



Topic:Fitness app analyzer  
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## Problem Statement

The fundamental challenge in personal nutrition is that many people lack clarity regarding meal suitability for specific fitness goals. Individuals are often left without a reliable method to evaluate whether their daily recipes align with their health objectives. This knowledge gap forces them to depend on estimation and online advice rather than personalized, data-driven feedback. As a result, meal choices become inconsistent and often suboptimal for their intended fitness outcomes. This inconsistency not only slows physical progress but also diminishes long-term motivation and adherence.

## The system architecture

The system employs a well-defined, three-tier architecture designed to ensure both high performance and clear separation of concerns, which allows each component to be developed, scaled, and maintained independently.

The first tier, the presentation layer, is a responsive web application built with modern frameworks to provide an intuitive and accessible user interface. This layer handles all user interactions, from inputting a recipe and selecting a fitness goal to displaying the analysis results in a clear, actionable format, ensuring a seamless user experience across all devices.





### The ML model

The analytical core employs a multi-stage machine learning pipeline. Initial natural language processing standardizes recipe text through tokenization and semantic normalization. A transformer-based embedding model converts textual recipes into high-dimensional vector representations. These embeddings undergo classification through a deep neural network architecture specifically designed to correlate recipe attributes with fitness outcome predictions

### Vector Database & Semantic Analysis

For nutritional similarity assessment I implemented vector embeddings . Each recipe undergoes transformation into a 384-dimensional vector representation capturing its nutritional profile. These embeddings populate a ChromaDB vector database, enabling efficient similarity searches through approximate nearest neighbor algorithms. This facilitates intelligent recipe recommendations based on nutritional congruence rather than mere keyword matching.

The second tier, the **application layer**, serves as the computational core of the system. It is powered by a robust API that orchestrates the entire machine learning pipeline. This layer receives requests from the frontend, executes the pre-trained deep learning models for embedding generation and classification, and manages the business logic for nutritional analysis and recommendation generation. It acts as the intelligent engine that transforms raw recipe data into meaningful insights.

The third tier, the **data layer**, is dedicated to information persistence and intelligent retrieval. At its heart is a specialized vector database that stores high-dimensional embeddings of recipes, enabling lightning-fast semantic similarity searches. This layer does not just store data; it allows the system to understand contextual relationships between different foods and cooking methods, facilitating the find similar healthy recipes feature that enhances the system's utility.

The system employs Docker to ensure consistent deployment across large environments. Three containerized services operate in concert: an Nginx-served frontend application, a Python-based inference service incorporating PyTorch models, and a ChromaDB vector database instance. This encapsulated approach guarantees environmental consistency while simplifying both development iteration and production deployment.



# 🍴 Recipe Fitness Analyzer

AI-powered analysis to match recipes with your fitness goals

## ✍ Enter Your Recipe

Example: Grilled chicken breast with steamed broccoli, quinoa, and olive oil. Season with herbs and spices...

## ◎ Select Your Fitness Goal



Lose Weight

Calorie deficit



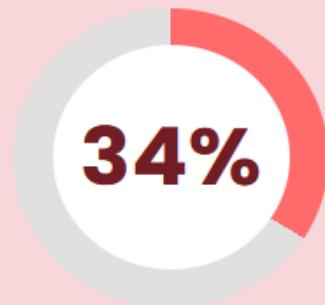
Gain Weight

Muscle building

⬇️ Analyze Recipe with AI

 NEEDS ADJUSTMENT

**Too calorie-dense for weight loss. Consider reducing high-calorie ingredients.**



Calorie density score: 21, Protein: Yes, Veggies: Yes

 Recommendations

-  Reduce oil, cheese, nuts or avocado to lower calories
  
-  Great healthy cooking method!

Excellent for muscle gain! High protein, healthy calories, good nutrition.



Calorie density score: 21, Protein: Yes, Veggies: Yes

### Recommendations

✓ Perfect! Healthy ingredients with good protein for clean gains

✓ Good carb source for energy and calorie surplus

✓ Great healthy cooking method!

- In conclusion, this project successfully transforms a common point of confusion nutritional uncertainty into a clear, actionable solution. Demonstrating that by applying modern technologies like machine learning, containerization, and semantic search, we can build intelligent systems that serve real human needs.

- The **Recipe Fitness Analyzer** is more than a technical proof-of-concept; it is a functional tool that provides immediate, personalized dietary feedback, empowering users to make informed choices aligned with their fitness objectives

1350

Calories

45g

Protein

73g

Carbs

23g

Fats