Calorie Intake Tracker

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***Abstract*: The calorie intake tracking is used for getting accurate calorie information from food image and adding the no.of calories captured to the progress bar if the user exceeds the no. of calorie target which was previously given by him then he/she need to be warned. The objective of this work is to develop a model which can predict the calories from the food image taken by the user and add the calories to the daily progress bar. This work can be done using a Convolution Neural Networks model using a dataset with cross-validation technique to identify food items from image. With this model, we overcome the problems of over-eating, obesity etc. The calorie intake tracking is important as it helps user to be conscious of what they are consuming**

***Keywords*: CNN ML Algorithm, Android, TensorFlow, TensorFlowLite.**

1. Introduction

Recent studies have shown that overweight people are overweight they may have serious conditions such as high blood pressure hypertension, heart attack, second-degree polygenic, high steroid alcohol, and respiratory problems.. Therefore to lose weight in a very healthy way, you continue to maintain healthy weight of traditional people, daily diet food should be weighed. With this page, we have the tendency to propose the app to live calories and nutrients to use a Smartphone or other mobile device fitted with a camera and captures a photo of before and after feeding to sustain life calorie consumption of food and nutrient components. Therefore, in order to lose weight in a very healthy way, in terms of indigenous peoples who should take care of the healthy weight daily diet should be weighed . Excessive treatment requires the patient to be aware of it the amount of daily food, but in most cases, it is not easy for patients to survive or manage their own daily diet due to food insecurity, education or self-control.

2. Proposed System Our proposed approach works as follows. User submits a photo of the food item to the system. Based on visual features of the image and in a monitored way , our app is able to predict what kind of food is this. Predicts the size of food item and based on these predictions' values and actual features of the image, we predict the number of calories in the food item. At that point picture will be resized in suitable arrangement then it will be transferred on which a calculation is carried out utilizing Convolutional Neural Network Each Convolutional Neural Network engineering is isolated into two sections initially is include extraction and second is grouping and has four primary segments.

1. Convolutional activity.

2. Max-pooling (Down examining)

3. ReLu (Non Linear Function)

4. Dropout

When picture is reached to app accurately estimate the value calories in a given food item depending on the image only. While there have been some previous attempts to predict the amount of calories in a food item given its image, according to our knowledge, this is not the same as previous attempts. In every Layer image is very well may be passed to completely associated layer for example classifier after each layer we apply ReLu for example non linearity so tackle complex issue like order. After this the machine learning code is converted in tflite file which is kept in the asserts folder in android studio and a text file is created . The Image which is captured by the user is taken in the form of bitmap and it is compared with the images in tflite file and the result is computed accordingly .The proposed model was evaluated based on Food, which achieved around 95% accuracy.
This ML model consists of three major parts : Building and creating a machine learning model using TensorFlow with tflearn Deploying the model to an Android application using TFLite.
The references are mentioned at the end of the paper.

3. Methodology

A.. System Architecture

This part portrays the means associated with making and conveying the classifier. Arrangement by CNN is partitioned into three stages that tackle separate undertakings. They are convolutional layers, pooling layers, and activation function Layers, ordinarily Rectified Linear Units (ReLUs). The number of layers utilized, their plan, and the presentation of other handling units differ starting with one design then onto the next, deciding their particularity.

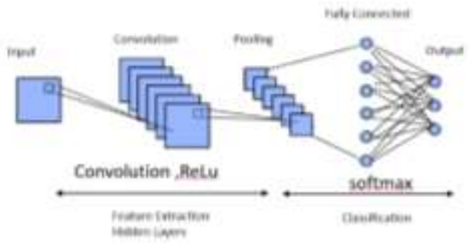

Fig. 1: CNN architecture

Below are the layers used in CNN along with activation functions like Softmax, ReLU. Each Convolution Layer is followed by a Max-Pooling Layer with different number of features . It also contains a Fully Connected Layer and a Dropout Layer.The hidden Layers use ReLu as Activation function and the output Layer uses Softmax function. After classifying using CNN the food object the system then calculates the total amount of food portion on the plate in order to estimate the calorie value. The constraint here is that the calorie estimation is calculated based on the food image captured by the user

conv2d (Conv2D)
max_pooling2d (MaxPooling2D)
conv2d_1 (Conv2D)
max_pooling2d_1 (MaxPooling2D)
conv2d_2 (Conv2D)
max_pooling2d_2 (MaxPooling2D)
conv2d_3 (Conv2D)
max_pooling2d_3 (MaxPooling2D)
conv2d_4 (Conv2D)
max_pooling2d_4 (MaxPooling2D)
FullyConnected
Dropout

Fig 2: layers of CNN

b. Dataset

Food dataset has 13,500 food pictures of 15 different types of food classes. This dataset food images with noise in background and each picture contains just one food item. It likewise accompanies preset preparing/testing subsets which we continue in this investigation. We use this dataset in two distinct manners, first to train and then to test the training and testing datasets are split into 70% and 30% respectively i.e; 9,450 samples for training and 4050 sample images for testing class. For each food there are nearly 800 samples and a total of 1.3GB Dataset as a whole. We gathered from all accessible food items from kaggle. Once the model file is generated from the training, we load it into the application and test it against the images captured and submitted by the user. The system then performs the image recognition process and generates a list of probabilities against the label name. The label with the highest probability is prompted to the user in the dialog box, to confirm the object name. Once the object name is confirmed, the system performs the calorie computation part by calculating the size of the food item with respect to the finger in the frame. It finally prints the output to the user with the required calorie. We trained the system using the deep neural network model by 15 categories with various classes of food samples.

S.No	Food Item	Calories
1	Apple	95
2	Orange	45
3	Banana	105
4	Grape	62
5	Hamburger	354
6	Doughnut	195
7	Hot dog	151
8	Sandwich	340

Fig 3 : Dataset of Food items

C.MACHINE LEARNING 1) Stage one:-

Stage one means to explore the impact that picture size has on model execution. Altogether, five pictures estimated are tried going from 150 x 150 to 400 x 400. As a default of move learning, all layers with the besides of the last two layers are frozen. These contain new loads and are explicit to the plant illness characterization task. Freezing permits these layers to be illness independently prepared, without back-propagating the inclinations. In precisely thusly, the 1cycle approach is utilized to prepare the last layers. With this total, the leftover layers are delivered. To help the calibrating interaction, a plot showing learning rate versus misfortune is produced and investigated. From this, appropriate learning is chosen, and the model is run. With results recorded, the model is re-made to the extra four picture sizes.

2) Phase two:-

Utilizing the most appropriate picture size, the Cnn model is advanced. To additionally improve the model's exhibition, extra expansion settings are added. Then, the last two layers are disengaged and prepared at the default learning rate. With this total, tweaking is performed, running numerous preliminaries to test a progression of learning rates and a number of epochs.

The convolutional layer is the fundamental structure square of the convolutional neural organization. The layer's boundaries are included a bunch of learnable pieces which have a little responsive field yet reach out through the full profundity of the information volume.

Each convolutional layer has M maps of equivalent size, Mx and My , and a piece of size kx, and ky is moved over the specific district of the info picture. The skipping factors Sx and Sy characterize the number of pixels the channel/portion avoids in x- and y- heading between ensuing convolutions. The size of the
yield guide could be characterized as

$$M_x^n = \frac{M_x^{n-1} - K_x^n}{S_x^n + 1} + 1,$$

$$M_y^n = \frac{M_y^{n-1} - K_y^n}{S_y^n + 1} + 1,$$

where n demonstrates the layer. Each map in layer Ln is associated with most maps Mn-1 in layer. Corrected Linear Units (ReLU) are utilized as an alternative for soaking nonlinearities. This enactment work adaptively learns the boundaries of rectifiers and improves precision at the insignificant extra computational expense. It is
characterized as

$$f(x) = \begin{cases} 0 & x < 0 \\ x & x >= 0 \end{cases}$$

ReLU Function

$$F(z_i) = \max(0, z_i),$$

where zi addresses the contribution of the nonlinear initiation function f on the ith channel. Profound CNN with ReLUs trains a few times quicker. This technique is applied to the yield of each convolutional and completely associated layer. Regardless of the yield, the info standardization isn't needed; it is applied after ReLU nonlinearity after the first and second convolutional layer since it decreases top-1 and top-5 mistake rates. In CNN, neurons inside a secret layer are divided into "include maps." The neurons inside a component map share a similar weight and predisposition. The neurons inside the element map look for a similar component. These neurons are extraordinary since they are associated with various neurons in the lower layer. So for the primary secret layer, neurons inside a component guide will be associated with various districts of the information picture. The secret layer is sectioned into highlight maps where every neuron in an element map searches for a similar component yet at various places of the information picture. Essentially, the component map is the consequence of applying convolution across a picture. Each layer's highlights are shown in an alternate square, where perception addresses the most grounded initiation for the gave include map, beginning from the first convolutional layer, where highlights go from singular pixels to straight lines, to the fifth convolutional layer where learned highlights like shapes and certain pieces of leaves are shown.

The development of CNNs allude to their capacity to learn rich mid-level picture portrayals instead of hand-planned low-level highlights utilized in other picture grouping strategies

Figure 4 shows detection of food image in each step. First input image is processed and converted to black and white image then its shape is predicted using skull strip algorithm od edge detection.

Fig. 4. Output Layers

D Performed tests: -

The basic methodology in estimating the execution of artificial neural organizations is parting information into the preparation set and the test set and afterward preparing a neural network on the training set and utilizing the test set for prediction. Accordingly, since the first results for the testing set and our model anticipated results are known, the exactness of our expectations can be determined.

4. Results and Discussions

The cnn architecture pictures the hidden layer output for each layer and its generated intermediate outputs are yields are summarized. In our trained model, a portion of the intermediate outputs in the shallow layers (Conv1, Conv5) feature the yellow and earthy colored injuries that are evident inside the picture . Be that as it may, in the more profound layer , attributable to the convolution and pooling layers, the picture size is too little to even think about interpretting whether such removed highlights have been held. Additionally, the worldwide normal pooling layer changes pictures over to a component vector that disposes of the spatial data, making it profoundly hard to see how the highlights are taken care of in continuing layers. It is hard to recognize whether the extricated includes decidedly add to the grouping of the info picture to the right infection class or are utilized for motivation to deny different potential outcomes Hence, understanding what the CNN has realized by just investigating the halfway yield is lacking.

Fig. 7. Main Page

After opening the application, the above page is displayed. There we can see two fields one is for target calories and the other is submit button. The users can select their target once in a day.

Fig 8: Home Page

Whenever user sets target, he enters into home page of application. User can select the camera option and scan food items and click ok. It will return to thus page and calories are predicted. Progress bar is there to check progress of calories. After reaching target calories progress bar is changed to red color indication calories are exceeded.

Fig. 9. Food Detection

User can scan the food items it detects multiple foods in single as shown in fig 9. Food image with name is given after detecting food item .User can also get a message as food detected .

Fig. 10. History

The application has a feature which saves the user past activity so that he can view it whenever needed. So that it can save his time.

5. Conclusion

- People across the universe are becoming more attentive towards their health. They are adopting various ways to keep themselves fit. One the way is to measure the calorie in the meal. A system is proposed which uses segmentation and classification using Deep learning to measure the calorie level in the meal. Our system is designed to aid dieticians for the treatment of obese or overweight people, although normal people can also benefit from our system by controlling more closely their daily eating without worrying about overeating and weight gain . System is cost effective and simple. Practical results of the system might boast the research in the field of food processing.

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