ABSTRACT

Nowadays, people are more concerned about their health due to COVID-19. Number of diseases are increasing day-by-day such as heart diseases, high blood pressure, diabetes, etc. These diseases are increasing due to over consumption of oily food, high sugary contents, junk food and many more which leads to obesity.Even COVID-19 has proved the importance of intake of sufficient nutrients to build a strong immune system.So, in order to keep a track of intake of necessary nutrients and to avoid over consumption of fatty and high cholesterolic foods , we are proposing this system . It is not just for the fatty people or the people who are suffering from any disease but can also work for the persons who want to gain weight. In this paper, we proposed an image based calorie estimationsystem which can run on desktop system without any use of external servers. The proposed system consists of various steps such as food classification, detection, segmentation and calorie calculation

OBJECTIVES

The objective of this project is to develop an accurate and efficient deep learning-based computer vision system for calorie estimation.

The system will leverage the power of deep learning algorithms to analyze food images and accurately estimate the calorie content of various food items.

To detect food type by using CV ZONE which uses Convolutional Neural Network (CNN)

Proposed AI&ML based calorie estimation app which will detect food item from image and gives approximate calories present in that item.

EXISTING SYSTEM

FoodAI employs convolutional neural networks (CNNs) trained on large datasets of food images to recognize the type and composition of the food in the input image. The CNN model consists of multiple layers that extract high-level features from the image, enabling accurate food identification.

FoodAI offers a user-friendly interface, such as a mobile application or a web-based platform, where users can upload food images, view the recognized food items, and access the predicted calorie information.

The FoodAI system can acquire food images from various sources, including user-submitted photos, restaurant menus, or food databases.

DISADVANTAGES OF EXISTING SYSTEM

One of the major drawbacks of the existing system is its limited accuracy. While it can recognize some common foods accurately, it often struggles with complex or unconventional dishes.

This can lead to inaccurate predictions of calorie content, posing a problem for individuals who rely on such information

Estimating the portion size of a food item based on an image is a challenging task for the existing system. It may struggle to accurately assess the actual quantity of food present in an image, which can significantly impact the calorie prediction. This limitation makes it difficult for users to rely on the system for precise nutritional information.

PROPOSED SYSTEM

The proposed system aims to address the challenges associated with manual calorie estimation by developing an automated approach using deep learning and computer vision. By leveraging the power of these technologies, the system will provide users with a more accurate and efficient method for estimating calorie intake based on food object.

ARCHITECTURE

- SCAN THE OBJECT OF FOOD ITEM
- DETECTION OF FOOD ITEMS
- SEGMENTATION OF FOOD ITEMS AND PREREGISTERED REFERENCE OBJECT
- CALCULATE FOOD CALORIE FROM THEIR SIZE
- DISPLAY CALORIES CALCULATED

MODULES

- Object Detection
- Food Segmentation
- Portion Estimation
- Calorie Estimation

OBJECT DETECTION

The object detection module utilizes deep learning algorithms, such as convolutional neural networks (CNNs), to identify and locate food items within the input images. It detects the presence of different food objects and extracts their bounding boxes. This module is trained on large-scale datasets containing various food categories to accurately detect and classify food items.

FOOD SEGMENTATION

The food segmentation module focuses on segmenting the detected food objects from the background and other non-food elements in the image. It uses semantic segmentation techniques, such as fully convolutional networks (FCNs) or U-Net architectures, to create pixel-level masks that outline the boundaries of the food items. This step is crucial for isolating the food regions and excluding irrelevant information

PORTION ESTIMATION

The portion estimation module is responsible for estimating the portion size or quantity of each recognized food item. It leverages techniques such as geometric analysis, statistical models, or reference-based comparisons to estimate the volume or weight of the food. This module takes into account factors like the size of the food object in the image and compares it with reference objects of known sizes.

CALORIE ESTIMATION

The final module in the system is the calorie estimation module. It takes the recognized food items and their estimated portions as inputs and utilizes a calorie database or a mathematical model to assign caloric values to each food item. This module considers factors such as the nutrient composition of the food, the portion size, and cooking methods to estimate the calorie content accurately.

Objective

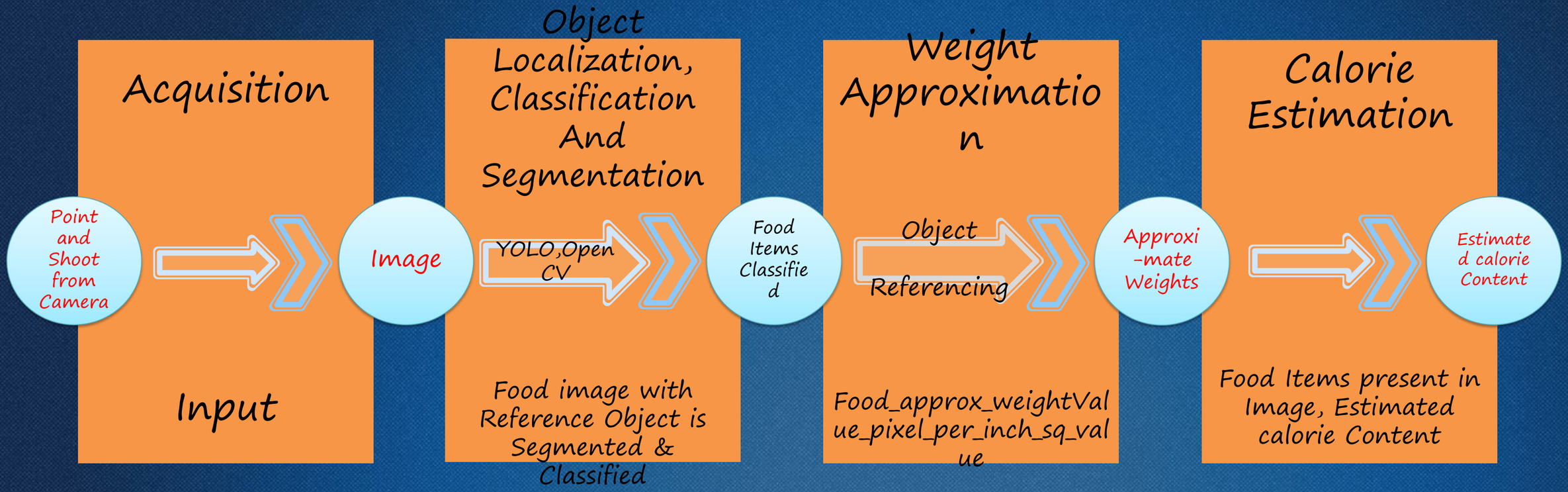
1. To detect food type by using CV ZONE which uses Convolutional Neural Network (CNN)
2. Proposed AI&ML based calorie estimation app which will detect food item from image and gives approximate calories present in that item.

SYSTEM REQUIRMENTS

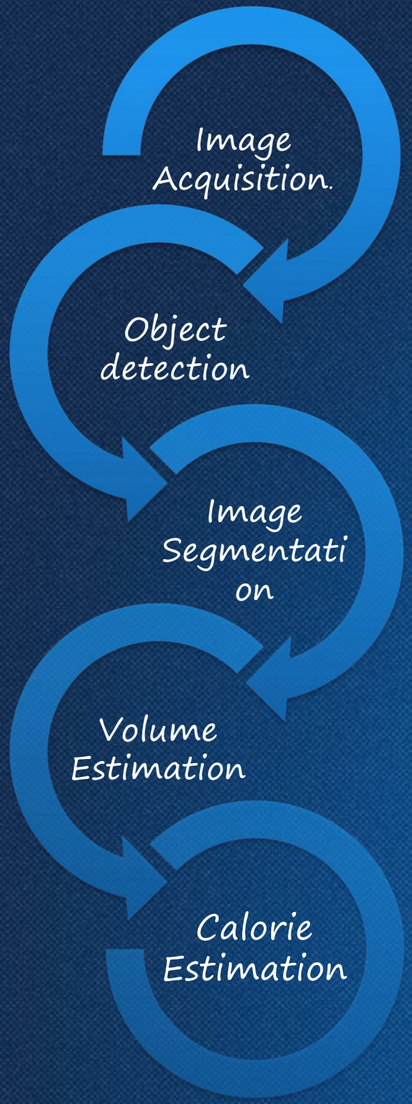
- 3.6.2Software Requirements
- 1.Operating System: Microsoft Windows 7 and Above
- 2.Programming Language: Python
- 3.IDE: Python IDLE
- 4.Platform : Jupyter notebook

- 3.6.3Hardware Requirements
- 1.Processor: Intel Core I3 or Higher
- 2.RAM: 4 GB or Higher

Block Diagram



ALGORITHM FLOWCHART



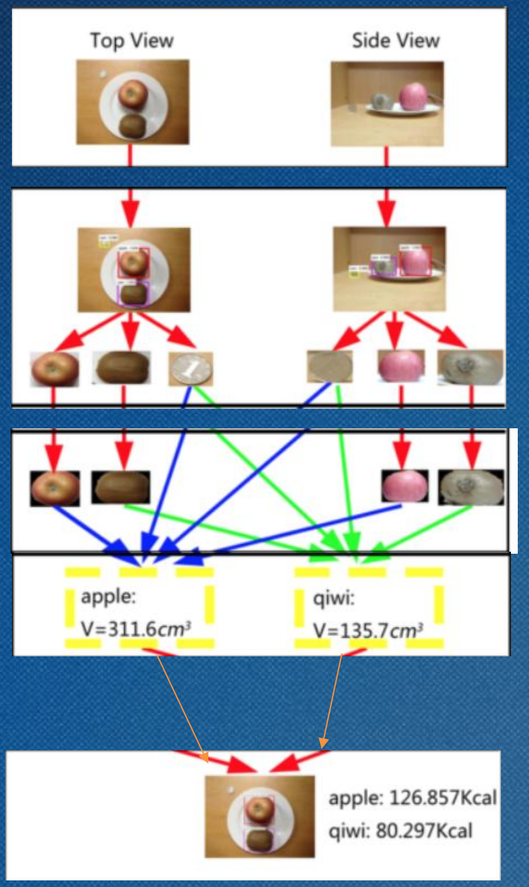
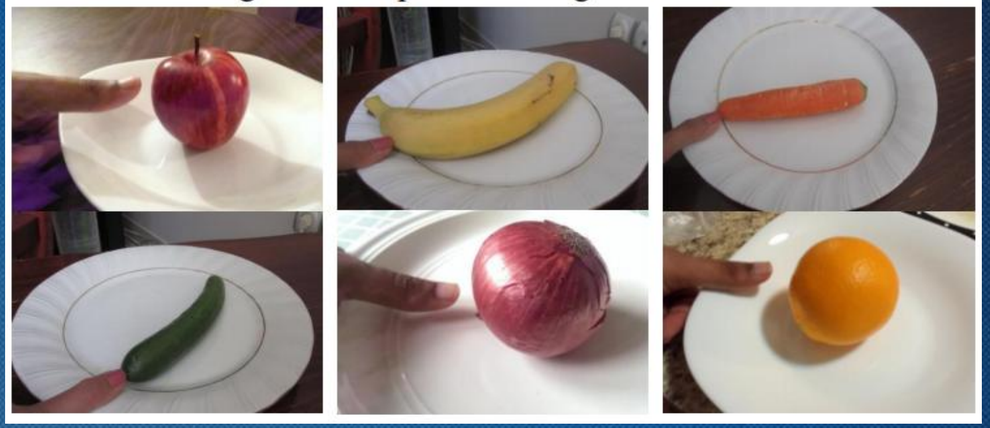


Figure 1 Sample food images in dataset



ALGORITHM FLOW

Algorithms Process Flow for every 1 Complete Cycle

Deep Learning

For **Detection & Classification**:

We are using YOLO (You Only Look Once) Algorithm which contains many CNN based layers.

Computer Vision

There are few techniques In **OpenCV** used for **Segmentation**:

Thresholding ,Contours finding, and some image pre processing filters

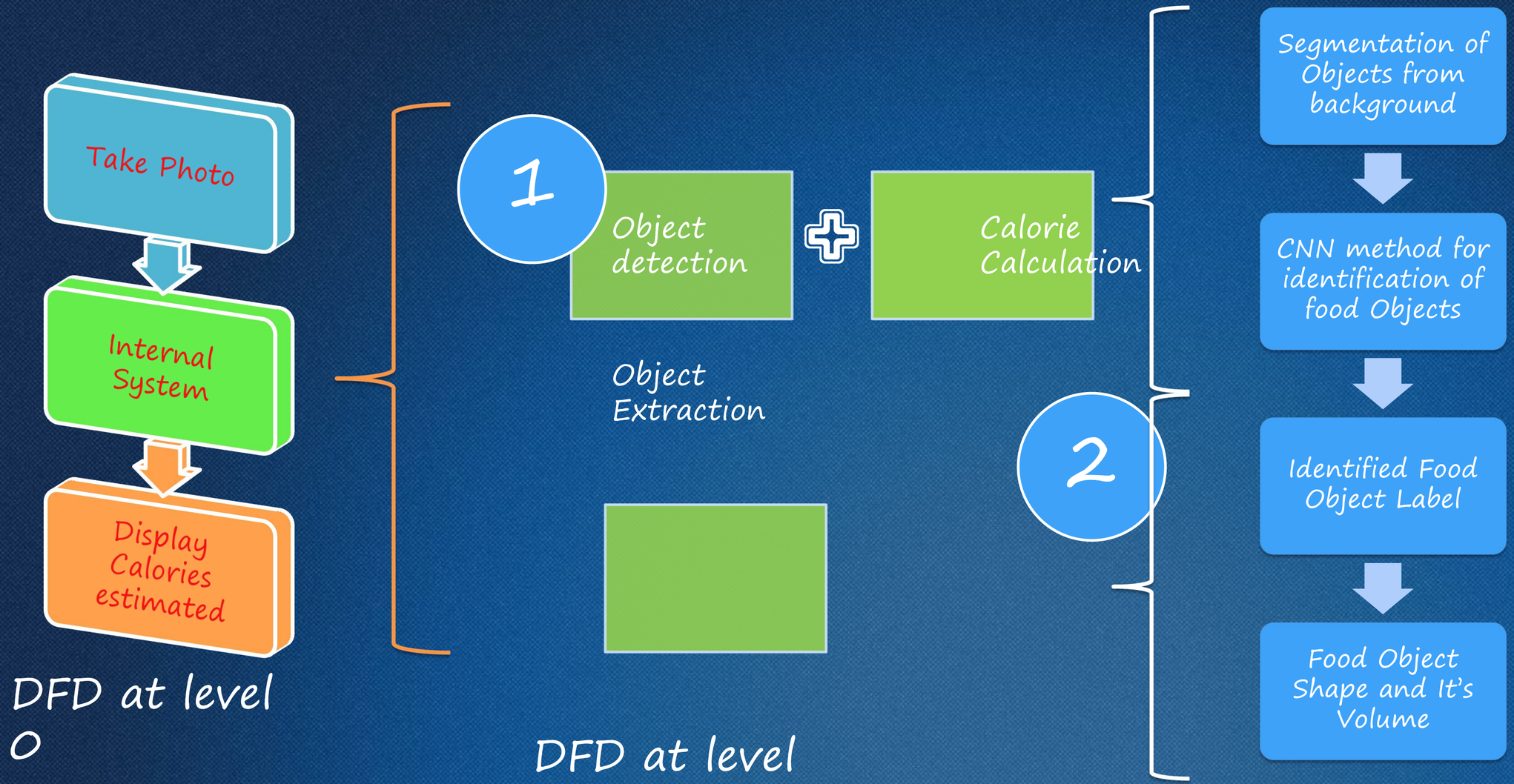
Display The Calories

Display the Approximate Amount Of Calories Of That Food Object Predicted By Our System. If Required Run The System Again For New Calculations

Calculation :

Now Our Model Have Pre-defined Referance Object Area, Food Area and required values that will help for Calculating Calories.

UML-DFD level Diagram

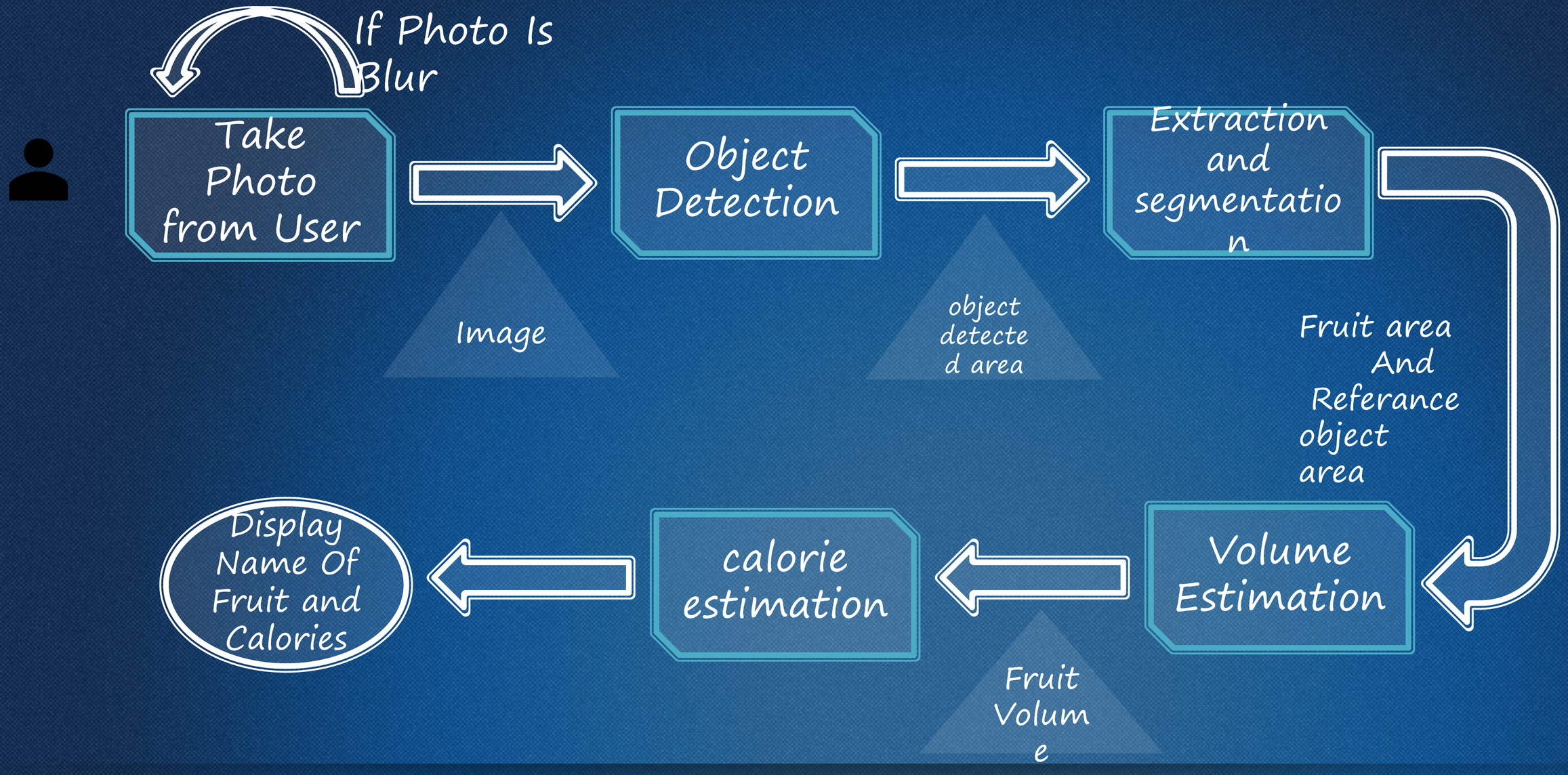


DFD at level 0

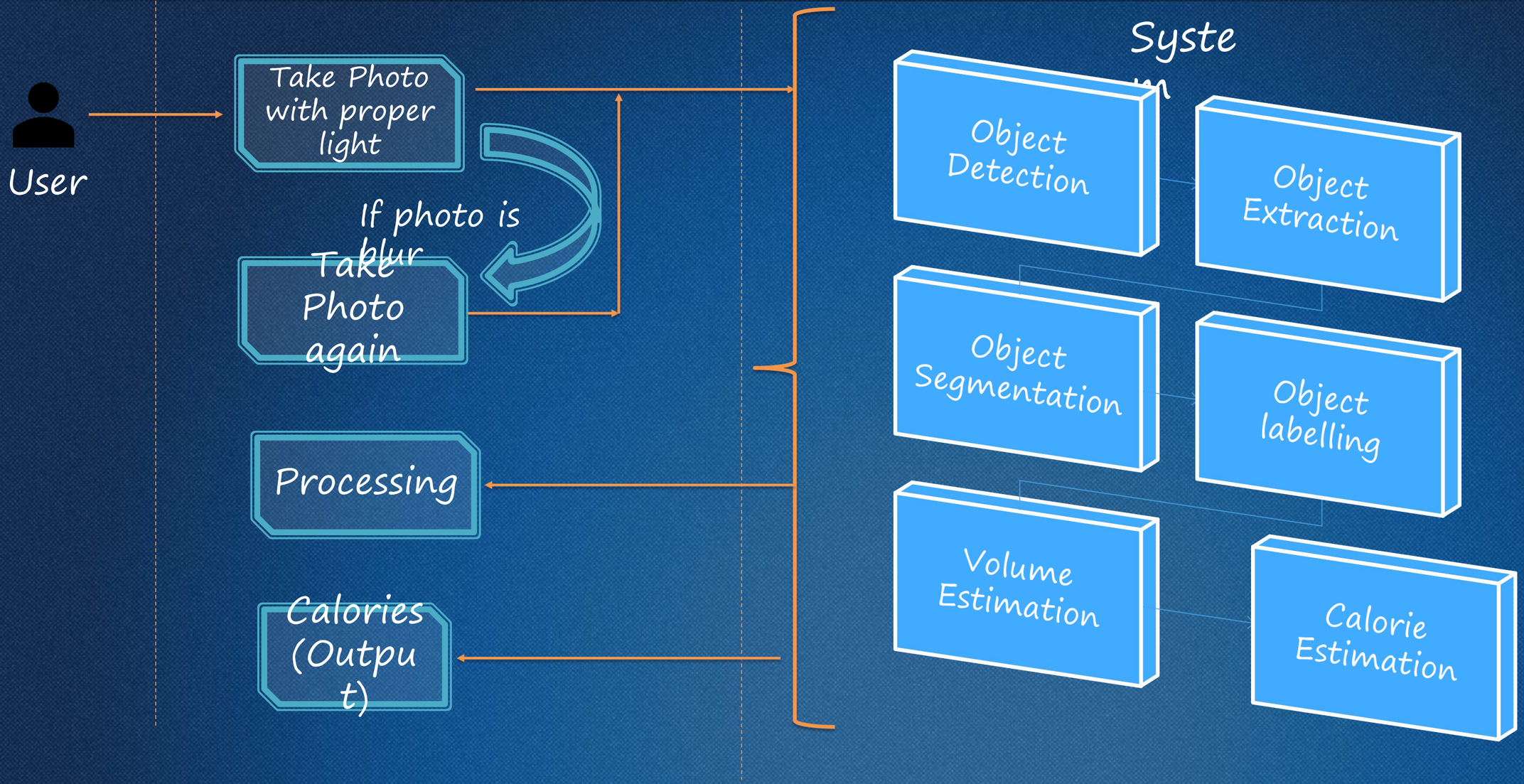
DFD at level 1

DFD at level 2

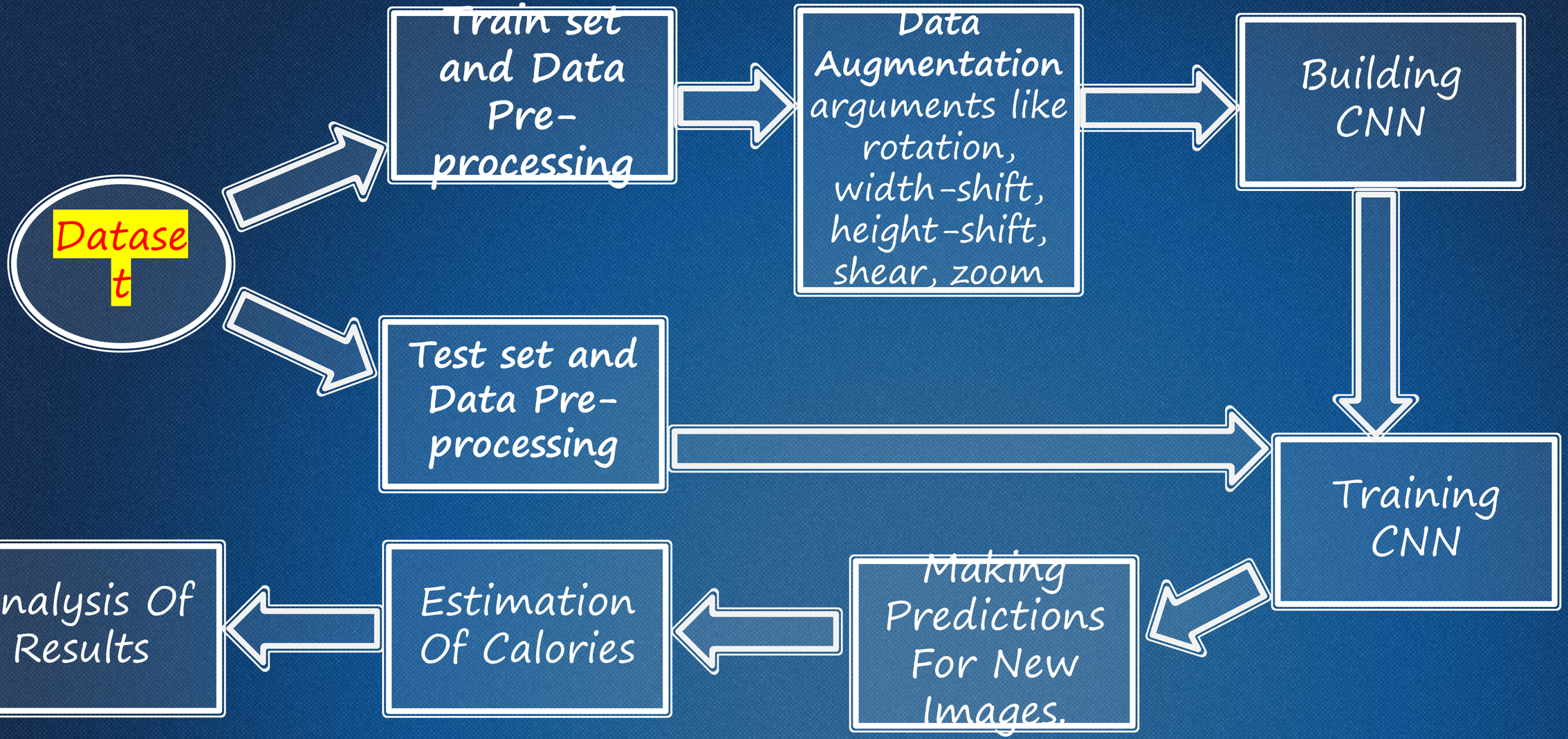
Collaboration Diagram



Sequence Diagram



Class diagrams



Advantages

1. Classification Of Food Objects has become easy now .
2. We can Estimate the Approximate Calories of food even without knowing Actual weight of Food objects.
3. We can meet with out results only using Image as Inputs.
4. We can do both ways we can deploy this system with help of servers or we can use it offline .
5. We now can use more feasible reference object for our system .

Disadvantages

1. If the Input (Image of Food) is taken in Improper ways it directaly affects on Accuracy of Prediction .

2. Currently Proposed system can only work on fruits .

3. Current Proposed System can only estimate the calories of 1 Food object at a time

Conclusion & Future Work

❖ **Conclusion:**

➢ We are Proposing an image based calorie estimation system which will run without any external servers

❖ **Future Works**:

➢System can give less accuracy when background is Non-uniform , light intensity is not good and due to that be categorization problems.

➢Good data Augmentation , more precise Input for the Models, Hyper parameter tuning

➢These are some things which will help make models more accurate in future .

Reference

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2. P.Pouladzadeh, S.Shirmohammadi, and R.Almaghrabi, “Measuring Calorie and Nutrition from Food Image”, IEEE Transactions on Instrumentation & Measurement, Vol.63, No.8, p.p. 1947 – 1956, August 2014.

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4. Meghana M Reddy, “Calorie-estimation-from-foodimages-opencv”, github repo, May 2016

Thank you!