Ideation Phase

Literature Survey on the given project and information gathering

Date	08 November 2022
Team ID	PNT2022TMID12370
Project Name	AI-Powered Nutrition Analyzer For Fitness Enthusiasts

Abstract:

Lifestyle has a significant impact on physical health, with eating habits playing a major role. According to the statement from World Health Organization (WHO) obesity and overweight are defined as abnormal or excessive fat accumulation that presents a risk to health. It claims that fundamental cause of such issues is an energy imbalance between calories consumed and expended. Hence a solution is proposed in identifying the type of fruits correctly and also display its nutrition facts.

Problem Statement:

- To identify the type of fruit correctly irrespective of its resolution.
- To provide nutrition facts of the identified fruit.

Problem Description:

The main aim of the project is to building a model which is used for classifying the fruit depends on the different characteristics like colour, shape, texture etc. Here the user can capture the images of different fruits and then the image will be sent the trained model. The model analyses the image and detect the nutrition based on the fruits like (Sugar, Fibre, Protein, Calories, etc.).

Technologies Used:

- Python
- CNN
- IBM Cloud
- IBM Cloudant DB
- Deep Learning
- Python
- Flask

PROJECT FLOW:

- The user interacts with the User Interface and uploads an image of a fruit as an input.
- The input image is passed to flask application and it is classified based on its colour, shape, texture.
- Finally, the type of fruit is identified with the help of the model and along with the type of fruit its nutritional facts are also displayed in the user interface which is in the form of a HTML page.

PROJECT ARCHITECTURE:
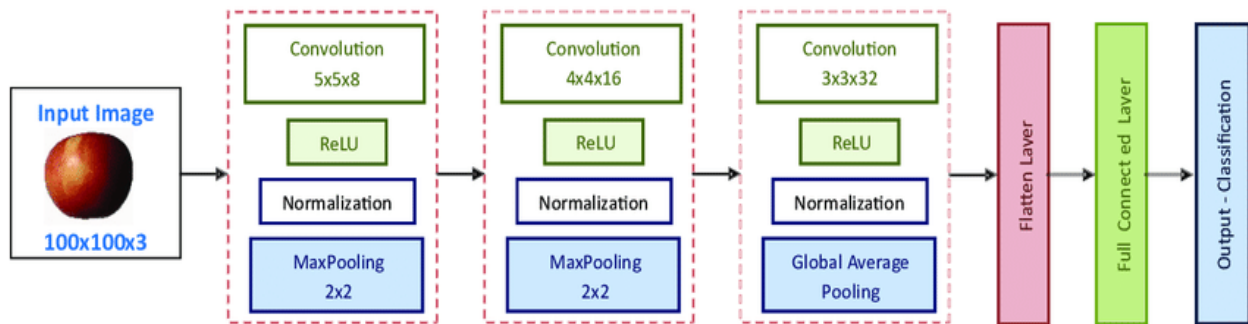
LITERATURE SURVEY:

1. **Title:** DeepFood: Food Image Analysis and Dietary Assessment via Deep Model

   Authors: Landu Jiang, Xue Liu, Chenxi Huang, Kunhui Lin

   Published In: IEEE Access (Volume: 7)

   Date of Publication: 13 February 2020

   Link: https://ieeexplore.ieee.org/document/8998172/authors#authors

   Problem Statement:

   To analyse the nutritional ingredients based on the recognized results and generate a dietary assessment report by calculating the amount of calories, fat, carbohydrate and protein.

   Proposed Solution:

   A three-step algorithm to recognize multi-item (food) images by detecting candidate regions and using deep convolutional neural network (CNN) for object

classification. The system first generates multiple regions of proposal on input images by applying the Region Proposal Network (RPN) derived from Faster R-CNN model. It then identifies each region of proposals by mapping them into feature maps, and classifies them into different food categories, as well as locating them in the original images. Finally, the system will analyse the nutritional ingredients based on the recognition results and generate a dietary assessment report by calculating the amount of calorie, fat, carbohydrate and protein.

Challenges Addressed:

- The first challenge in this project is to recognize multiple food items from a single image.
- The second challenge in this project is to reduce the processing time for food detection and classification
- The third challenge in this project is to identify a large number of food class and accurately analyse nutrition contents

Limitation:

The limitation of computing resource results in low MAP in these experiments

Result:

Results show that the proposed solution achieved comparable performance and has great potential to promote healthy dietary and feasible advice.

2. **Title:** Food Calorie and Nutrition Analysis System based on Mask R-CNN

Author: Meng-Lin Chiang; Chia-An Wu; Jian-Kai Feng; Chiung-Yao Fang; Sei-Wang Chen

Publisher: IEEE

Published on: 13 April 2020

Link: https://ieeexplore.ieee.org/document/9064257/figures#figures

Problem Statement:

Over the past few decades, obesity has become a serious problem. Obesity is associated with many of the leading causes of death, such as chronic diseases including diabetes, heart disease, stroke, and cancer. The most effective way to prevent obesity is

through food intake control, which involves understanding food ingestion, including the nutrients and calories of each meal. To assist with this issue, this study develops a food calorie and nutrition system that can analyse the composition of a food based on a provided image.

Proposed Solution:

The proposed system aims to help users manage their diet through food recognition and calorie nutrient analysis. This study uses food images as input to the system, based on Mask R-CNN to detect and recognize food class and food masks. The proportion of food in the image is obtained through the food mask, and the weight of the food is estimated by linear regression. The combination of food calories and estimated weights allows the system to ultimately label food calories and nutrients.

Result:

This study proposes the Ville Cafe dataset, which is divided into 16 food classes with 35,842 images and 9,776 food items. The Ville Cafe dataset collected five Western style brunch restaurants with different food items, and most food images contain a variety of food. The accuracy of the combination of the Ville Cafe dataset and the Food-256 Dataset is 99.86% and IoU is 97.17%.

3. **Title:** A Framework to Estimate the Nutritional Value of Food in Real Time Using Deep Learning Techniques

    Author: Raza Yunus, Omar Arif, Hammad Afzal, Muhammad Faisal Amjad, Haider Abbas

    Published in: IEEE Access (Volume: 7)

    Published on: 27 December 2018

    Link: https://ieeexplore.ieee.org/document/8590712

    Problem Statement:

    To develop a mobile application that can record real time images of meal and analyse it for nutritional content, so that people can improve their dietary habits and lead a healthy life.

Proposed Solution:

The proposed system consists of two components. The first component uses CNNs to recognize the food item in an image. The second component estimates food attributes using text retrieval from internet archives as well as scrapping of data from nutritional and recipe websites for ingredients and nutrient counts.

Result:

This paper presents a system that exploits the extensive use of mobile devices to provide health information about the food we eat. The mobile-based app takes the image of the meal and presents approximate ingredients and nutritional values in food. The results are improved via data augmentation, multi-crop evaluation, regularization and other similar techniques. 85% accuracy is achieved.

REFERENCES:

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[4] M. Puri, Z. Zhu, Q. Yu, A. Divakaran, and H. Sawhney, ''Recognition and volume estimation, of food intake using a mobile device,'' in Proc. Workshop Appl. Comput. Vis. (WACV), 2009, pp. 1–8

[5] H. Hassannejad, G. Matrella, P. Ciampolini, I. De Munari, M. Mordonini, and S. Cagnoni, ''Food image recognition using very deep convolutional networks,'' in Proc. 2nd Int. Workshop Multimedia Assist. Dietary Man   age., 2016, pp. 41–49.