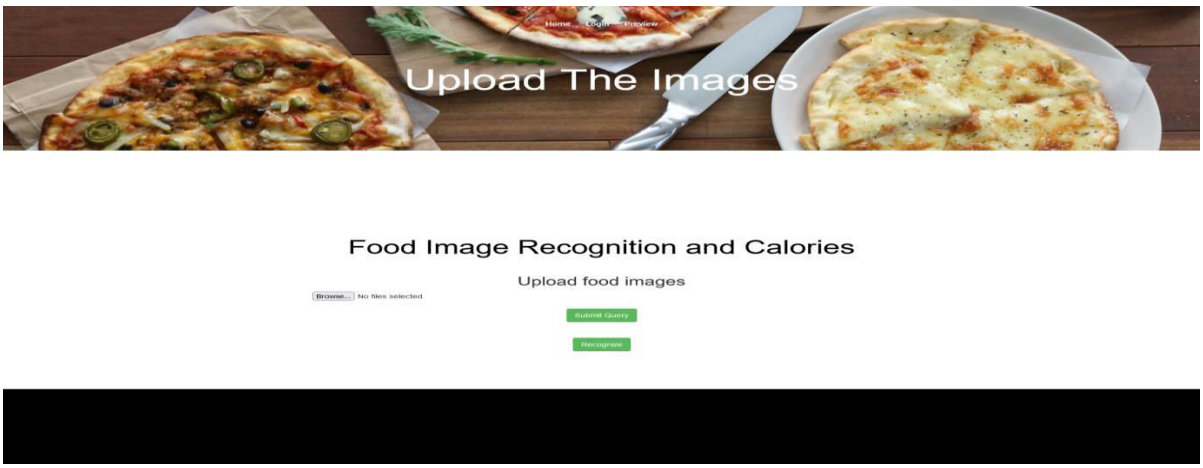

Fig 5: user's input page

Fig 6: output of the food calorie

V.Conclusion

The project, "Food Recognition and Calorie measurement," has successfully developed an advanced system that combines deep learning techniques, an extensive food dataset, and innovative features to enable accurate and comprehensive food recognition and calorie estimation. Through the implementation of a deeper and more sophisticated MobileNet architecture, the system achieves enhanced accuracy in food recognition, ensuring reliable identification of a wide variety of food items. The integration of the Food 101 dataset, consisting of 101 food classes, expands the system's recognition capabilities, enabling it to classify a diverse range of food items accurately. This comprehensive coverage supports users with different dietary preferences and requirements. Furthermore, the system incorporates real-time calorie estimation, leveraging deep

learning models and the extensive food dataset. Users can obtain immediate insights into the nutritional aspects of their diet, facilitating informed decision-making and effective monitoring of calorie intake. By providing users with accurate food recognition and real-time calorie estimation, the system promotes healthy eating habits and empowers individuals to take control of their nutrition and well-being. The project's success can be attributed to the careful implementation of deep learning methodologies, rigorous training on the Food 101 dataset, and the integration of user-friendly interfaces.

REFERENCES

1. K. Radhakrishna, D. Satyaraj, H. Kantari, V. Srividhya, R. Tharun and S. Srinivasan, "Neural Touch for Enhanced Wearable Haptics with Recurrent Neural Network and IoT-Enabled Tactile Experiences," 2024 3rd International Conference for Innovation in Technology (INOCON), Bangalore, India, 2024, pp. 1-6,
2. Karne, R. K., & Sreeja, T. K. (2023, November). Cluster based vanet communication for reliable data transmission. In AIP Conference Proceedings (Vol. 2587, No. 1). AIP Publishing.
3. Karne, R., & Sreeja, T. K. (2023). Clustering algorithms and comparisons in vehicular ad hoc networks. Mesopotamian Journal of Computer Science, 2023, 115-123.
4. Karne, R. K., & Sreeja, T. K. (2023). PMLC-Predictions of Mobility and Transmission in a Lane-Based Cluster VANET Validated on Machine Learning. International Journal on Recent and Innovation Trends in Computing and Communication, 11, 477-483.
5. Mohandas, R., Sivapriya, N., Rao, A. S., Radhakrishna, K., & Sahaai, M. B. (2023, February). Development of machine learning framework for the protection of IoT devices. In 2023 7th International Conference on Computing Methodologies and Communication (ICCMC) (pp. 1394-1398). IEEE.
6. Kumar, A. A., & Karne, R. K. (2022). IIoT-IDS network using inception CNN model. Journal of Trends in Computer Science and Smart Technology, 4(3), 126-138.
7. Karne, R., & Sreeja, T. K. (2022). Routing protocols in vehicular adhoc networks (VANETs). International Journal of Early Childhood, 14(03), 2022.
8. Karne, R. K., & Sreeja, T. K. (2022). A Novel Approach for Dynamic Stable Clustering in VANET Using Deep Learning (LSTM) Model. IJEER, 10(4), 1092-1098.
9. RadhaKrishna Karne, D. T. (2021). COINV-Chances and Obstacles Interpretation to Carry new approaches in the VANET Communications. Design Engineering, 10346-10361.
10. RadhaKrishna Karne, D. T. (2021). Review on vanet architecture and applications. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 12(4), 1745-1749.