

# Calorish – A Food Recognition and Calorie Tracking Application

Prof. Asmeeta Mali<sup>1</sup>, Srishti Mishra<sup>2</sup>, Adarsh Thakur<sup>3</sup>, Prayag Magotra<sup>4</sup>, Chinmay Kulkarni<sup>5</sup>

<sup>12345</sup>Department of Computer Engineering, DYPIT, Pimpri, Pune

## 01 - ABSTRACT

It is very important in today's time that people should be aware of what they are consuming and what will be its impact on the body. With the increasing number of health issues reported due to obesity and overeating, there are very few people who are cautious about their health and are taking proper health precautions. Not to mention, during these times, where the whole world is stuck under the pandemic, our lifestyles have changed drastically and the culture of

"Work-from-home (WFH)" took over. This is also one of the crucial reasons that the problems of obesity, overeating etc. are increasing. As per the data shared by WHO, at least 2.8 million people are dying each year because of being overweight or obese. We complied all these points and came up with the idea of creating the Mobile Application - "Calorish". Our Application "Calorish" is designed in a way that will let any user scan a food item and upon scanning, the application will automatically show the "estimated weight of the item, calorie count of the item and all other nutritional Values". The Application also helps the users to maintain their body weight through the principle of BMR (Bio Metabolic Rate) by suggesting the calorie intake required by the individual on a daily basis to maintain their body weight and thereby, helping them to lead a healthy lifestyle. The application will also have a social media touch to it i.e., users can post about their success stories, recipes etc. that other users can see and interact with. The application will also give friendly reminders to take food, drink water or take medicines.

## 01 – INTRODUCTION

In today's time it is very important for the people to be aware of what they are eating/consuming and ultimately, how it will impact their bodies and health. With the increasing number of health reports being issued every day, very few people are aware about their health and are taking proper health precautions. There is a huge amount of hustle in our day-to-day lives. Whether we talk about an individual who doesn't want to be late for work, or we talk about students who don't want to be late for the lectures, we are forgetting about the most vital component of our lives i.e., "HEALTH". In these drastic times, where the whole world is stuck under the pandemic, the culture of "Work-from-Home" took over, which may seem like a convenient thing but today, is one of the key factors that health-related problems are increasing day by day.

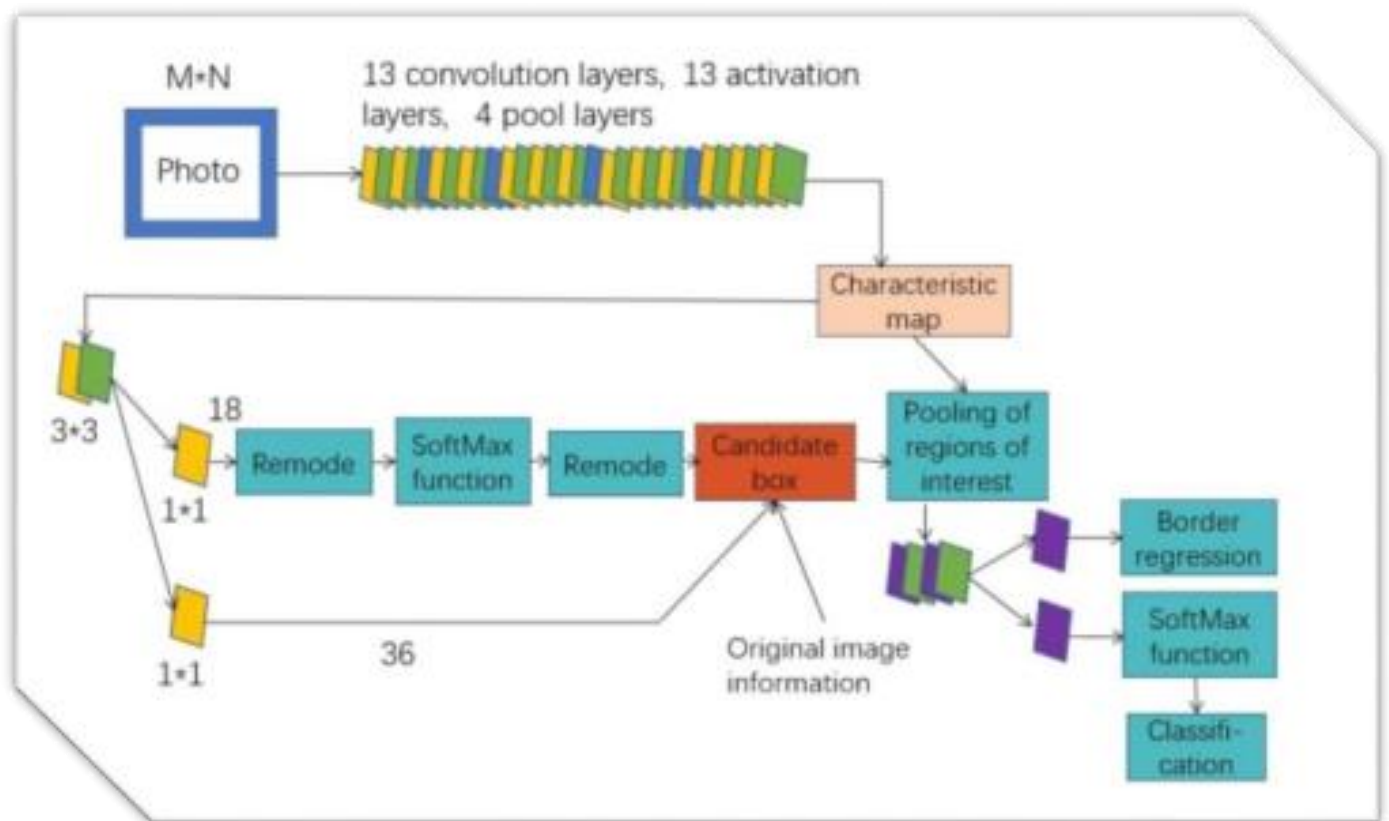
According to a census issued by WHO (World Health Organization), around "2.8 million" people die each year of being overweight and obese, excluding all other diseases. The problems of obesity and overeating have been around the world for a very long time. But it is essential for an individual to act upon it, which if not taken strict actions against at the earliest, will affect the individual in the longer run.

### 03 – LITERATURE SURVEY

#### 3.1 – yuan2020.pdf: -

This paper proposes an intelligent food identification and intelligent billing system. The mobile device is used to collect the food image, and the deep neural network is used to identify the food in the image. Finally, the price calculation result of each is found and returned to the user. They use the Cascade R-CNN algorithm.

Cascade R-CNN Algorithm: Cascade R-CNN is an object detection architecture that seeks to address problems with degrading performance. The cascade of R-CNN stages is trained sequentially, using the output of one stage to train the next.



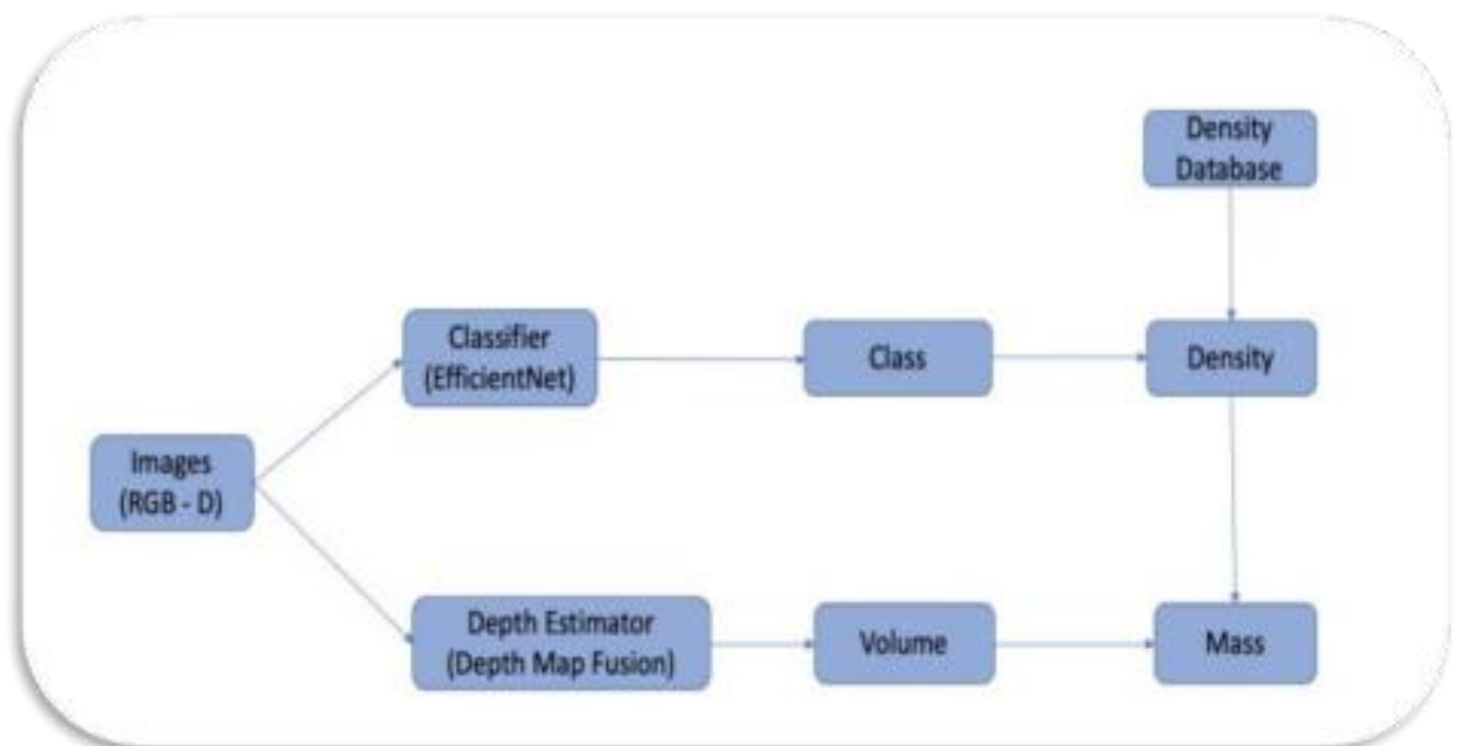
### 3.2 – saci.pdf: -

The paper introduces an approach Food recognition using Convolutional neural networks and depth maps for detecting types of food on mobile devices by using phone cameras. The detection of food is done using EfficientNet, a state-of-the-art convolutional neural network model suitable for mobile platforms.

The method used to estimate the volume is called depth map fusion and involves taking different images from various angles, along with their depth maps and computing a 3D model of the object.

**EfficientNet:** EfficientNet is a convolutional neural network architecture and scaling method that uniformly scales all dimensions of depth/width/resolution using a compound coefficient. The EfficientNet scaling method uniformly scales network width, depth, and resolution with a set of fixed scaling coefficients.

**Depth Map Fusion:** Depth Map Fusion is a standard approach for generating accurate and robust 3D scene representations using structure from motion pipelines. Fusion methods based on determining an implicit surface corresponding to the level set of a volumetric occupancy function have shown to be effective at generating 3D models for arbitrary objects.



### 3.3 – msmvdfafr.pdf: -

In this paper a multi-scale multi-view feature recognition scheme for food recognition is implemented.

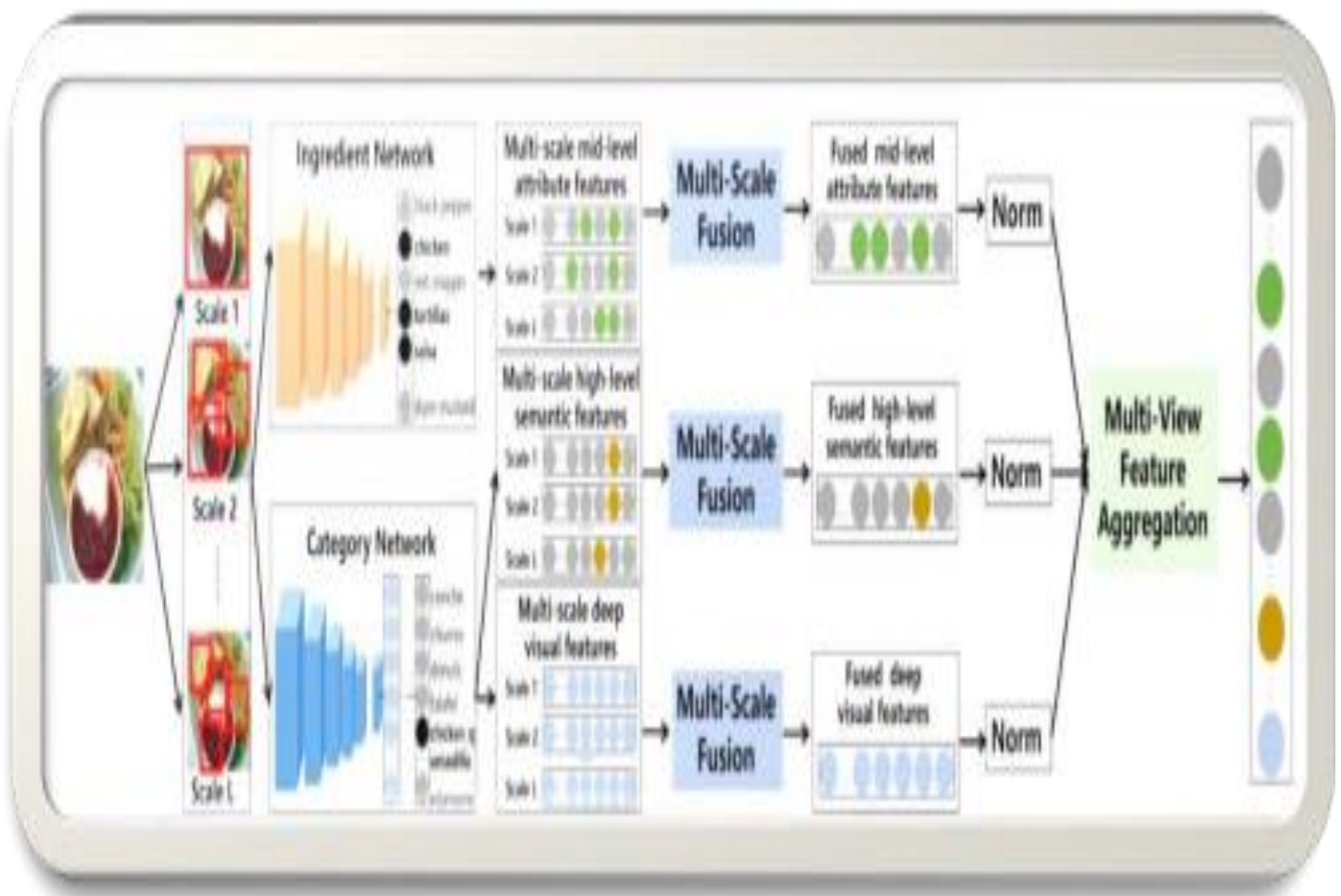
MSMVFA can aggregate high-level semantic features, mid-level attribute features, and deep visual features into a unified representation.

These three different types of features describe the food image from different granularity. The mid-level attribute representation is obtained via ingredient supervised CNNs.

High-level semantic features and deep visual features are extracted from class supervised CNNs.

The aggregated features are more robust, comprehensive, and discriminative via two-level fusion, namely multiscale fusion for each type of features and multi-view aggregation for different types of features.

MSMVFA is general and different deep networks can be easily applied into this scheme.



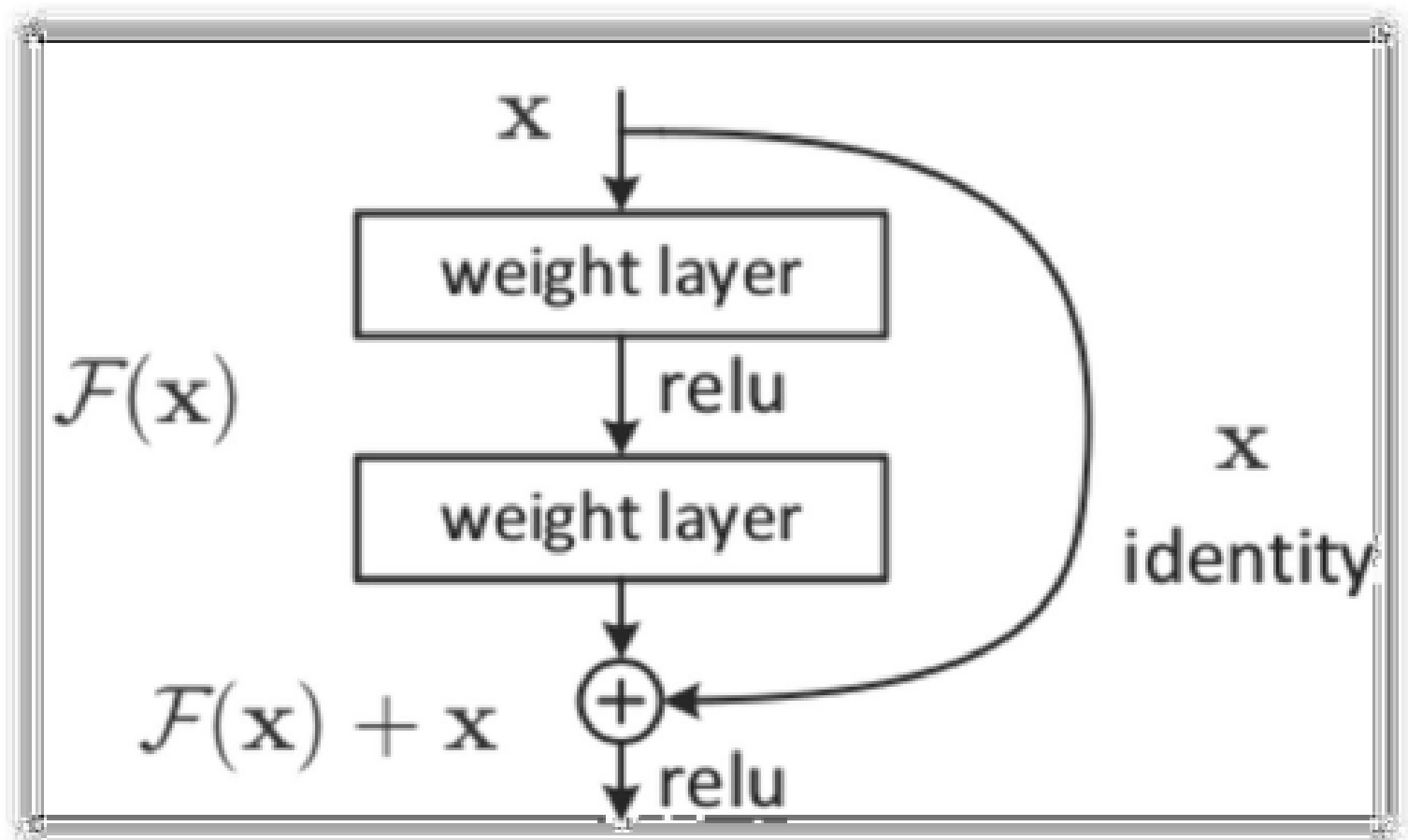
### 3.4 – kasyap.pdf: -

The proposed model is to provide a unique solution for measuring calories by using deep learning algorithms. The food calorie calculation is taken from food images in different objects that are fruits and vegetables.

This measurement is taken with the help of a neural network.

This method is implemented to calculate the food calorie with the help of Convolutional Neural Network. The input of this calculated model is taken from an image of food.

The primary parameter of the result is taken by volume error estimation and secondary parameter is calorie error estimation.



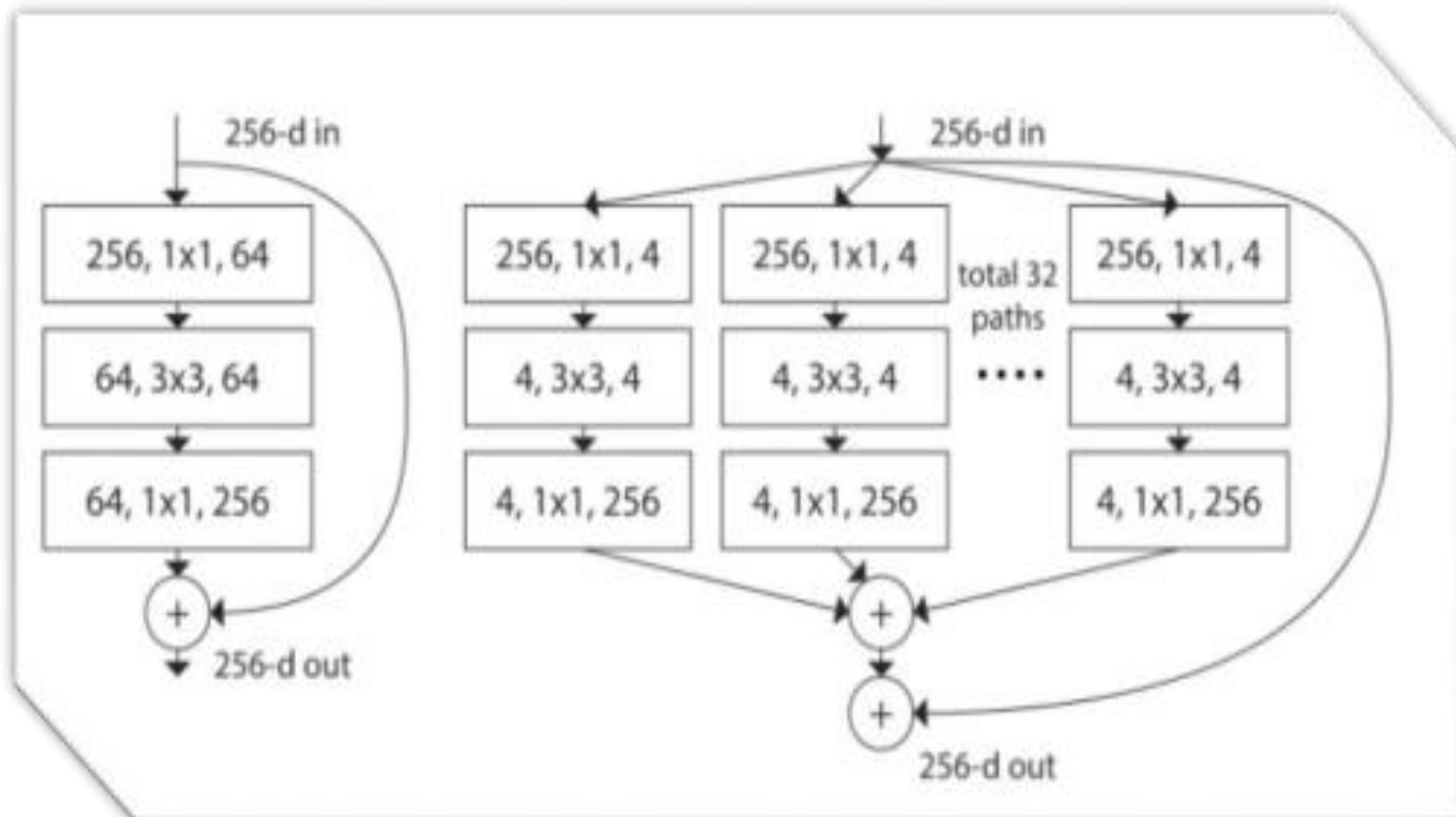
### 3.5 – Arslan.pdf: -

This paper surveys the most common deep learning methods used for food classification, it presents the publicly available databases of food, it releases benchmark results for the food classification experiment averaged over 5-trials, and it beats the current best-shot performance on UEC Food-100 database.

The best results have been achieved by ensemble method averaging the predictions of RedNeXt and DenseNet models.

ResNet: Residual neural networks or commonly known as ResNets are the type of neural network that applies identity mapping. What this means is that the input to some layer is passed directly or as a shortcut to some other layer.

ResNeXt: This is a proposed variant of ResNet with the following building block. In this variant, the outputs of different paths are merged by adding them together. For this architecture, all paths share the same topology.



### 3.6 – Ayon2021.pdf: -

This paper is aimed at developing an application that automatically detects food objects in real-time scenes and localizes them within the image, which can be used in a standalone or connected application framework. A dataset compiled from multiple online sources was used to train a Single Shot Detector (SSD) configuration.

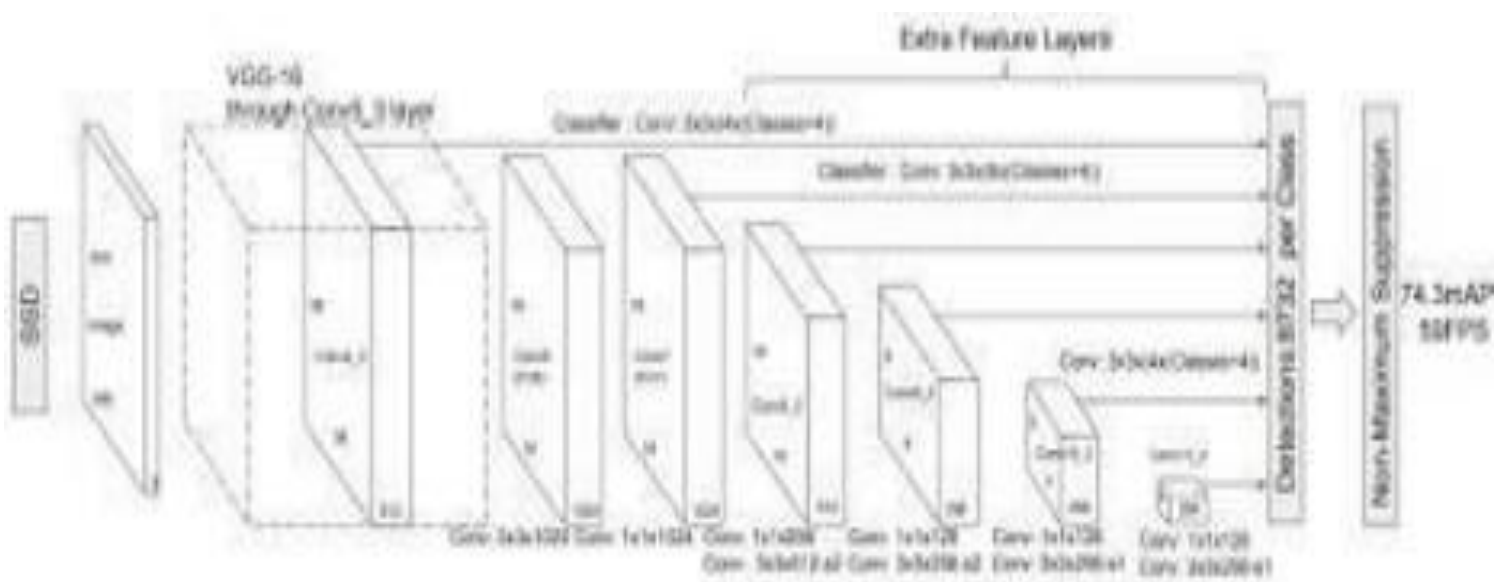
The object detection model and various convolutional network architectures were paired with the Single Shot Detector and the most efficient approach was identified as InceptionV2 convolutional neural network architecture paired with a Single Shot Detector.

Single Shot Detector: Single Shot detector like YOLO takes only one shot to detect multiple objects present in an image using multi-box. It is significantly faster in speed and high-accuracy object detection algorithm.

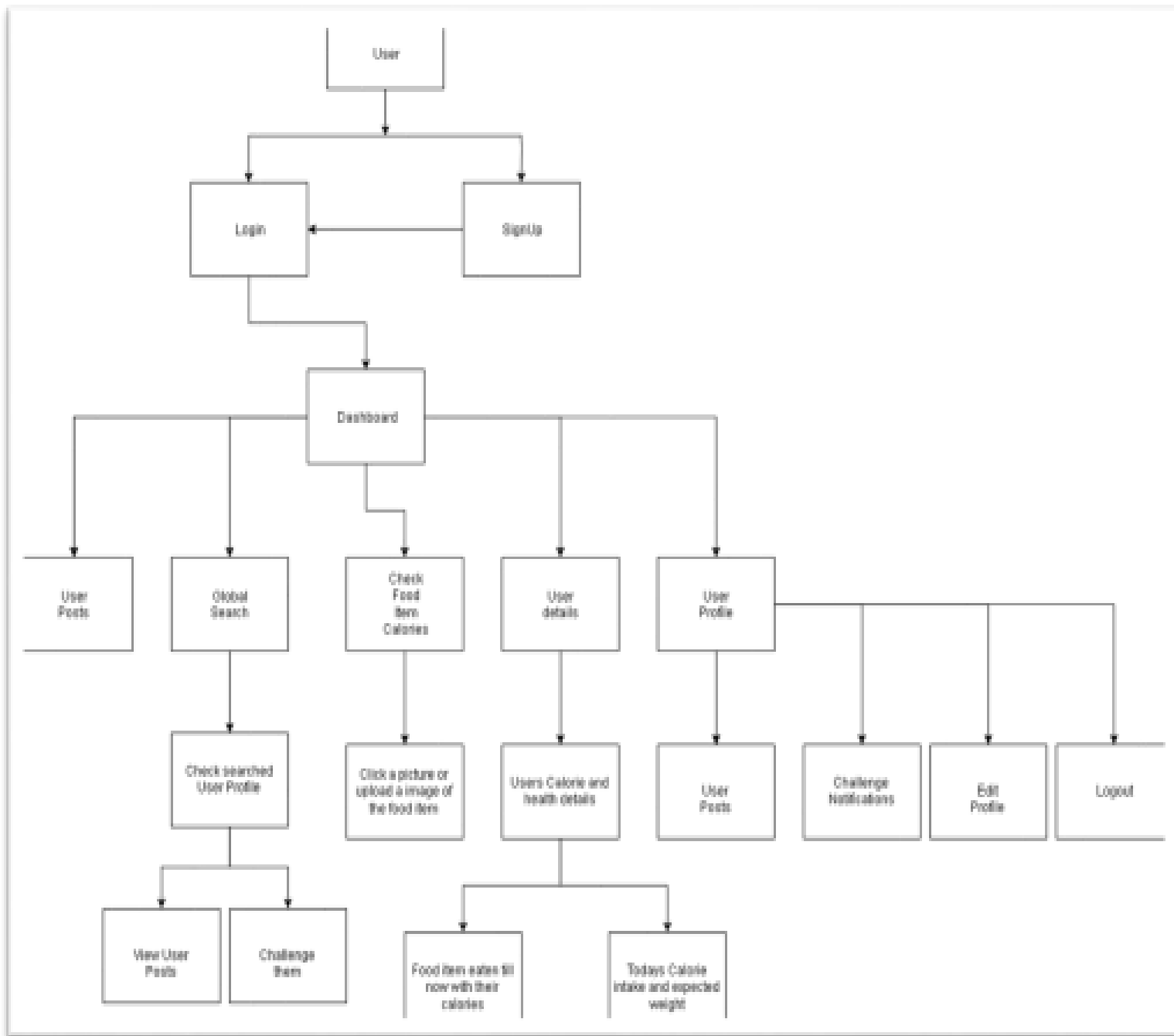
It eliminates bounding box proposals like the ones used in RCNN's.

It includes a progressively decreasing convolutional filter for predicting object categories and offsets in bounding box locations.

High detection accuracy in SSD is achieved by using multiple boxes or filters with different sizes, and aspect ratio for object detection.

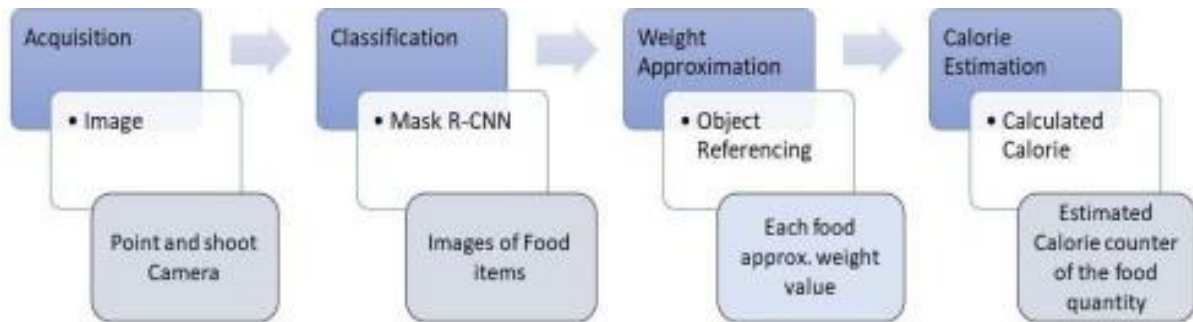


#### 4.1 – System Design: -

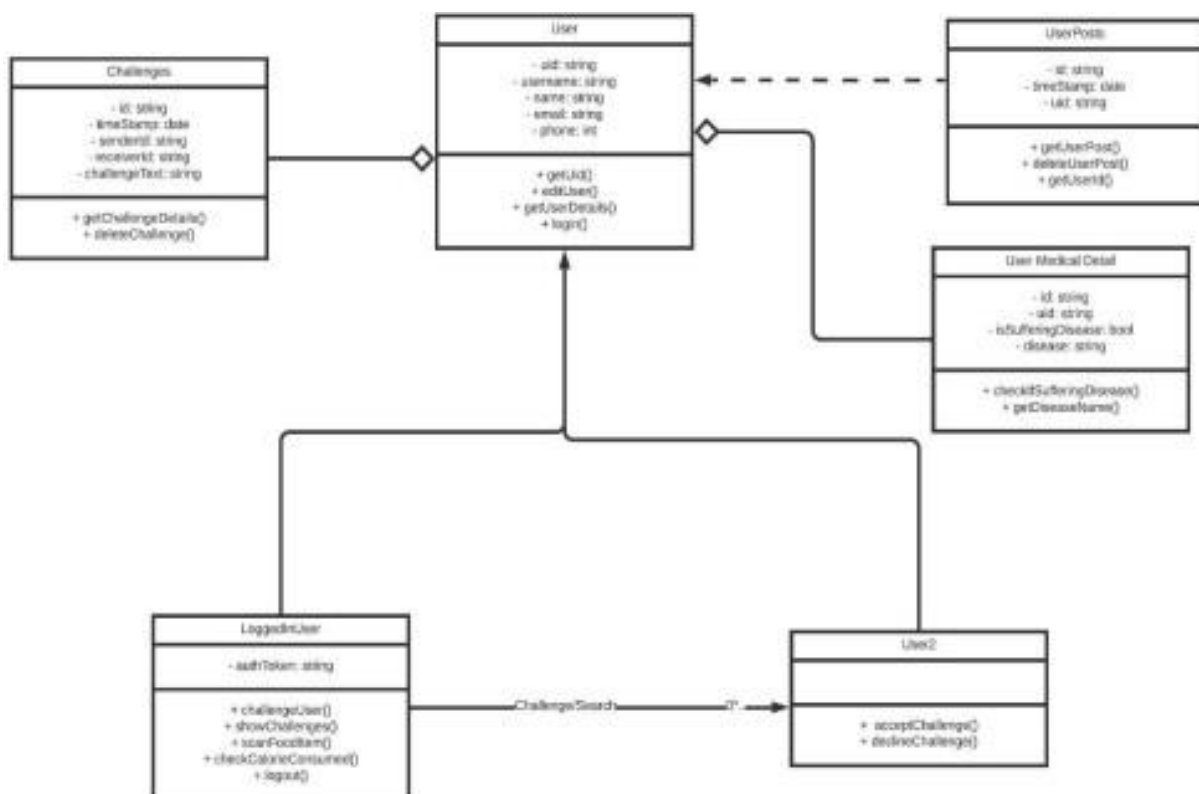




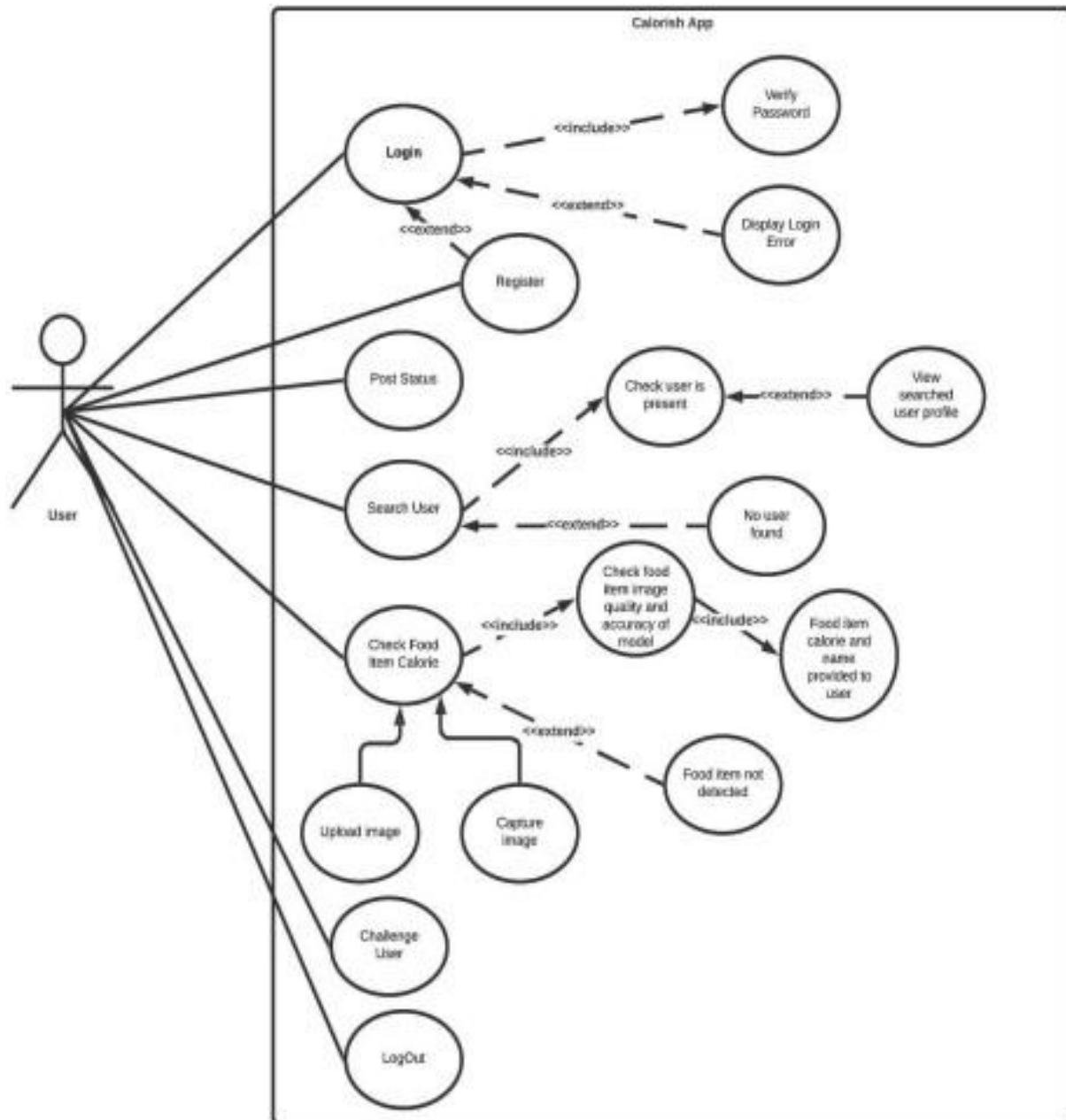
#### 4.2 – Machine Learning Model Architecture: -



#### 4.3 – UML Class Diagram: -



#### 4.4 – UML Use Case Diagram: -



## 05 – TOOLS & TECHNOLOGIES

Frontend	Flutter
Backend	Firebase
Database	Firestore
M.L. Algorithms	Single Shot Detector (SSD), non-maximum suppression algorithm, SVM, k-mean, Grabcut, Mask R-CNN, Inception v3, Bag of features, Multiple kernel learning, fast R-CNN, canny edge detection, nearer R-CNN, ad boost-based feature selection.
Datasets	food 100, food 101, food256, ECUSTFD, Ville dataset, Egocentric Food dataset, US department of Agriculture and food nutrition database, UNIMIB2016
Tools	Mathworks Image Processing toolbox, LabellImage graphical user interface, nanonets platform, pixel annotation tool
Source CodeManagement	Git   GitHub

## 06 – CONCLUSION

In today's time, where there is a lot and lot of hustles around everywhere, whether it may be an office employee who wants to be in time at the office or a student who doesn't want to get late for his/her classes, we forget the most crucial element of our lives i.e., "HEALTH". Obesity, overeating and other health related problem are there since a long time, which, if not taken a proper action against at early, will cause a lot of body and health problems to an individual in the longer term. Today, people are more and more reliant on smartphones. Not to mention, during these times, where the whole world is stuck under the pandemic, our lifestyles have changed drastically and the culture of "Work-from-home (WFH)" took over. This is also one of the crucial reasons that the problems of obesity, overeating etc. are increasing. Thus, our application helps people maintain their health and saves their precious time through a user-friendly experience.

## 07 – REFERENCES

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