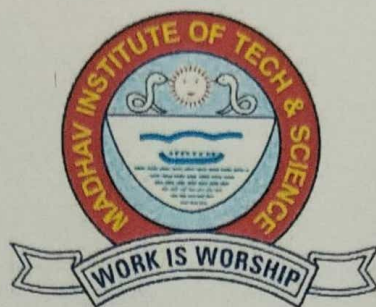


MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

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Project Report

on

Development of NutriGen (GenAI Module)

A project report submitted in partial fulfilment of the requirement for the degree of

MASTER IN COMPUTER APPLICATION

in

COMPUTER SCIENCE AND ENGINEERING

Submitted By:

Kartikey Soni
(0901CA221034)

Industry Mentor:

Mr. Tushar Shandhilya (Machine Learning Engineer, Teachnook)

Faculty Mentor:

Dr. Anshu Chaturvedi (Professor)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

Gwalior – 474005 (MP) Estd.1957

January – June 2024

Certification of internship completion.

Dear,

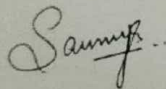
KARTIKEY SONI

We are heartful to announce the enrollment for an internship. And we are grateful to announce that he has gone through an internship in the domain of Python with Data Science in the months of Jan.

We are in collaboration with **Cognizance 24 IIT ROORKEE**. while working students have gathered commendable soft and hard skills.

Enrollment month:- Jan 15th to April 25th

Yours Faithfully,



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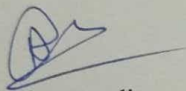
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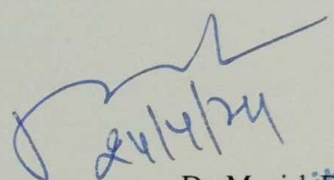
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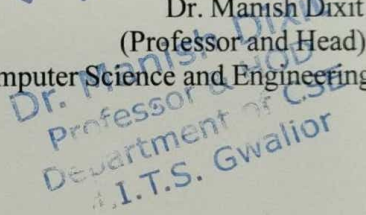
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CERTIFICATE

This is certified that **Kartikey Soni (0901CA221034)** has submitted the project report titled **Development of NutriGen(GenAI Module)** under the mentorship of **Mr. Tushar Shandhilya** (Machine Learning Engineer, Teachnook), in partial fulfilment of the requirement for the award of degree of **Master in Computer Application** of Computer Science and Engineering from **Madhav Institute of Technology and Science, Gwalior**.


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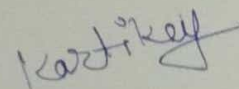
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DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Master in Computer Application in Computer Science and Engineering at **Madhav Institute of Technology & Science, Gwalior** is an authenticated and original record of my work under the mentorship of **Mr. Tushar Shandhilya** (Machine Learning Engineer, Teachnook).

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.



Kartikey Soni

0901CA221034

2022-2024

Master in Computer Application
Computer Science and Engineering

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

Deemed to be University

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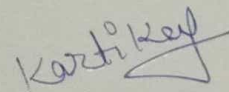
ACKNOWLEDGEMENT

The full semester project has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology and Science** to allow me to continue my disciplinary project. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Department of Computer Science and Engineering**, for allowing me to explore this project. I humbly thank **Dr. Manish Dixit**, Professor and Head, Department of Computer Science and Engineering, for his continued support during the course of this engagement, which eased the process and formalities involved.

I would like to extend my heartfelt appreciation to **Mr. Tushar Shandhilya** (Machine Learning Engineer, Teachnook) for his exceptional mentorship, guidance, and assistance throughout the project. His valuable input and feedback during the course of the project have helped me enhance my knowledge and skills. His constant encouragement and support have been instrumental in the successful completion of this project.

I am sincerely thankful to my faculty coordinator. I am grateful to the guidance of **Dr. Anshu Chaturvedi**, (Professor), Computer Science and Engineering, for her continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.



Kartikey Soni
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2022-2024

Master in Computer Application
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ABSTRACT

NutriGen is like having a nutrition expert right in your pocket! It's a super smart program that uses Google's special technology to give you personalized advice about what to eat. When life gets busy and it's hard to make healthy choices, NutriGen steps in to make sure you're still getting the nutrients you need.

It's all thanks to this cool thing called the Google Gemini API. This magic tool helps NutriGen understand exactly what you're looking for. It looks at things like what foods you enjoy, any dietary goals you have, and even real-time data to give you advice tailored just for you.

But NutriGen doesn't stop there! It can do all sorts of amazing things, like suggesting meals that fit your tastes and needs, breaking down the nutrients in your food so you know what you're eating, and even chatting with you about nutrition whenever you need advice. And the best part? You can access NutriGen from your computer, phone, or even your smart devices, making it super convenient.

And here's the really cool part: NutriGen is always learning and improving. It pays attention to how you use it and stays updated with the latest nutrition research, so it can keep giving you the best advice possible.

Plus, NutriGen is designed to make healthy eating fun! With its interactive features and personalized recommendations, it feels like having your own personal chef and nutritionist rolled into one.

So whether you're trying to eat healthier, manage a dietary restriction, or just curious about improving your nutrition, NutriGen is here to help you every step of the way. Say goodbye to guesswork and hello to a happier, healthier you with NutriGen by your side!

सार

न्यूट्रीजेन आपकी जेब में एक पोषण विशेषज्ञ होने जैसा है! यह एक सुपर स्मार्ट प्रोग्राम है जो आपको क्या खाना चाहिए इसके बारे में व्यक्तिगत सलाह देने के लिए गूगल की विशेष तकनीक का उपयोग करता है। जब जीवन व्यस्त हो जाता है और स्वस्थ विकल्प चुनना कठिन हो जाता है, तो न्यूट्रीजेन यह सुनिश्चित करने के लिए आगे आता है कि आपको अभी भी आवश्यक पोषक तत्व मिल रहे हैं।

यह सब गूगल जेमिनी एपीआई नामक इस शानदार चीज़ के लिए धन्यवाद है। यह जादुई उपकरण न्यूट्रीजेन को यह समझने में मदद करता है कि आप क्या खोज रहे हैं। यह उन चीज़ों को देखता है जैसे आप कौन से खाद्य पदार्थों का आनंद लेते हैं, आपके कोई आहार संबंधी लक्ष्य हैं, और यहां तक कि आपके लिए सलाह देने के लिए वास्तविक समय का डेटा भी।

लेकिन न्यूट्रीजेन यहीं नहीं रुकता! यह सभी प्रकार की आश्चर्यजनक चीज़ें कर सकता है, जैसे कि आपके स्वाद और जरूरतों के अनुरूप भोजन का सुझाव देना, आपके भोजन में पोषक तत्वों को तोड़ना ताकि आप जान सकें कि आप क्या खा रहे हैं, और यहां तक कि जब भी आपको सलाह की आवश्यकता हो तो पोषण के बारे में आपसे बातचीत करना। और सबसे अच्छा हिस्सा? आप न्यूट्रीजेन को अपने कंप्यूटर, फोन या यहां तक कि अपने स्मार्ट उपकरणों से एक्सेस कर सकते हैं, जिससे यह बेहद सुविधाजनक हो जाता है।

और यहाँ वास्तव में अच्छा हिस्सा है: न्यूट्रीजेन हमेशा सीख रहा है और सुधार कर रहा है। यह इस बात पर ध्यान देता है कि आप इसका उपयोग कैसे करते हैं और नवीनतम पोषण अनुसंधान के साथ अपडेट रहता है, इसलिए यह आपको यथासंभव सर्वोत्तम सलाह देता रह सकता है।

साथ ही, न्यूट्रीजेन को स्वस्थ भोजन को मज़ेदार बनाने के लिए डिज़ाइन किया गया है! इसकी इंटरैक्टिव सुविधाओं और वैयक्तिकृत अनुशंसाओं के साथ, ऐसा महसूस होता है कि आपका अपना निजी शेफ और पोषण विशेषज्ञ एक में आ गए हैं।

तो चाहे आप स्वस्थ भोजन करने की कोशिश कर रहे हों, आहार प्रतिबंध का प्रबंधन कर रहे हों, या बस अपने पोषण में सुधार करने के बारे में उत्सुक हों, न्यूट्रीजेन हर कदम पर आपकी मदद करने के लिए यहां है। अनुमान लगाने को अलविदा कहें और अपने साथ न्यूट्रीजेन के साथ एक खुशहाल, स्वस्थ व्यक्ति को नमस्ते कहें!

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Chapter 1 : Introduction

In today's fast-paced world, finding the time and knowledge to maintain a healthy diet can be tough. But with advances in technology like artificial intelligence (AI) and machine learning (ML), there's a new solution on the horizon: NutriGen.

NutriGen is like having a personalized nutrition coach right at your fingertips. It uses cutting-edge tools like the Google Gemini API to understand your unique dietary needs and preferences. Whether you're looking for meal suggestions, want to know the nutritional breakdown of your food, or need recipe ideas, NutriGen has you covered.

What sets NutriGen apart is its ability to learn and improve over time. By analyzing user interactions and staying up-to-date with the latest nutritional research, it continually refines its recommendations to better suit your needs.

Imagine having a knowledgeable friend who not only understands your dietary goals but also helps you navigate the complex world of nutrition with ease. That's what NutriGen aims to be: your trusted companion on the journey to a healthier lifestyle.

With NutriGen, eating well becomes simpler, more accessible, and more enjoyable than ever before. Say goodbye to guesswork and hello to a healthier, happier you with NutriGen by your side.

NutriGen isn't just about giving you generic advice—it's about understanding your unique preferences and lifestyle to provide personalized recommendations that actually work for you. Whether you're a busy professional, a parent juggling multiple responsibilities, or someone with specific dietary restrictions, NutriGen can help you make healthier choices that fit seamlessly into your life.

And the best part? NutriGen isn't static—it's always evolving. As you use the platform and provide feedback, it learns more about you and gets better at providing relevant recommendations. It's like having a nutrition expert who's constantly learning and growing alongside you.

So, if you've ever felt overwhelmed by all the conflicting information out there about nutrition, or if you've struggled to stick to a healthy eating plan in the past, give NutriGen a try. It's the smart, personalized solution you've been looking for to help you achieve your health and wellness goals.

Module – Image - Based Food Analysis

Description :

NutriGen's Image-Based Food Analysis and Health Assessment feature lets you upload pictures of your food. Using smart image recognition, it figures out what's in your meal and its nutritional value. It also tells you how healthy your food is, giving personalized tips to help you make better choices about what you eat.

Key Features :

Image Recognition: The module uses smart image recognition algorithms to look at pictures users upload and figure out what food is in them. It does this by analyzing things like the shape, color, and texture of the food, so it can accurately tell what it is.

Nutritional Analysis: Once the food item is identified, the module conducts a comprehensive nutritional analysis to determine its macro-nutrient and micro-nutrient composition. Nutritional values such as calories, protein, carbohydrates, fats, vitamins, and minerals are extracted from the image data and presented to the user.

Health Assessment: After identifying the food item, the module goes a step further by doing a deep dive into its nutrition. It looks at things like how many calories it has, how much protein, carbs, and fats are in it, and even what vitamins and minerals it contains. Then, it presents all this important nutritional information to the user in an easy-to-understand way.

Personalized Recommendations: Once it's done analyzing the food, the module gives personalized advice based on what it found. It tells users if the food fits their dietary goals and needs. If it's not the healthiest choice, the module suggests better alternatives that align with the user's goals. This way, users get tailored recommendations to help them make healthier choices.

Conclusion:

NutriGen's Image-Based Food Analysis helps you make smart food choices. It uses fancy tech to analyze your food pics and tell you what's inside. Then, it gives you tips on how to eat healthier based on what it finds. Plus, it lets you keep track of your meals so you can stay on top of your wellness goals. NutriGen is all about making healthy living easier for everyone.

1.1 Problem identification

Checking the nutrition of food can feel like a chore. It often involves inputting data and doing calculations, which can be time-consuming and frustrating. This might discourage us from finding out what's in our food and making informed choices about what we eat.

Additionally, it's not always easy to know what's in our food, especially when we're dining out or buying items with limited labels. This lack of information can make it challenging to make healthy decisions, leaving us uncertain about the nutritional content of our meals.

Moreover, determining the healthiness of the food we eat can be tricky. Without the right tools or information, we may struggle to assess if our meals are good for us. This uncertainty can leave us feeling unsure about whether we're making the best choices for our health.

Furthermore, much of the nutrition advice available is generic and not tailored to individual needs and preferences. This one-size-fits-all approach can make it difficult for people to stick to the advice and may result in suboptimal nutrition, posing potential risks to their health.

1.2 Parent organization :

TEACHNOOK.

Teachnook is a dynamic organization leading the way in educational innovation and technology solutions. Our goal is to revolutionize traditional learning methods, making education accessible to everyone and tailored to individual goals.

We offer a wide range of services, from interactive online courses and personalized tutoring to advanced software development and IT solutions. By understanding the unique needs of our clients, we create customized strategies that deliver real results.

What makes Teachnook stand out is our dedication to excellence and innovation. Our team consists of experienced professionals who are always exploring new ideas and using the latest technology to improve education and IT services. We're constantly researching and developing new solutions to stay ahead of industry trends.

At Teachnook, we believe in the power of collaboration. We work closely with our clients as partners, facing challenges together and celebrating successes as a team.

Join us in shaping the future of learning and technology at Teachnook, where every interaction is an opportunity to learn and grow, and every innovation reflects our commitment to excellence. Welcome to Teachnook!

1.3 Hardware and Software Specification

- (a) **Hardware Requirement** - For our project's robust performance and reliability, we've outlined precise hardware specifications. Our system will feature an Intel Core i5 processor from the latest 10th generation, clocked at 2.40 GHz, ensuring efficient handling of computational tasks.

To facilitate multitasking and manage large datasets effortlessly, we'll incorporate 8 GB of DDR4 RAM into our system. Storage needs will be met with a 256 GB solid-state drive (SSD), offering faster data access and improved system responsiveness.

Running on a 64-bit Windows 10 operating system, our hardware configuration is optimized for seamless compatibility with contemporary software and applications. With these specifications in place, we're poised to commence our project confidently, knowing our system can effectively meet its demands.

S.no	Specification	Description
i.	Processor	Intel core i3 and above generation.
ii.	RAM	Upto 8 GB
iii.	SSD	512 GB
iv.	System Type	64 bit OS X64 H Pre-Processor

(b) Software Requirement -

- i. **Python:** To implement the module, we use the Python programming language. Python is chosen for its flexibility, wide range of libraries, and simplicity, making it ideal for creating machine learning and data analysis applications.
- ii. **Computer Vision:** The software relies on computer vision techniques to accurately analyze food images uploaded by users. These techniques involve using algorithms to process visual data, allowing the module to recognize food items and extract information from the images. This enables the module to assess the nutritional content of the food items effectively.
- iii. **Streamlit:** We create the user interface of the module using Streamlit, a Python library. Streamlit makes it easy to build and launch interactive web apps that deal with data. It gives users a simple and intuitive way to interact with the module's features.
- iv. **Google API:** We need to connect with Google APIs to access external data sources and services. These APIs help us fetch nutritional info from other databases and perform tasks like understanding language using Google's tools.
- v. **Prompt Engineering:** The module uses a technique called prompt engineering to give personalized nutrition advice and responses based on what users say. This means we design specific questions or prompts to get the best answers from language models. It helps the module give customized guidance and info to users.
- vi. **Conda:** We use Conda to make sure everything the module needs is set up correctly. It helps manage the software packages and environment in Python, making it easy for both users and developers to install and configure everything they need.

S.no	Specification	Description
i.	Operating system	Window 11
ii.	Other Applications	Visual code, Conda, Version Control System, Web browser
iii.	Languages	Front-End – Streamlit Library. Server-Side – Google API. Back-End – Python , conda.
iv.	Network	Wi-Fi, LAN

Chapter 2 : System Analysis

2.1 Problem Analysis :

Problem analysis is like being a detective solving a mystery. We start by carefully examining the problem, breaking it down into smaller pieces to understand its different aspects. We ask questions like: What's going wrong? Why is it happening?

To get to the bottom of things, we gather information from various sources. We might talk to people affected by the problem, look at data or reports, or even conduct experiments to understand how things work.

Once we have all the pieces of the puzzle, we start connecting them. We look for patterns or trends—things that keep popping up and might be causing the problem. We also listen to different perspectives to make sure we're seeing the whole picture.

Finally, we put everything together in a clear, easy-to-understand summary. This helps us figure out the best way to fix the problem and make things better for everyone involved. Problem analysis is all about digging deep, finding the root cause, and coming up with smart solutions.

i. Dispersed Nutritional Data Sources: When it comes to finding out what's in our food, the information is all over the place. It's like pieces of a puzzle scattered across different platforms. This makes it hard for us to get a complete picture of the nutritional content of what we're eating.

Solution: Introducing a centralized platform that brings together all nutritional data from various sources into one easy-to-use interface. Users can access comprehensive details, ingredient lists, and health-related information, facilitating informed decision-making and promoting healthier dietary habits.

ii. Complex Food Analysis Processes: Analyzing the nutrition of food can be complicated. Users have to deal with complex data and understand different nutritional measures. This complexity might stop users from doing a detailed analysis and making the best dietary choices.

Solution: We're creating a user-friendly platform with simple food analysis tools. Our goal is to make it easy for users to access important nutritional info like calorie counts, macronutrient breakdowns, and ingredient analyses. With this platform, users can make informed dietary choices effortlessly and work towards their health goals effectively.

iii. Time-Consuming Research Procedures: Searching for nutritional data from multiple sources can be overwhelming and time-consuming. This might discourage users from exploring their options fully and delay them from adopting healthier dietary habits.

Solution: Introducing a comprehensive research platform that gathers real-time nutritional data from different sources. This platform serves as a centralized hub for users to analyze nutrition, research ingredients, and monitor dietary trends. By simplifying the research process, it helps users make informed decisions quickly and proactively adopt healthier eating habits.

iv. Limited Comparison Tools: Users might struggle to compare the nutritional content of different foods, making it hard for them to choose healthier options.

Solution: Improve decision-making by adding advanced comparison tools to the platform. These tools will let users compare different foods side by side, looking at things like calorie density, nutrient profiles, and ingredient quality. With these insights, users can make informed decisions and choose healthier options more easily.

v. Lack of Transparency in Nutritional Information: Users might struggle to find clear and accurate nutritional information, leaving them unsure about what's in their food and how it affects their health.

Solution: We're creating clear and simple nutritional guidelines that explain the nutritional content and health benefits of various foods. Plus, we'll give real-time updates and notifications about nutritional trends and dietary recommendations. This way, users can easily access accurate information and feel confident about their food choices, leading to healthier eating habits.

2.2 FEASIBILITY STUDY

2.2.1 Economic Feasibility Study :

An economic feasibility study checks if a project or business idea would make enough money to be worth doing. It looks at different things to see if the project could be profitable and last for a long time.

1. **Cost-Benefit Analysis:** Doing a cost-benefit analysis helps us see if the Nutrigen project is worth it. We look at things like how much it costs to develop and run the project, as well as how much money it could make and save for users.
2. **Market Demand and Potential:** Checking if people want a nutritional analysis app like Nutrigen is really important. We study what the target users want, like, and are willing to pay for in such a service. This helps us figure out if the project will make economic sense.
3. **Revenue Generation:** Figuring out how Nutrigen can make money is crucial. We can do this by offering special features or subscription plans for more detailed nutritional analysis. Another option is teaming up with health brands for sponsorship or advertising chances.
4. **Competitive Analysis:** Looking at other similar apps helps us see how Nutrigen stacks up against them. We can find ways to stand out and decide on prices and what makes Nutrigen special compared to the competition.
5. **Scalability and Return on Investment (ROI):** We need to see if Nutrigen can grow over time and if it'll make enough money in the long run. This means figuring out how many users we can get, how much money we'll make, and what it'll cost to keep running. It's all about making sure Nutrigen can keep making money and growing sustainably.

2.2.2 Technical Feasibility Study :

Technical feasibility refers to the evaluation of whether a proposed project can be implemented using current technology and resources. Here's a draft for our E-Auction project:

- i. **Infrastructure Requirements :** To make the Image-Based Food Analysis module work smoothly, we'll need strong server infrastructure. This includes handling things like processing images, storing data, and interacting with users. Cloud-based options like AWS or Google Cloud are great because they can scale up as more people use the module. This means we can keep things running smoothly even when there are lots of users, and make sure everything works quickly and responsively.
- ii. **Security Measures :** To keep users' personal and dietary info safe, we'll use encryption protocols for secure data transmission and storage. This means the data will be coded in a way that only authorized people can understand it. We'll also have strong authentication methods and access controls to make sure only the right people can access the info. Plus, we'll regularly check for any security issues to keep everything safe from hackers and unauthorized access.
- iii. **Image Recognition and Processing :** The module uses advanced computer vision algorithms to analyze food images accurately. By integrating with image processing libraries like OpenCV or TensorFlow, we can recognize food items efficiently and extract important nutritional information from the images.
- iv. **Mobile Compatibility :** It's important to make sure the module works well on different mobile devices and operating systems so that everyone can use it easily. We'll use responsive design principles to make sure the module adjusts to different screen sizes and layouts. We might also consider developing a mobile app to make it even easier for people to access the module on their phones or tablets. This way, more people can use the module no matter what kind of device they have.
- v. **Technical Support and Maintenance :** Offering continuous technical support and maintenance services is essential for addressing user questions, fixing technical problems, and keeping the module running smoothly. We'll provide regular updates to improve the user experience, fix any bugs, and make the platform work even better over time. This way, users can always rely on the module to meet their needs and provide valuable nutritional insights.

2.2.3 Behavioral Feasibility Study :

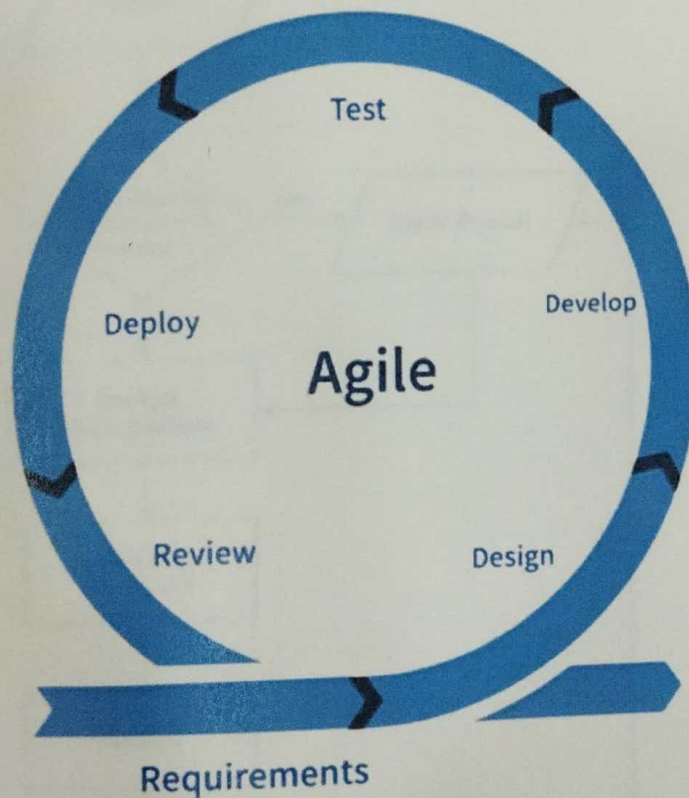
A behavioral feasibility study looks at whether people are likely to change their behavior to support a proposed project. It examines things like attitudes, beliefs, and motivations to see if people will be willing to adopt the changes needed for the project to succeed.

- i. This module gives users lots of info about what's in their meals, helping them make smart choices for their health goals. It gives personalized advice, making users feel more confident and healthy.
- ii. As more people care about health, there's a big need for tools that help with eating better. This module fills that need by making it easy to check food pictures and get nutritional info. It's made for folks who want to be healthier, making it simpler to pick good foods.
- iii. The module meets the need for easy-to-access nutrition info, especially when other sources aren't available. It uses image recognition and cloud tech to give users a smooth experience, letting them check nutrition data wherever they are.
- iv. The module helps people change their habits by giving them personalized advice on their food choices. It lets users track what they eat, set goals, and see how they're doing, empowering them to eat healthier in the long run.
- V. The module helps people change their habits by giving them advice on their food choices. It lets users track what they eat, set goals, and see how they're doing, which encourages them to stick to healthier habits over time.

2.3 PROJECT DEVELOPMENT PROCESS

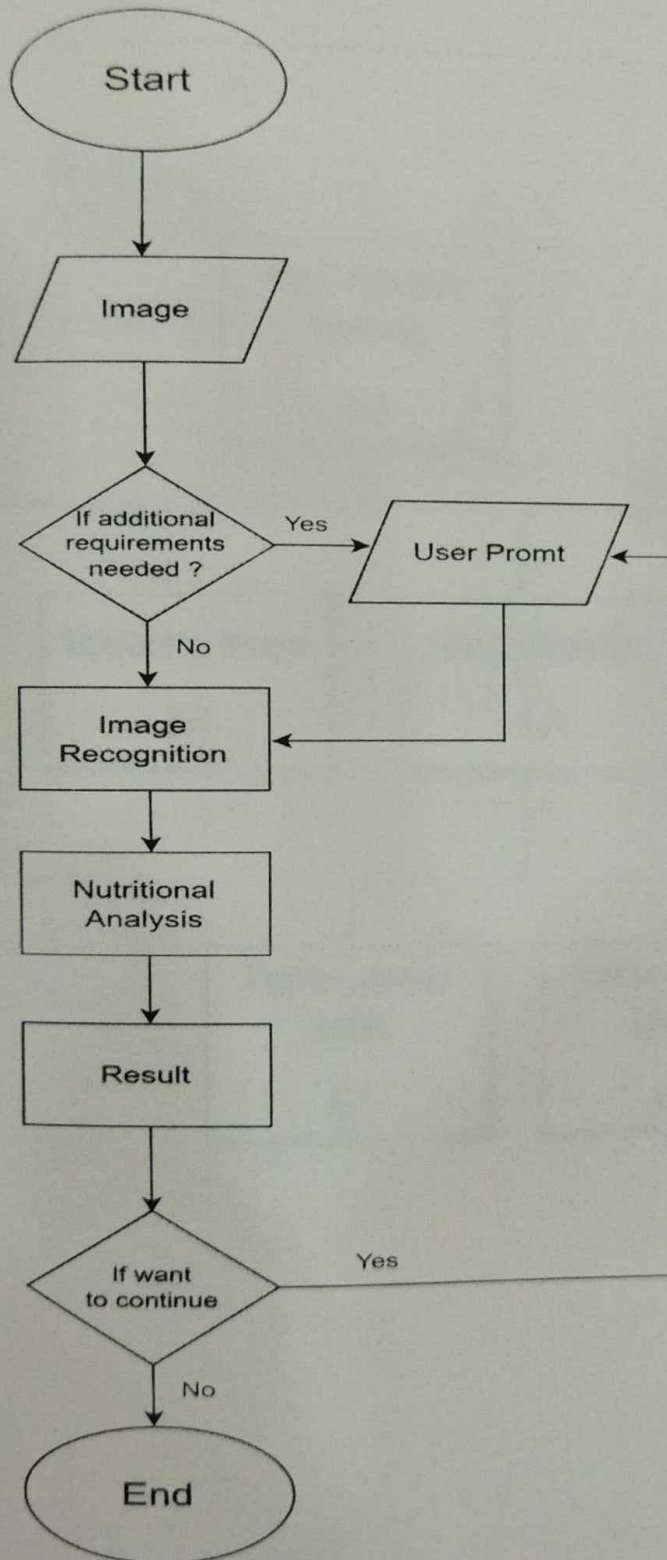
In the creation of the NutriGen project, Agile methodology was utilized. Agile development is marked by its collaborative and iterative approach, giving significant importance to adaptability and customer feedback. It emphasizes flexible planning, gradual delivery, and ongoing enhancement, empowering teams to swiftly adapt to changes and efficiently deliver value.

Agile Model

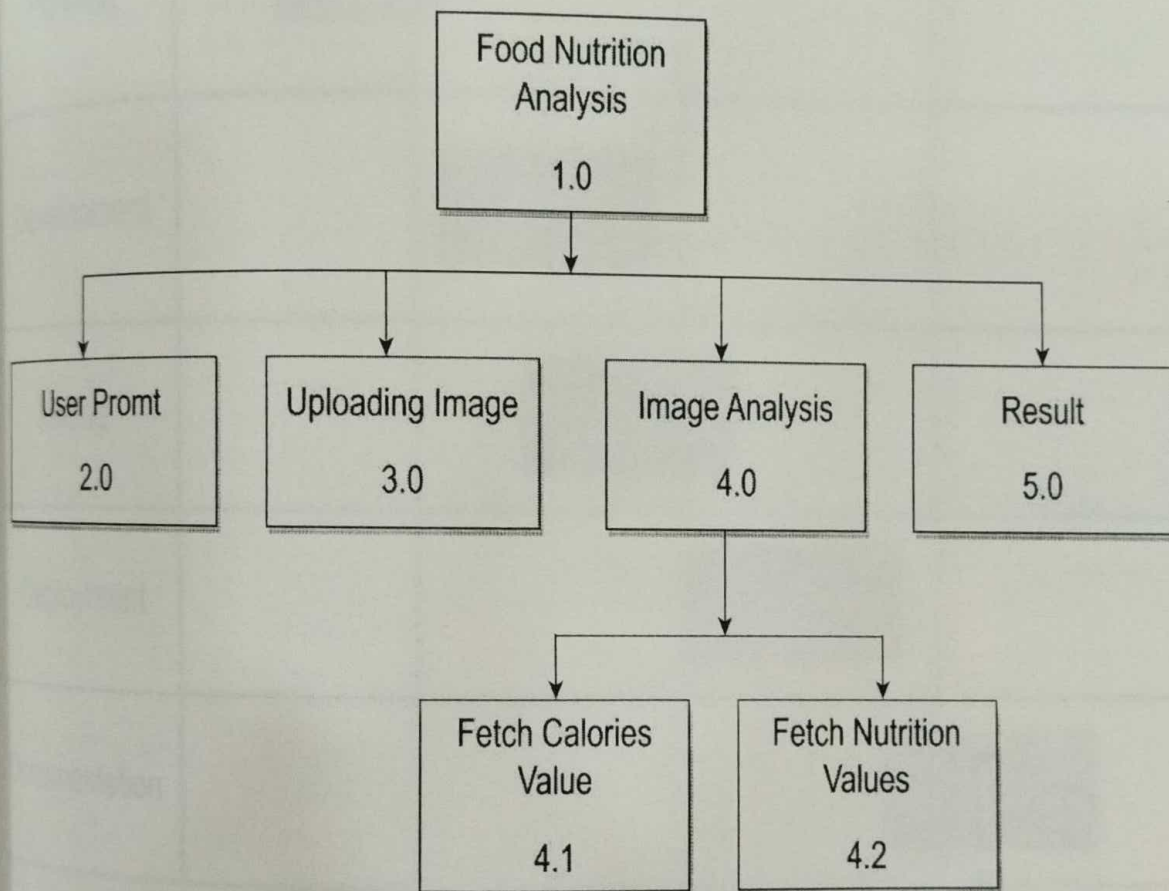


Chapter 3: System Design




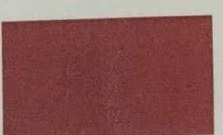
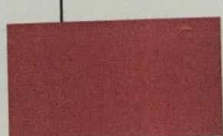
3.1 System FlowChart :



3.2 HIPO Diagram :



3.3 Gantt Chart :

Process	Jan	Feb	Mar	Apr
Planning				
Development				
Testing				
Deployment				
Documentation				

Chapter 4 : Testing

Testing is super important for making sure our online service works well. We don't just check if it runs smoothly; we also test how fast it is and how safe it keeps users' info. To keep our platform reliable, we use these testing techniques:

4.1 Unit Testing :

We performed unit testing in each and every smallest unit of the of project individually to check its working. We need different test data to perform the testing. We try each and every type of possible input to check their corresponding outputs and its working.

Test Case ID	Section	Test Case	Test Data	Expected Result	Result
01	Image Recognition	Handle no image uploaded	No Image Uploaded	Display appropriate message	Test case passed
	Image Recognition	Identify food items from images	Sample food images	Correct identification of items	Test case passed
	Image Recognition	Handle various image qualities	Images with different lighting	Consistent recognition	Test case passed
02	Nutritional Analysis	Calculate values accurately	Nutritional data	Accurate nutritional calculations	Test case passed
	Nutritional Analysis	Consider portion sizes	Food items with serving sizes	Adjusted values based on portion sizes	Test case passed
	Nutritional Analysis	Analyze complex dishes	Recipes with multiple ingredients	Correct breakdown of nutritional calculations	Test case passed
	Nutritional Analysis	Handling missing nutritional information	Food items with incomplete data	Provide best estimate for missing values	Test case passed
03	Personalized Recommendations	Provide relevant suggestions	User dietary preferences	Recommendations match user preferences	Test case passed

4.2 Integration Testing:

Integration testing is really important for making sure all the parts of project work together smoothly. It's a big step in making sure our app runs well, keeps info safe, and works fast. We use integration testing to check that all the different pieces of our app fit together and work like they should.

Test Case ID	Test Case	Description	Expected Outcome	Result
01	Image Recognition With Nutritional Analysis	Test integration between image recognition and nutritional analysis	Correct nutritional analysis based on recognized food items.	Test case passed
02	Personalized Recommendation with Nutritional Analysis	Test integration between personalized recommendations and nutritional analysis.	Product is Displayed in correct category.	Test case passed
03	User Interface with Backend Services	Test integration between UI and backend services.	UI triggers backend processes accurately	Test case passed
04	Input Validation with Error Handling	Test integration between input validation and error handling.	Proper validation and display of error messages.	Test case passed

Chapter 5 : Implementation

Firstly, we need to install some IDE software for implementing our project which are as follows:

i. Visual Studio Code –

- Go to the official Visual Studio website <https://visualstudio.microsoft.com/downloads/>.
- Click on the "Download" button for the version of Visual Studio you want to install.
- Choose the components you want to install, such as languages, frameworks, and tools.
- Click on the "Install" button to start the installation process.
- Follow the installation wizard and select the options that suit your needs.

ii. Anaconda or Miniconda –

- Go to official Anaconda website: <https://www.anaconda.com/>.
- Select the appropriate version of Anaconda community edition, your system architecture and the package type.
- Click on the "Download" button to start the download.
- Once the download is complete, run the installer. Choose the "Complete" installation type for a typical installation with default settings.
- Open a new terminal or command prompt window to recognize the changes made by the installer.
- Update Conda to the latest version using the command: 'conda update conda'.
- Create a new environment using the command: 'conda create --name myenv', replacing 'myenv' with your desired environment name.
- Activate your environment:
- On Windows: 'conda activate myenv'
- On macOS and Linux: 'source activate myenv'
- Install packages into your environment using the command: 'conda install packagename', replacing package-name with the name of the package you want to install.

iii. Python –

- Visit the official Python website at python.org and go to the Downloads section.
- Decide which version of Python you want to install. Python 3 is the recommended version.
- Choose the appropriate installer for your operating system (Windows, macOS, or Linux) and download it.
- Once the download is complete, locate the downloaded installer file and run it.
- Follow the installation wizard's instructions. You may need administrative privileges to install Python.
- Customize the installation by choosing the installation directory, adding Python to your system PATH, and selecting additional features.
- Complete the installation process. Once finished, you should see a message indicating successful installation.
- Verify the installation by opening a command prompt (Windows) or terminal (macOS/Linux) and typing 'python --version'. This command displays the installed Python version. Typing python and pressing Enter enters the Python interpreter.
- Update pip to the latest version using the command: 'python -m pip install --upgrade pip'.
- Install additional Python packages using pip. For example, to install the requests package, use the command: 'pip install requests'.

iv. Streamlit –

- Open a terminal or command prompt.
- Use pip to install Streamlit: 'pip install streamlit'
- Wait for installation to finish.
- Verify the installation: 'streamlit --version'.


Chapter 6 : Sample Forms

6.1 Main Page

NutriGen

Input Prompt:

Choose an image...

 Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG

Browse files

Tell me the total calories

6.2 Junk Food Image Upload

 pennie-pasta-tomato-sauce-with-chicken-tomatoes-wooden-table.jpg 11.2MB





Uploaded Image.

Tell me the total calories

6.3 Nutrition Analysis Of Junk Food

The Response is

1. Chicken Pasta - 498 calories
2. Cherry Tomatoes - 27 calories
3. Parsley - 6 calories

Total Calories: 531

The dish is not healthy because it is high in carbohydrates and low in protein and vegetables. The percentage split of the ratio of carbohydrates, fats, fibers, sugar, and other things required in our diet is as follows:

Carbohydrates: 55% Fats: 25% Fibers: 10% Sugar: 5% Other: 5%

6.4 Healthy Food Image Upload

Choose an image...



Drag and drop file here

Limit 200MB per file • JPG, JPEG, PNG

Browse files



360_F_51212489_T5VPYoaeyKQc3XShEjJAn5Xng6DbBjLV.jpg 45.6KB



6.5 Nutrition Analysis Of Healthy Food

Tell me the total calories

The Response is

The food items in the image are:

1. Lettuce - 5 calories
2. Tomatoes - 16 calories
3. Cucumber - 16 calories
4. Bell pepper - 31 calories
5. Feta cheese - 78 calories
6. Kalamata olives - 115 calories
7. Red onion - 8 calories
8. Olive oil - 119 calories

Total calories: 382 calories

The food items in the image are healthy. They are low in calories and high in nutrients. The salad is a good source of vitamins, minerals, and fiber. The feta cheese is a good source of protein and calcium. The olive oil is a good source of healthy fats.

The percentage split of the ratio of carbohydrates, fats, fibers, sugar and other things required in our diet is:

Carbohydrates: 45% Fats: 35% Fiber: 10% Sugar: 5% Other: 5%

Chapter 7 : Conclusion

In a nutshell, NutriGen is a game-changer in the world of nutrition and personal wellness. Using advanced image recognition and tailored dietary insights, it revolutionizes how people approach their eating habits.

At its heart, NutriGen empowers users, giving them control and understanding over what they eat. By analyzing food images and providing detailed nutrition info, it helps users make smart choices that match their health goals and tastes.

But NutriGen does more than just give data; it builds a deeper connection between people and their food. Its easy-to-use interface turns complex info into actionable tips, making users feel like they're in charge of their health. With personalized recommendations, NutriGen guides each user towards better nutrition and well-being.

Plus, NutriGen isn't just about knowledge—it's about action. It gives users practical strategies and support to turn what they learn into healthy habits that last.

In short, NutriGen is the perfect blend of science and tech for better health. And as it keeps growing and improving, it's leading us towards a future where personalized nutrition is key to overall wellness.

Bibliography

The following links were referred during the analysis and execution phase of the project.

1. <https://www.kaggle.com/models?tfhub-redirect=true>
2. <https://www.nutritionix.com/business/api>
3. <https://streamlit.io/>
4. <https://cloud.google.com/vision>
5. <https://scikit-learn.org/stable/>

PLAGARISM REPORT

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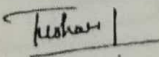
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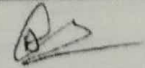
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Summary

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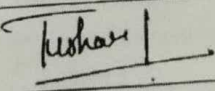
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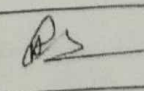
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Punctuality/Timely completion of assigned work			✓		
Learning capacity/Knowledge up gradation			✓		
Performance/Quality of work				✓	
Behaviour/Discipline/Team work			✓		
Sincerity/Hard work				✓	
Comment on nature of work done/Area/Topic	<ul style="list-style-type: none"> - Discuss about the program - Learn Python Basics - Well Organized and Expected output 				
OVERALL GRADE (Any one)	POOR/AVERAGE/GOOD/VERYGOOD/EXCELLENT				
Name of Industry Mentor	Tushar				
Signature of Industry Mentor					

Receiving Date	16/1/24	Name of Faculty Mentor	Dr. Anshu Chaturvedi	Sign	
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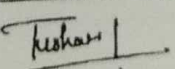
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Behaviour/Discipline/Team work				✓	
Sincerity/Hard work				✓	
Comment on nature of work done/Area/Topic	<ul style="list-style-type: none"> - Learn Python Libraries (Panda , NumPy , Matplotlib). - Data Visualization. 				
<u>OVERALL GRADE (Any one)</u>	<u>POOR/AVERAGE/GOOD/VERYGOOD/EXCELLENT</u>				
<u>Name of Industry Mentor</u>	Tushar Shandhilya				
<u>Signature of Industry Mentor</u>					

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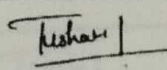
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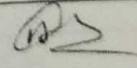
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<u>Name of Industry Mentor</u>	Tushar Shandhilya				
<u>Signature of Industry Mentor</u>					

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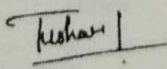
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OVERALL GRADE (Any one)	POOR/AVERAGE/GOOD/VERYGOOD/EXCELLENT				
Name of Industry Mentor	Tushar Shandhilya				
Signature of Industry Mentor					

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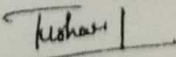
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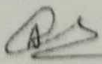
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Comment on nature of work done/Area/Topic	<ul style="list-style-type: none"> - Gained the skills necessary to cope with real-time projects. - Learnt coding skills to manage the big data. 				
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<u>Name of Industry Mentor</u>	Tushar Shandhilya				
<u>Signature of Industry Mentor</u>					

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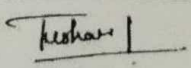
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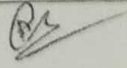
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Name of Industry Mentor	Tushar				
Signature of Industry Mentor					

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OVERALL GRADE (Any one)	✓ <u>POOR/AVERAGE/GOOD/VERYGOOD/EXCELLENT</u>				
Name of Industry Mentor	Tushar Shandhilya				
Signature of Industry Mentor					

Receiving Date	22/4/24	Name of Faculty Mentor	Dr. Anshu Chaturvedi	Sign	
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