

Automated Food Recognition and Personalized Health Recommendation App

December 26, 2024

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Github Link: <https://github.com/shantanuchougule/Feynn-Labs/tree/main/Project%204>

Step 1: Prototype Selection

Abstract

The Automated Food Recognition and Personalized Health Recommendation App leverages cutting-edge artificial intelligence to address the growing need for personalized health management. This app integrates a Convolutional Neural Network (CNN) for accurate food recognition and Google Gemini API to provide customized dietary and workout plans based on user preferences, health conditions, and lifestyle goals. Designed for health-conscious individuals, the app simplifies calorie tracking and meal planning, promoting sustainable wellness.

This project focuses on creating a scalable and monetizable product that aligns with current health trends and long-term market viability. It offers direct monetization through subscription-based pricing and partnerships with healthcare providers and fitness brands. The app's prototype demonstrates feasibility, combining AI-driven insights with an intuitive user interface. This solution not only empowers users to achieve their fitness goals but also contributes to the broader vision of leveraging AI for improving health outcomes globally.

Problem Statement

In today's fast-paced world, individuals struggle to manage their health due to a lack of accessible tools for tracking diet and fitness. Manually monitoring calorie intake, meal planning, and creating workout routines can be time-consuming and prone to inaccuracies. This creates a gap for a solution that integrates technology to provide personalized health recommendations. The Automated Food Recognition and Personalized Health Recommendation App addresses this issue by using AI to recognize food items, calculate nutritional values, and offer tailored diet and exercise plans. This app empowers users to make informed decisions, promoting healthier lifestyles with minimal effort.

Evaluation of the Prototype

1. Feasibility

The Automated Food Recognition and Personalized Health Recommendation App is feasible within a short-term timeline of 2-3 years. Current advancements in AI, including image recognition through Convolutional Neural Networks (CNNs) and APIs like Google Gemini for health recommendations, make this concept technically achievable. The development process is streamlined by the availability of open datasets for training and existing cloud platforms for deployment.

2. Viability

Health and fitness are evergreen sectors, with increasing global emphasis on personalized wellness solutions. The app aligns with this trend, ensuring its relevance for the next 20-30 years. Rising adoption of AI-powered health tools and government initiatives promoting healthier lifestyles further support its long-term viability. Continuous updates with advancements in AI and healthcare will maintain user engagement and market competitiveness.

3. Monetization

The app is directly monetizable through:

- **Subscription Plans:** Monthly or annual fees for premium features.
- **Partnerships:** Collaborations with gyms, dieticians, and health-focused brands.
- **In-app Advertisements:** Optional monetization without affecting user experience. These revenue streams ensure a sustainable and scalable financial model.

Step 2: Prototype Development

The Automated Food Recognition and Personalized Health Recommendation App prototype validates the feasibility and functionality of the proposed product. Below is an overview of the development process:

1. Features and Workflow

Food Recognition:

- Utilizes a Convolutional Neural Network (CNN) trained on a dataset of food images to identify food items in user-uploaded photos.
- Provides calorie and nutritional breakdown of identified food items.

Personalized Health Recommendations:

- Integrates with the Google Gemini API to deliver customized diet and workout plans based on user inputs like age, weight, height, gender, activity level, and health goals.

User Interface:

- Built with Stream-lit for a simple and interactive frontend.
- Allows users to upload images, input personal details, and view personalized recommendations.

2. Code Implementation

Technologies Used:

- Python for backend development.
- TensorFlow/Keras for building and training the CNN model.
- Stream-lit for creating the user interface.
- Google Gemini API for generating personalized recommendations.

Workflow:

- User uploads a food image via the app.
- The CNN model identifies the food item.
- Nutritional data and calorie details are displayed.
- User inputs personal details (e.g., age, gender, weight, height).
- Google Gemini API generates diet and workout recommendations.

3. Prototype Validation

Food Recognition Accuracy:

- The CNN model achieves high accuracy on a test dataset of food images, ensuring reliable identification.

Recommendation Relevance:

- Health plans and workout routines generated by Google Gemini API are personalized and align with user inputs.

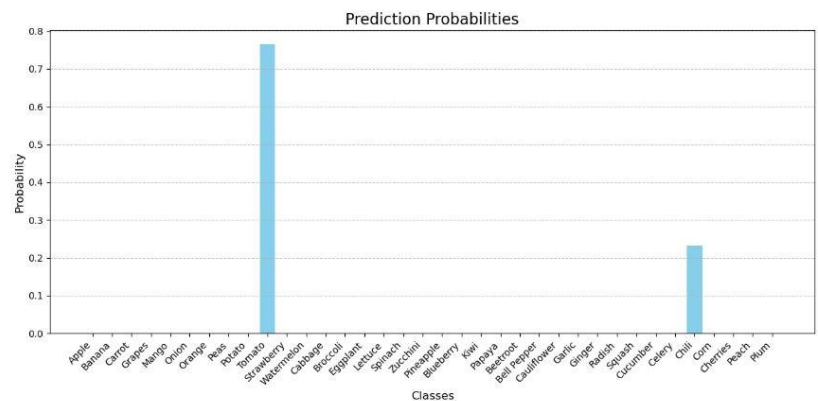
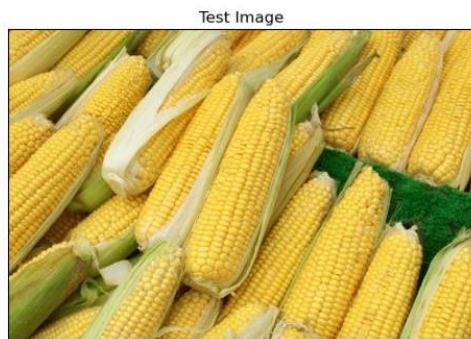
4. Optional Enhancements

- Integration of additional APIs for ingredient-based calorie estimation.
- Development of a mobile app for broader accessibility.

5. Prototype Outcomes

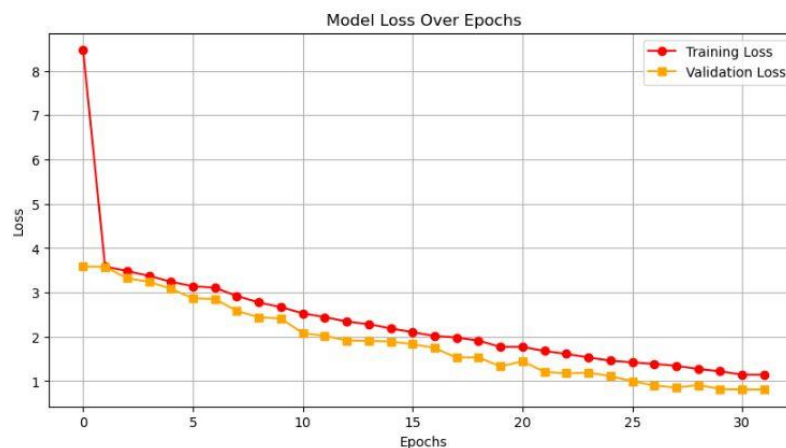
- The prototype demonstrates the core functionality of recognizing food and generating personalized health recommendations.
- It validates the app's potential to simplify calorie tracking and promote healthy living.

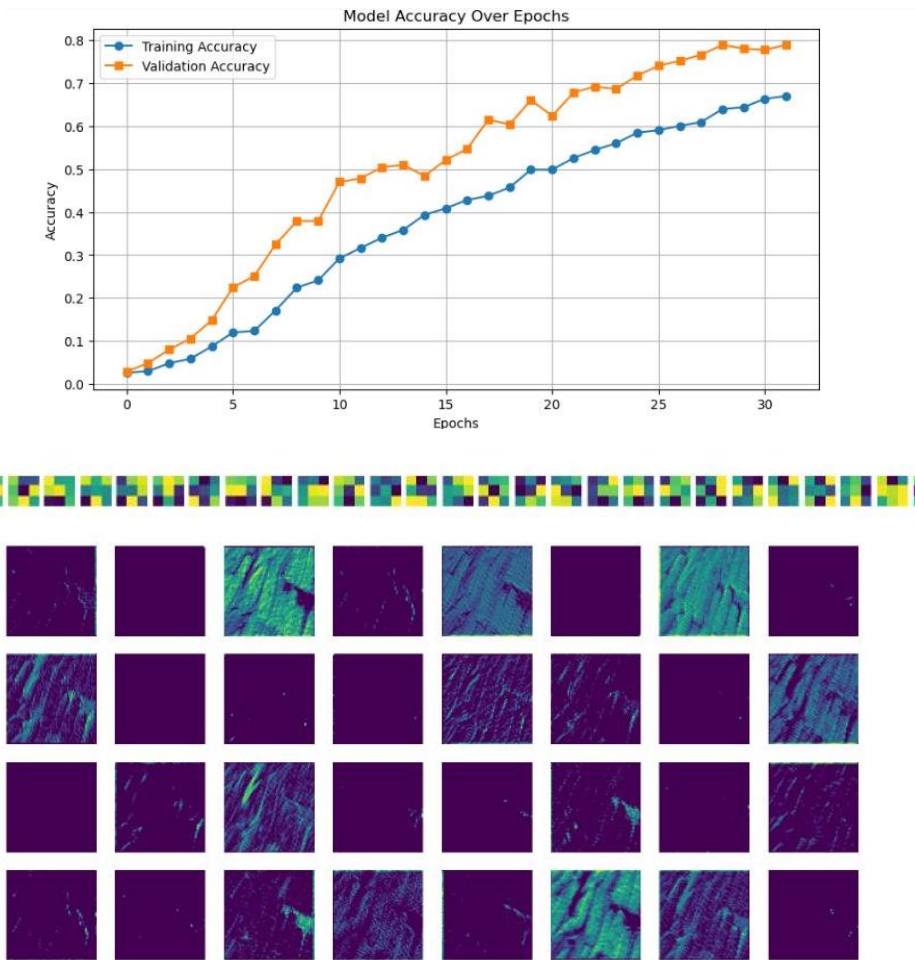
Visualizing and Performing Prediction on a Single Image



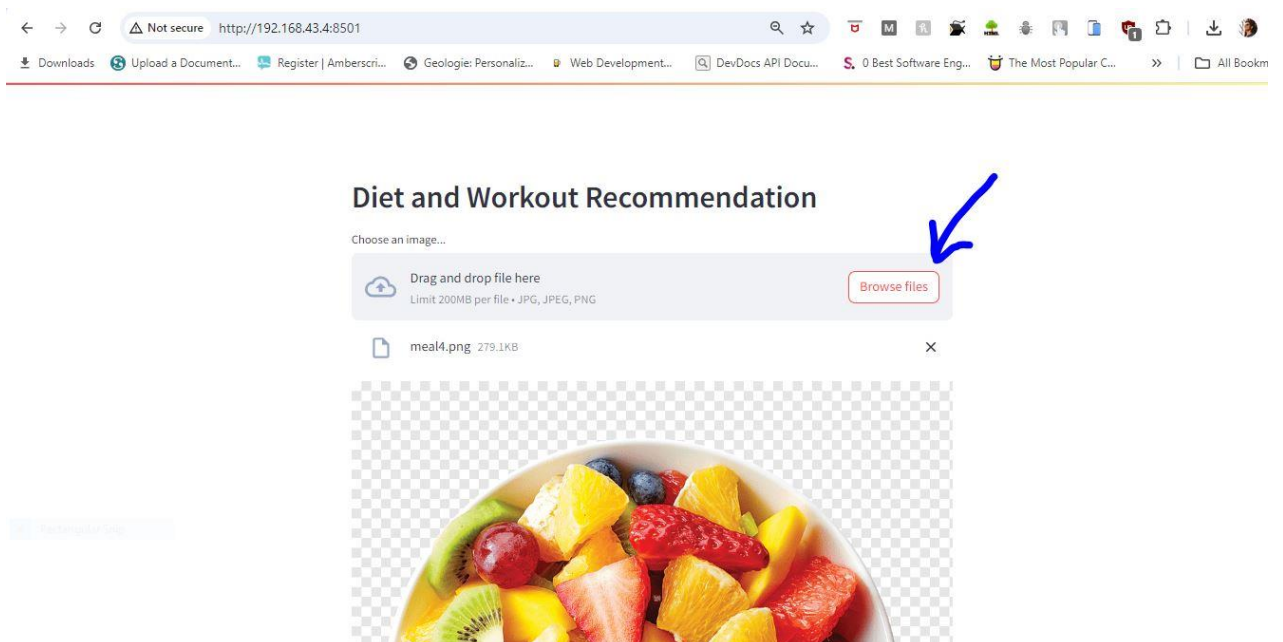
```
n [11]: #Single image Prediction
print("It's a {}".format(test_set.class_names[result_index]))
```

It's a corn





Web Interface



Enter your age:
20

Select your gender:
Male

Enter your weight (kg):
55

Enter your height (cm):
164

Enter your waist size (cm):
80

Enter your neck size(cm):
40

How often do you workout weekly:
Sedentary: little or no exercise

Diet Preference:

Fitness Report

- BMI:
 - $BMI = (Weight\ (kg) / Height\ (m)^2)$
 - $BMI = (55 / (1.64)^2) = 20.6$ (Healthy weight range)
- BFP:
 - $BFP = 86.010 \times \log_{10}(\text{abdomen-neck}) - 70.041 \times \log_{10}(\text{height}) + 36.76$
 - $BFP = 86.010 \times \log_{10}(80-40) - 70.041 \times \log_{10}(164) + 36.76 = 20.5\%$ (Healthy body fat percentage)
- Daily Calorie Intake:
 - Your BMR (Basal Metabolic Rate) is approximately 1600 calories.
 - As you are sedentary, your daily calorie intake should be around 2000-2500 calories.

Workout Recommendation for week

Day	Exercise	Duration
Monday	Cardio (Running, cycling, swimming)	30 minutes
Tuesday	Strength Training (Squats, push-ups, lunges)	30 minutes
Wednesday	Rest	

Personalized Diet and Workout Recommendation

Food Recognition

Predicted Food: Fruit Salad

Calorie Estimation & Food Analysis

Item	Total Calories	Protein (g)	Carbs (g)	Fats (g)	Fiber (g)	Vitamins
1 cup Strawberries	46	1	11	0.4	2	Vitamin C, folate, potassium
1/2 cup Kiwi	42	1	11	0.5	3	Vitamin C, potassium, folate
1/2 cup Mango	60	1	15	0.3	2	Vitamin A, C, potassium
1/2 cup Grapes	52	0.4	14	0.2	1	Potassium, Vitamin K
1/2 cup Orange	62	1	16	0.2	2	Vitamin C, potassium

1 / 5 67%

Diet and Workout Report

Food Recognition

Predicted Food: Fruit Salad

Calorie Estimation

Item	Total Calories	Protein (g)	Carbs (g)	Fats (g)	Fiber (g)	Vitamins
1 Cup Strawberries	50	1	11	0.5	2	Vitamin C, Potassium
1 Cup Mango	100	1	25	0.5	3	Vitamin C, Potassium
1 Cup Kiwi	90	1	23	1	3	Vitamin C, Potassium
1 Cup Orange	65	1	16	0.5	2	Vitamin C, Potassium
1 Cup Grape	60	1	15	0.5	1	Vitamin K, Potassium
Total **365** **5** **90** **3.5** **11** Vitamin C, Potassium, K						

Diet Recommendation

****Your daily calorie intake should be around 2000-2500 calories.****

****Here's a sample meal plan for you:****

Step 3: Business Modelling

The Automated Food Recognition and Personalized Health Recommendation App aims to establish a sustainable and scalable business by addressing a growing demand for personalized health and wellness solutions. Below is the detailed business model:

1. Value Proposition

- **Personalized Health Management:** Provides users with tailored diet plans, workout routines, and calorie tracking based on individual preferences, medical conditions, and fitness goals.
- **Time-Saving AI Technology:** Automates food recognition and recommendation processes, reducing the manual effort required for meal planning and calorie tracking.
- **Holistic Wellness Support:** Integrates AI insights with health and fitness expertise to promote long-term lifestyle improvements.

2. Target Market

Demographic Segments:

- **Age:** 20–50 years.
- **Gender:** Equally appealing to male and female users.
- **Income:** Middle to high-income groups who can afford subscriptions.

Geographic Segments:

- **Primary:** Urban areas in Tier 1 and Tier 2 cities with higher digital adoption.
- **Secondary:** Suburban regions showing increased interest in health and fitness apps.

Psychographic Segments:

- **Tech-savvy individuals** willing to adopt AI-driven solutions.
- **Health-conscious users** focused on personalized wellness.

3. Revenue Streams

Subscription Plans:

- **Free Tier:** Limited features with ads.
- **Premium Tier:** Ad-free experience with advanced health recommendations at ₹500/month or ₹5,000/year.

Partnerships:

- Collaborations with gyms, dietitians, fitness centers, and health brands for targeted promotions.

In-App Purchases:

- Additional features like custom meal plans, fitness challenges, or consultations with experts.

Advertisements (Optional):

- Sponsored health products or services in the free tier.

4. Cost Structure**Development and Maintenance:**

- Initial development costs for AI models and API integrations.
- Regular updates for features and datasets.

Infrastructure:

- Cloud storage and processing costs for handling user data and app functionality.

Marketing:

- Digital campaigns targeting health-conscious users in urban areas.
- Partnerships with influencers and fitness communities.

Customer Support:

- Dedicated teams to handle user queries and ensure app satisfaction.

5. Marketing Strategy**Channels:**

- Digital marketing: Social media ads, health blogs, and newsletters.
- App store optimization: Highlight features and benefits to rank higher in app stores.
- Referral programs: Incentives for existing users to bring new customers.

Positioning:

- As a comprehensive AI-powered solution for personalized health and wellness.
- Emphasis on user convenience and accuracy in calorie tracking and health insights.

6. Scalability and Expansion**Short-Term Goals:**

- Establish a strong presence in urban areas.
- Build partnerships with fitness and health organizations.

Long-Term Goals:

- Expand to Tier 3 cities and suburban regions.
- Introduce multilingual support to cater to a diverse audience.

Step 4: Financial Modelling

The financial modelling for the Automated Food Recognition and Personalized Health Recommendation App involves estimating revenue based on sales volume, pricing, and operational costs. Below is the detailed breakdown:

Example Calculation

Price per Subscription (P): ₹500/month.

Monthly Fixed Costs (C): ₹20,000 (includes server hosting, API charges, marketing, and customer support).

Sales Volume (x): Assume 1,000 subscriptions sold in a month.

$$Y = 500 \cdot 1000 - 20000 = ₹4,80,000$$

Break-Even Analysis

The break-even point occurs when revenue equals costs ($y=0$):

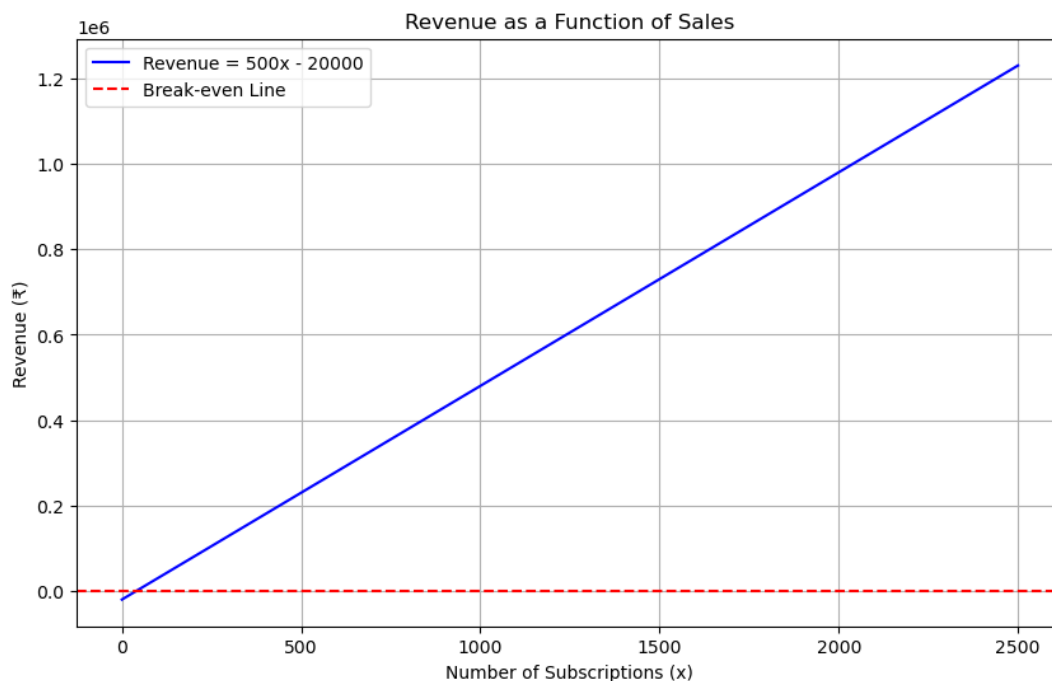
$$0 = 500 \cdot x - 20000$$

Solve for x :

$$x = 20000 / 500 = 40$$

Break-even sales: The app needs at least 40 subscriptions per month to cover costs.

Financial Projections:



The financial model demonstrates that the app can achieve profitability with a relatively low sales threshold. By focusing on user acquisition and retention, the app has the potential for sustainable growth in the competitive health-tech market.

Conclusion

The Automated Food Recognition and Personalized Health Recommendation App addresses a growing need for personalized health management by combining AI-powered food recognition with tailored dietary and fitness recommendations. The project demonstrates feasibility through its scalable technology stack, including Convolutional Neural Networks for food recognition and integration with advanced APIs like Google Gemini for health insights.

Through detailed market segmentation and financial modeling, the app has been validated as a viable business opportunity. The business model is designed to generate revenue through subscription plans, partnerships, and in-app purchases, ensuring long-term sustainability. Financial projections reveal that the app achieves profitability at a low break-even point of just 40 subscriptions per month, with significant revenue potential as user adoption grows.

This project highlights the potential of AI in transforming health and wellness management, empowering individuals to make informed lifestyle choices. Future plans include expanding the app's capabilities with ingredient-based calorie estimation, multilingual support, and integration with wearable devices. With a strong foundation in technology, market relevance, and monetization strategies, this app is well-positioned to thrive in the competitive health-tech industry, contributing to better health outcomes and improved user convenience.

