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FOOD CALORIE ESTIMATION APPLICATION

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Abstract:
According to the World Health Organisation, a bad diet is responsible for about 20% of all fatalities globally. As of 2018, 39% of people who were 18 and above were overweight, with 13% falling into the obese category. Nearly half of the global population resides in regions where excess fatness and obesity is a leading cause of death, surpassing underweight persons. A more accurate method of calculating caloric intake and other nutritional data from food consumed by humans is sought for in this work. This research argues for the use of convolutional neural networks (CNNs) for the purpose of food calorie estimate. It takes an input picture, examines it, and then assigns it to one of many categories based on the food's nutrients and calories, all thanks to machine learning.

Keywords:
Calorie estimation for food, Convolutional Neural Network picture perception with food.

I. INTRODUCTION

More individuals are watching what they eat and how often they eat it because of the current trend towards more positive views towards food. Keeping track of your regular meals may be made easier with one of the many programmes available for smartphones. However, most of the time, assessed calorie consumption is directly tied to assessed food groups; on the other hand, the user is usually given the overall size compared to the standard size of each food group by hand. When determining calorie content, hardly no applications take serving size into account. A calorie counter app for smartphones is currently under development. There are a number of methods available for calorie calculation; however, for the sake of speed, we will be using the convolutional neural network (CNN) technique in our project. Object detection is accelerated. It simply needs one picture of a meal to identify what's inside, sort the components, and then calculate an approximate calorie count. The proposed method is easy to implement into health applications as a solution since it uses well-developed image processing methods and photos collected from mobile phones.

II. LITERATURE SURVEY

To calculate caloric intake and evaluate dietary habits in relation to health, one of the most encouraging uses of object recognition in the visual domain is food-image recognition. So far, a great deal of literature has been produced. However, the majority of studies have shown that a single food item is all that's needed for a single food photo. You won't be able to support images with two or more items, like a frieze and hamburger combination. If you want to measure the calories of all the items on one photo and have them all listed, you'll need to segment the foods. The food zone was attempted to be segmented in several works. A number of methods were proposed by Matsuda et al. for the purpose of food region detection, including (DPM), the mechanism for JSEG area segmentation, and the circles detector. With the use of Local Variance, Heet al. were able to calculate the total calories contained in a certain picture of the food section's areas. To aid with mobile food identification, certain tasks require users to arrange foods in an awkward way inside a food frame, and then utilise GrabCut to cut off specific portions of the meal. Deep Convolutional Neural Networks (DCNNs) were also shown to be very effective in the ImageNet 2012 Wide-Scale Visual Recognition Challenge (ILSVRC). When compared to teams who opted for a more conventional, handmade approach, Krizhevsky et al. came out on top in ILSVRC 2012. A dimensional picture serves as both input data for the DCNN and a probability of a class name in the DCNN approach. Eliminating local functionality, features, and learning are all necessary steps for DCNN to identify artefacts. In most cases, the main benefit of DCNN is that it can handle datasets with features that the typical hand-craft method misses. Following conventional methods for extracting local features (such as SIFT and SURF), we encode the features into a bag-of-features representation of Fisher Vector. In order to improve food image recognition reclassification

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up from 59.6% to 72.26% on UEC-FOOD 100 by substituting DCNN for Fisher Vectors and Linear SVM.

We showcase some of the most popular food estimation methods developed in the last several decades. To evaluate the caloric content of food, Miyazaki et al. [1] suggested a method based on image searches. Dietitians compiled a database of calorie counts for various foods and then used it to find photos that were similar to a certain one. They did nothing more than search for visually similar images and transfer the calorie values indicated by the comments. Consequently, the level of accuracy in the evaluation was low. An image-based method for estimating food calories was proposed by Chen et al. [2] and would include the use of RGB-D pictures captured by depth cameras. The method of identifying certain foods in order to estimate their calories proved challenging to implement on mobile phones due to the lack of a depth camera and the rarity of such devices. A smartphone app called Diet Cam has been suggested by Kong et al. [3] for the purpose of measuring meal calories from several photos. Not only that, but we have also estimated the 3D volumes of foodstuffs, performed segmentation, and identified food objects.

roughly measured amounts depending on caloric intake. According to Xu [4], all it takes to determine the food's volume is one image. For the purpose of fitting into a 3D model, any food product may be graded according to its form, which can be anything from a cylinder to a box. A simple and effective method for quantifying volumes was proposed by Pouladzadhe and colleagues [5]. It included increasing the size of the food items as measured from the top picture by their height from the side image. To get a ballpark figure for their volumes, we multiplied the volume by the value in the top picture. In contrast to their work, we think that the height of the food section should be in accordance with the sizes and categories of the food items, and that the calories should be measured directly from the approximate sizes of the food products in the top picture. Using a single-medium shot with an end-of-shoe reference object, we use personal items like credit cards or wallets, which are often worn. We prioritise smartphone use above correct calorie calculation, even if several photographs [3, 5] are suitable for assessing the quantity of food more accurately—something that may be rather concerning. Despite the fact that these project-related news announcements from over a year ago, Android, and Google Research

They have been employing programmes and data collecting that have not yet been public, but are scheduled to be reported in their article.Nutritional calculator for Android phones, Im2Calories. On the other side, Okamoto et al. [9] recommended GrillCam, which continuously records the customer's eating patterns. The gadget can detect when food is being placed in the mouth, identify the types of food, and use the live video feed to approximate volume and consumption.

III. EXISTING SYSTEM

A large number of writers worked on the present system's smartphone app that estimates meal calories. RCNN and Faster RCNN are among the algorithms they have put into practice, along with 3D models, YOLO, image-based applications, and more. Calorie counting in food photos is a vital part of providing information to guide nutrition education and practice and assisting people in striking a healthy diet balance. This task is tough for both professionals and non-experts. Our knowledge of whether calorie estimation works "in the wild" in real-world circumstances is enhanced by this investigation. Numerous uses for it range from raising the level of scientific rigour (and decreasing the

an all-encompassing topic in nutrition research, the associated load of food evaluation impacts the character of dietary behaviour modifications. A number of technological applications have been developed to assist individuals in accurately assessing various aspects of their food consumption, such as calories, energy mass, nutrient densities, and portions, by utilising machine-learning (ML) and "crowd intelligence." This has been driven by the fact that individuals do not perform regular calorie calculations. Apps in this space are notoriously unintuitive; users are often forced to keep a tedious log of their food intake or input explicit weight numbers by hand, even when machine learning is used to classify food photographs. Calorie counting from food images using crowdsourcing or ML is still mostly an unsolved research mystery.The goal of this work is to one day be able to automatically identify the calories in food images.

Disadvantages:

1) It makes use of thousands of photos sourced from different databases.
2) It takes extra time to calculate the calorie content.

IV. PROPOSED SYSTEM

We have used one of the most effective and quickest machine learning algorithms named in our suggested method to build an app that estimates the number of calories in meals.

CNN. The convolutional neural network (CNN) system quickly determines the calorie content from food images. In order to calculate the approximate number of calories in the meal the user or individual ate, it is an essential component of the app. Here, then, is an app that records the meals you've eaten throughout the day. You may use it to keep your protein, carb, and fat consumption in check.

Advantages:

1) Food pictures may be used to estimate calories using convolutional neural networks.
3) Shows the amount of food eaten on a daily and visually basis.
3) Necessitated this kind of application to assist with health care.
4) It's a simple and straightforward application.
5) This approach is useful for determining what to eat.

II. METHODOLOGY

When it comes to supervised learning and data processing, the most fundamental kind of artificial neural network is the Convolutional Neural Network (CNN), which uses the perceptron algorithm. CNNs perform a variety of cognitive tasks, including picture classification and natural language processing. A CNN image classification process begins with an input file, then processes and sorts the data according to predetermined criteria.A crucial group for

The convolutional neural network is very good at object detection, picture classification, and object identification.

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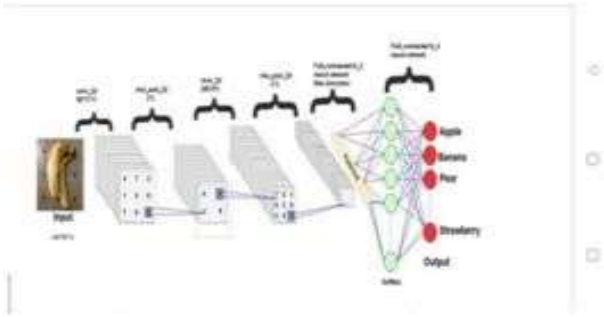

Fig:CNN Architecture

A) Calorie Estimation based on Deep Learning:

Images are required for the calorie estimate technique, and the object has to be calibrated for each photo. Therefore, in order to identify and estimate the food image, we opted for the CNN method.

B) Food Calorie Estimation:

We need a method to quantify calories or to estimate the size of food in the actual world so that we may manufacture foods of varying depths. The next step is to designate food products with their masks; for this, we need the exact sizes of the objects. Use of multiple-view photos allowed food calorie estimate to do food shape reconstruction, which in turn allowed for calorie measurement. Where v(cm3) stands for the existing meal volume and the density value of

C) v(g / cm3) is expressed.

$$m=p*v$$

You can then get the calorie content of the dish by

$$C =c*m$$

Where m(g) is massofthe existing food and c(Kcal / g) is calories per gram.

BMI Calculator:

A person's Body Mass Index (BMI) is a ratio of their weight to their height. BMI is a simple way to measure how much fat a person has.This is often the case when people's Body Mass Indexes are more than 30 (kg/m2). A high body mass index (BMI) may raise the risk of illnesses including heart disease. Calorie intake (consumption) minus energy expenditure (expenditure) is the main cause of obesity. Because of issues like not being able to record and manage their food intake or just not knowing enough about healthy eating, patients also struggle to control the amount of calories they consume the Outcomes Information repository: The contributors of this project painstakingly clicked images of food items to create our dataset. You may find XML files of food items in the collection. To get the exact location of the food item in a given picture, one uses an XML file. Various food products are often shown in the collection. Donuts, bread, bananas, apples, lichi, lemons, kiwis, oranges, and eggs are all part of this category. In order to train the pictures, the dataset is used. Each food item contains thousands of photos in the collection.The images in our dataset
at each meal, whether it's just one or a variety of dishes.

TableNo:1Nutritionalvaluesoffoodper 100 grams

S.No	Item	Calories	Protein (grams)	Carbohydrates(grams)	Fats(grams)
1	Apple	47.5	0.2	12.5	0.2
2	Banana	98	1.1	24	0.3
3	Kiwi	79	1.2	17	0.5
4	Orange	54	0.98	13	0
5	Water melon	39	0.5	8	0
6	Pomegranate	87	1.2	18.5	0.9
7	Guava	68	2.9	18	1
8	Grapes	71.2	0.6	18.5	0.1
9	Mango	96	0.8	16	0.4
10	Papaya	49	0.3	9	0.1

TableNo:2Nutritionalvaluesoffoodper 100 grams

S.No	**Item**	**Calories**	**Protein (grams)**	**Carbohydrates(grams)**	**Fats(grams)**
1	Beans	42	2.	8.6	0.2
2	Carrot	33	0.8	7.9	0.3
3	Cucumber	15	0.7	3.6	0.1
4	Tomato	21	0.9	4.5	0.2
5	Eggs	156	12.6	1.1	10.6
6	Onion	43	1.6	9.7	0.3
7	Bellpeppers	29	0.9	7.1	0.1
8	Wheat Bread	298	11.9	47	3.3
9	Tomato Sauce	27	1.3	6.4	0.3
10	Cheese	431	24	3.3	36.8

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TableNo:3Nutritionalvaluesoffoodper 100 grams

S.No	Item	Calories	Protein(grams)	Carbohydrates(grams)	Fats(grams)
1	Ariselu	1320	2.3	5.2	46
2	Laddu	1260	2.4	5.8	49
3	MotiChur Laddu	1400	2.9	6.1	57
4	Badusha	1568	2.6	5.4	56
5	Kaja	1490	2.4	5.9	58
6	Kalakand	684	1.9	4.6	35
7	Milkcake	420	2.8	4.8	26
8	Mysore Pak	519	2.3	5.3	36
9	Peda	496	1.4	4.9	28
10	Jangiri	1600	2.3	5.8	57

The data collected during the project's execution will be carefully examined. Some food photos or products need to be added to the calorie counter. After that, it will ask for personal details (name, age, gender, blood type, height, weight, etc.) in order to register and determine the calorie content of the meal, providing data on a daily basis. Then, it uses the BMI calculator to determine the food's calorie content. In this study, we also incorporated deep neural networks with graph cut segmentation. We can improve the accuracy of food categorization and identification by combining these two methods. Standard deviation, average, or mean (an approximation of the "real" measurement value), (average measurement variance estimated) and standard error (data "spread" measured) are crucial statistical metrics. Food group estimate and food calorie estimation were two areas where CNN outperformed single-task CNNs.

III. CONCLUSION

In this article, we presented a mobile app that can estimate the number of calories in a customer's meal without the need for third-party recognition servers. Just snap a picture of your meal or upload an image of the food item with a pre-registered reference object, and the computer will automatically calculate the calorie content. To identify every food item, we used a convolutional neural network (CNN) system that can identify food photos in under 0.2 seconds.Any user who is concerned about their nutrition and wants to keep track of what they eat, how much more they should eat, etc., may use this app.

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