Kathmandu University

Department of Computer Science and Engineering

Dhulikhel, Kavre

A Project Proposal

on

"nutri.gram"

[Course Code: COMP 308]

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Submitted By:

Sailesh Dahal (10)

Sarayu Gautam (14)

Bhabin Khadka (23)

Ashish Subedi (53)

Gaurav Singh Thagunna (55)

Submitted To

Dr. Gajendra Sharma

Department of Computer Science and Engineering

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Abstract

Nutrition is the main source of life and although it has been our secondary instinct to check for nutritional value in the food we eat, the effect any diet has in our body and health is consequential. From the fact which connotes the value of nutrition in our diet, springs the idea of "**nutri.gram**. **nutri.gram** is a mobile application that scans the food label present in the packaged food items and draws a significant conclusion from that data regarding its edibleness for a person, the nutritional worth it adds to our diet, how much calorific value it provides per serving and much more. Our project uses **Flutter** as a front-end framework, which uses **Dart** as a programming language and **Node.js** as server-side JavaScript runtime, **MongoDB** as a database, and **Python** for **Machine Learning** and **Computer Vision** algorithms to visualize the information. We are planning on using **OpenCV, sklearn**, and **Tensorflow** as tools for working with the data. This application functions with the information provided through the image of packaged food. The main objective of this project is to provide a handy guideline for the people who are diet conscious. This application is targeted to anyone who wants to get insight into what they are feeding into their body and how understanding the nutritional value will be of tremendous aid to their overall health.

Keywords: *Nutrition, Flutter, Node.js, Python, Machine Learning, Computer Vision, Image Processing*

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Abbreviations

Short-form	Full form
OpenCV	Open Source Computer Vision
DB	Database
iOS	iPhone/iPad/iPod Operating System
JS	JavaScript
ML	Machine Learning
OS	Operating System
SDK	Software Development Kit
UI	User Interface

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Chapter 1: Introduction

This chapter discusses the background, objective, and motivation related to this project.

1.1. Background

Nutrition is the science that interprets the nutrients and other substances in food about an organism's maintenance, development, reproduction, safety, and disease. The seven main nutrient groups are carbohydrates, fats, starch, minerals, proteins, vitamins, and water. We need all kinds of nutrition to function properly and for our immunity. These days we are more dependent on packaged foods and it is natural to worry about the calorie and nutrients we are getting from those foods. Nutrition is how food affects the health of the body. When you become aware of the value any food adds to your health, you start eating healthy. You start selecting that food, even if packaged, which provide an adequate amount of calorie and nutrition your body requires.

Hence, we decided to build a smartphone application **"nutri.gram"**. The application provides an interface so that users can scan the wrapper of packed foods and get relevant information in the app regarding the nutrient and calorie content of that food product. Among the food products the user searches, the algorithm generates effective information and provides a visual display to the users incorporating various features available through the analysis of data. Moreover, this application is designed with the target of helping any diet/ health-conscious people but, anyone trying to know the nutrition/calorie present in the packaged food can use this application for their benefit.

1.2. Objectives

The main objectives of **nutri.gram** are:

1. To enable users to get information about the nutrients and calories they are getting from the packaged food.
2. To display graphs on their calorie and nutrition consumption with respect to time so they can easily track their diet.
3. To keep the history of the packaged food they have scanned till now along with the content present in those diets.
4. To provide nutrition tips to better enhance the grasp of people on what type of food benefits them.
5. To show dietary recommendations as per the search by the user based on calorie and nutrient content.

1.3. Motivation and Significance

Every one of us requires nutrients to survive. Due to the increasing business mindset, packaged foods come with more processing and less fiber. On the contrary, due to our busy schedule, we are more and more allured towards canned and packaged foods than homemade and natural ones. Sometimes it is not our choice but the compulsion to be dependent or to choose packaged food. But like a diet conscious person, one desires to know the nutrients present in the food he/she is feeding. One may want to know which food is consumed by other people having the same medical condition or similar dietary preferences. People may take fancy on knowing the calorie content of their packaged diet, or how much calories are sufficient for them as per their body structure (weight and height), and also how is the nutrient distributed in the food they eat (is it a balanced diet).

To solve these issues, **nutri.gram** application is planned. We were inspired by the importance of nutrition and wanted to implement it uniquely. After the target was fixed, we started a discussion on its design, layout, features, and components. When we did some research on this idea and found that it had a notable potential, our team became confident that our idea of the project was worthy of acceptance and immediate response towards its actual development.

Chapter 2: Related Works

As the research for the project proceeded further, we went on to find some projects with goals like our own. Three such projects stuck out as noteworthy each of which is described in brief below.

2.1. MyPlate Calorie Tracker

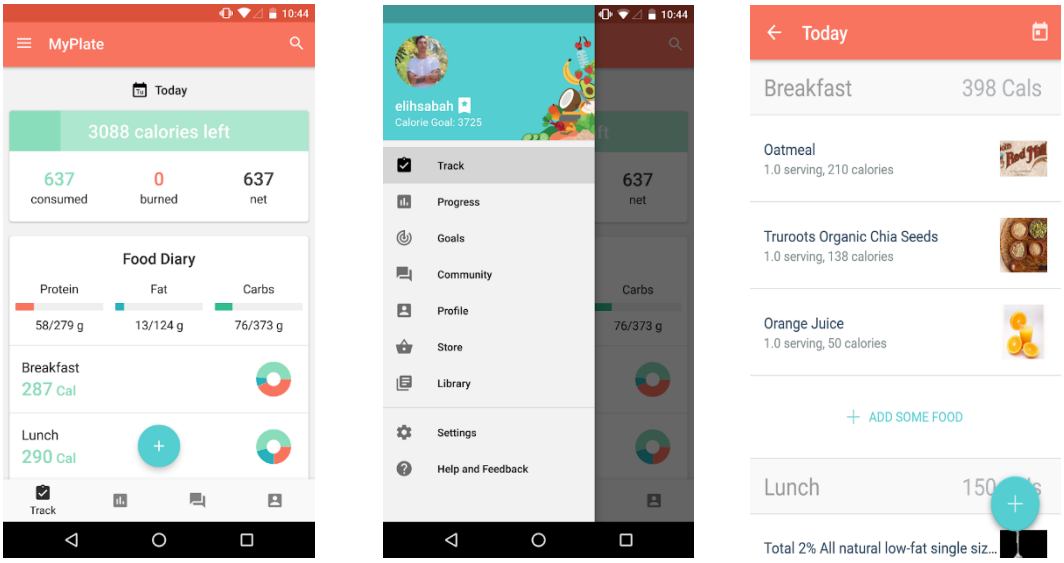

Figure 1: MyPlate Calorie Tracker

MyPlate Calorie Tracker [2], an app developed by livestrong.com, is a user-friendly app designed to help you lose weight and improve your health. This app offers easy-to-use nutritional facts, as well as personalized daily calorie goals, healthy meal plans, a barcode scanner, an extensive food database, and detailed statistics about your nutrition. This app is available on both iOS and Android. Features of this app are:

- Browse a comprehensive food database with over 2 million food items
- Uses barcode scanners to find and track food easily
- Get a personalized daily calorie goal based on your profile information
- Keep track of weight and progress over time
- Review custom goals for your nutritional intake of protein, fiber, carbs, etc.

2.2. MyFitnessPal

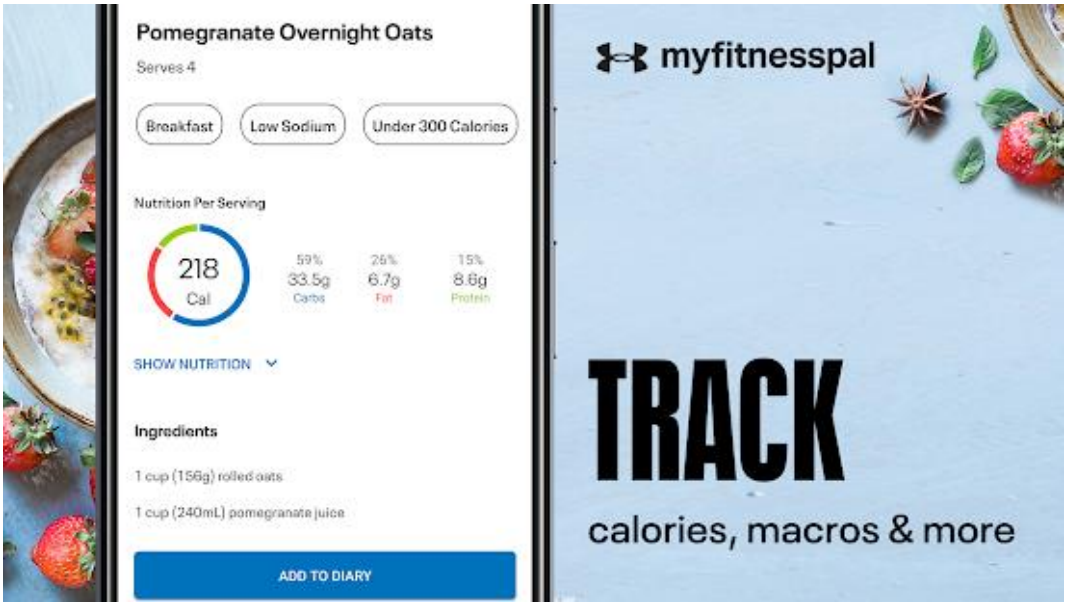

Figure 2: MyFitnessPal

MyFitnessPal [6][7] is a smartphone app and website that tracks diet and exercise. The app uses gamification elements to motivate users. To track nutrients, users can either scan the barcodes of various food items or manually find them in the app's large pre-existing database.

The key features of MyFitnessPal are:

- Track All Nutrients like Calories, macros (carbs, fat, protein), sugar, fiber, cholesterol, vitamins, and more.
- With 11+ million foods in their database including global items and cuisines.
- Import the nutrition information for the recipes cooked.

2.3. Open Food Facts – Scan Food

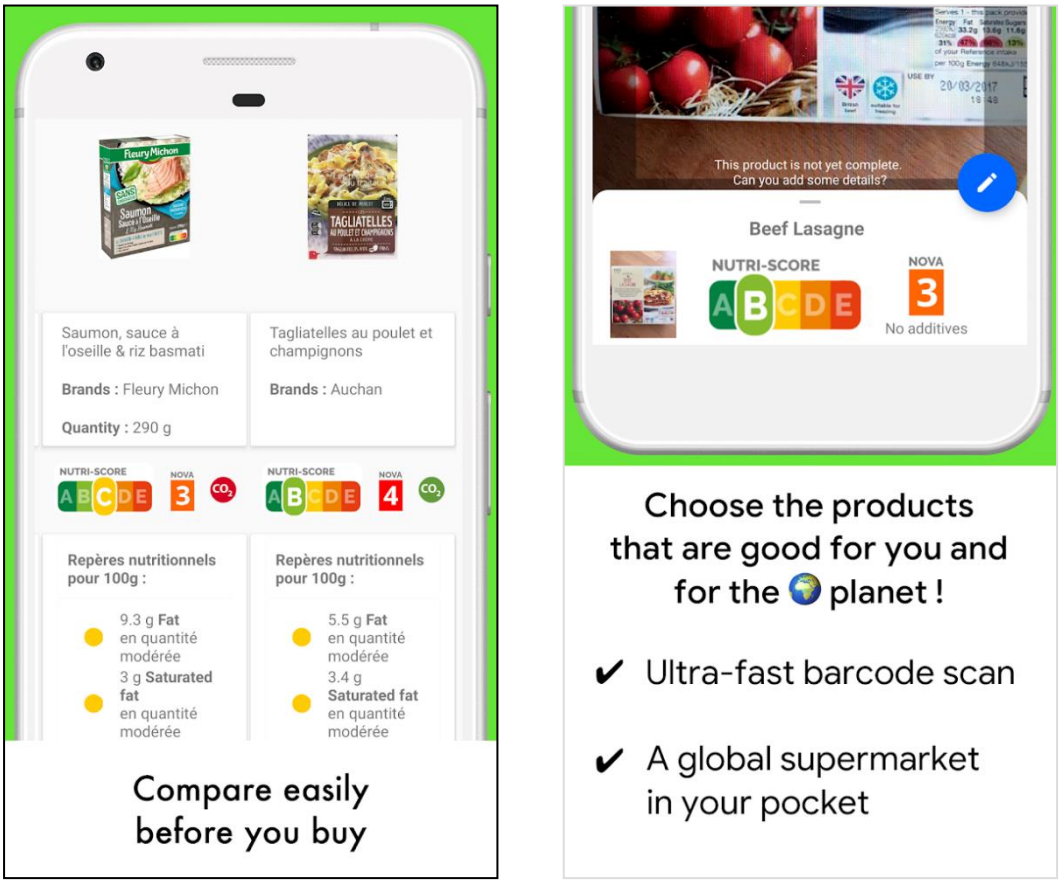

Figure 3: Open Food Facts- Scan food

Open Food Facts [4] is an open-source app developed by Open Food Facts. This app allows users to scan products contained in their database. In their words, "We're kind of the Wikipedia of food." It is available on both Android and iOS. It helps to choose the products good for users, contribute to food transparency, and to get the facts about food items.

The key features of Nutrients are:

- Get facts about nutrients in common food items.
- Get Nutri-Score grade, from "A" to "E" determining the nutritional quality
- Find the carbon footprint and recycling instructions

Although apps similar to ours are previously made, they are different in some aspects with our apps. MyPlate and MyFitnessPal deal with cooked foods, while our app is for packaged food. Though Open Food Facts - Scan Food has a feature to scan app barcodes, it doesn’t have a feature to scan food labels, which our app features machine learning and computer vision to recognize the labels with nutrients, which saves users effort to put every nutrients entry manually. Also, our app provides recommended diets from user-selected nutrients, which other users use for similar use.

Chapter 3: Procedures and Methods

3.1. Procedure

The procedure that we have intended to follow throughout the completion of this application is enlisted below:

1. Plan and design the application along with the consideration of the required tech stack Flutter, JavaScript runtime environment: Node.js, MongoDB, OpenCV, tesseract, Python, and Flask.
2. Design UI in Figma incorporating every page needed in the app.
3. Start simultaneously with frontend (Flutter SDK) and backend (both node server and ML server).
4. Add user authentication and display information per the data provided by the user to make the application user-specific.
5. Communicate frontend with backend (Flutter with node server and node with flask server)
6. Test and debug to avoid errors present.
7. Finally, make the application presentable.

3.2. Flowchart

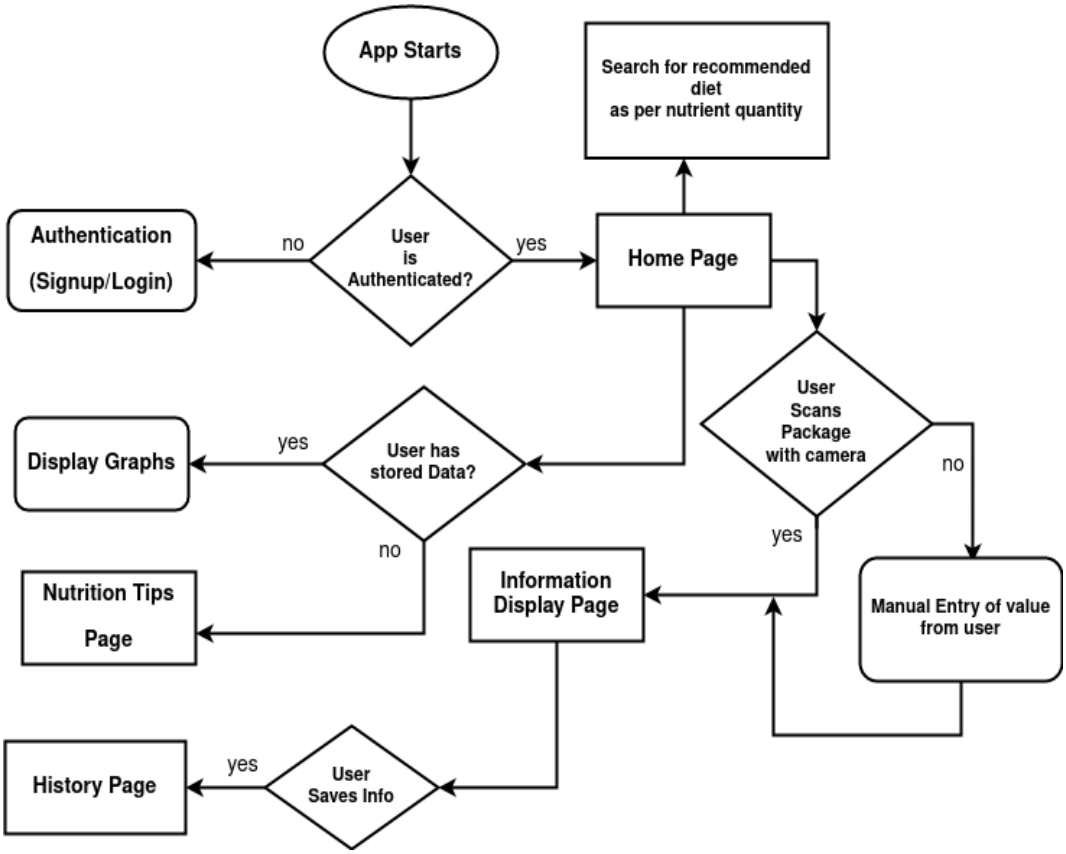

Figure 4: Flow chart of application information flow

3.3. Block Diagram

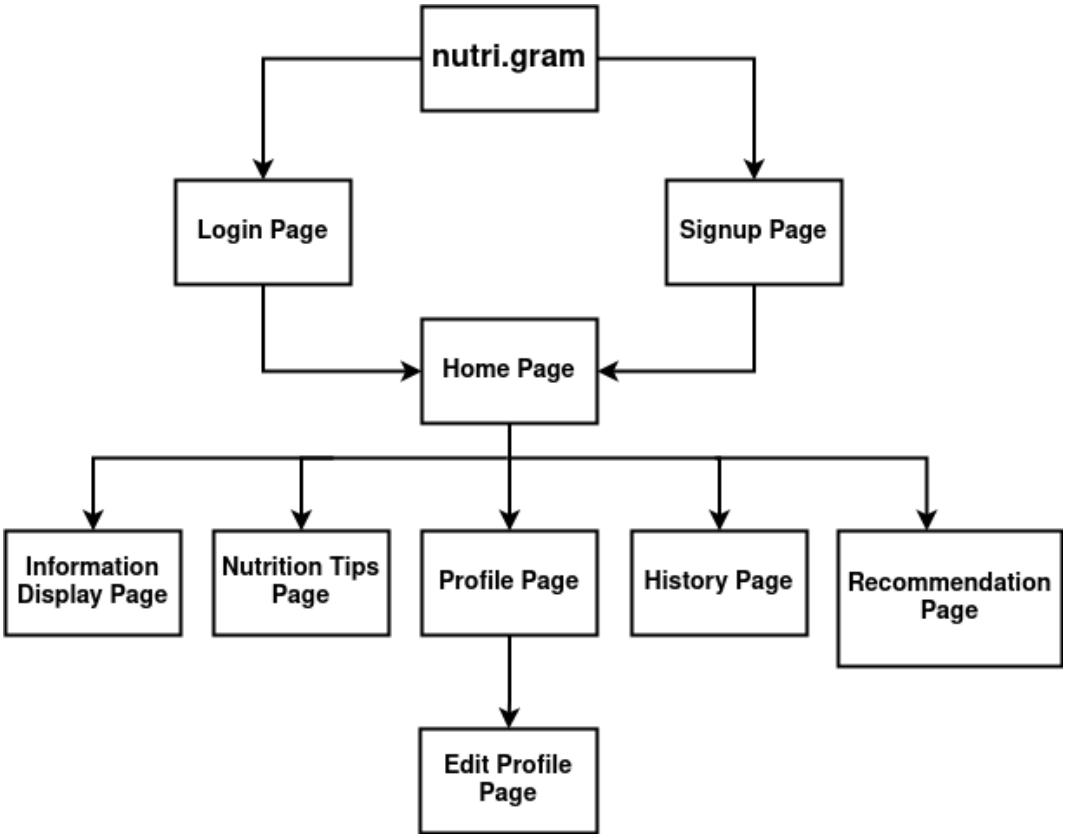

Figure 5: Block diagram of the application structure

Chapter 4: System Requirement Specification

4.1. Software Requirement

It contains information about OS, programming platform, and other APIs. It also contains information about the technique used to store and manipulate data.

4.1.1. Front End Tool

Flutter SDK [1], Figma

4.1.2. Back End Tool

Node.js [3], Python, MongoDB, OpenCV [5], Tesseract, Flask

4.2. Hardware Requirements

This project requires an Android OS with an Android version greater than 4.4. For the smooth running of the app, it is suggested that the device has RAM greater than 1 GB. For backend, it requires a virtual machine.

Chapter 5: Project Planning and Scheduling

The following is the Gantt chart to show the time allocated and planning for different aspects of our project. We have decided to dedicate at least 4-week time for coding purposes, by which our app can have all the functionality planned. In the remaining weeks, we have thought to debug and test our app to check if it is applicable for the release.

Week	1	2	3	4	5	6	7
Planning & Preparation	■						
Work Division	■						
Coding		■	■	■	■		
Debugging & Beta-Testing						■	
Documentation							■

Table 1: Gantt Chart

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