



FitLabel

Ingredient Scanner & Dietary Compatibility Checker

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THE PROBLEM

Users often need to check ingredient and nutrition labels when purchasing products, especially for allergies, dietary restrictions, or health reasons. However, this process is not simple.

- Labels are often small and difficult to read quickly
- Ingredient names can be complex or unfamiliar
- Important information may be hidden within long lists
- Users may need to check multiple restrictions at the same time
- Reading and verifying labels takes time, especially in a store environment

Because of this, users may misread information, overlook ingredients, or spend extra time checking products.



CURRENT SYSTEM

Users currently rely on:

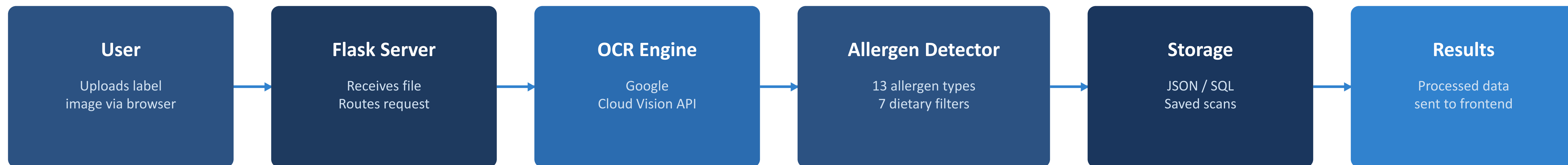
- Reading product labels manually
- Scanning through long ingredient lists
- Recognizing ingredients based on prior knowledge
- Double-checking labels multiple times when unsure

This process can be slow and inconsistent, especially when users need to check for multiple ingredients or restrictions at once.

There is no simple way to quickly read, verify, and keep track of product information in one place.



SYSTEM ARCHITECTURE



REQUIREMENTS

Functional Requirements

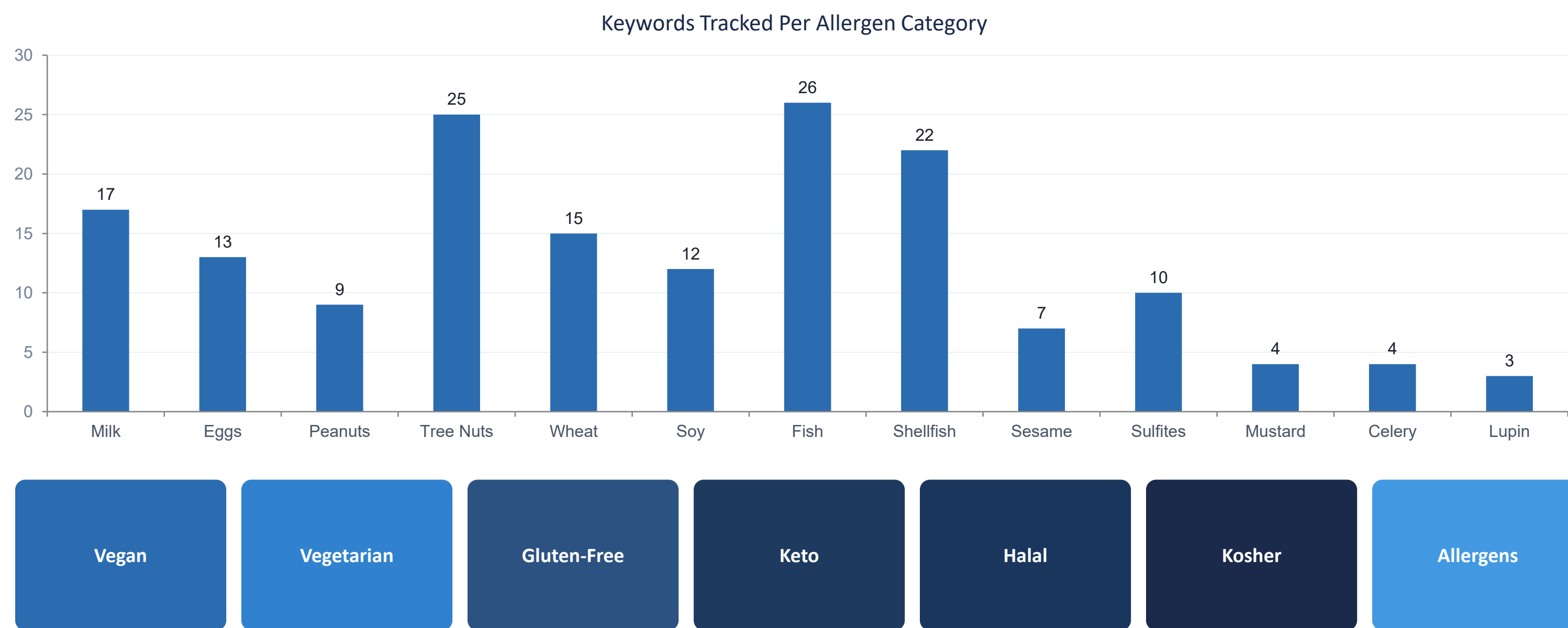
- Upload ingredient label images for OCR scanning
- Extract text via Google Cloud Vision API
- Detect FDA Big 9 + 4 additional allergen categories
- Check dietary compatibility (vegan, halal, keto, kosher, gluten-free, vegetarian)
- Save and manage scan results
- Scan product barcodes for automatic ingredient lookup

Non-Functional Requirements

- Live web application accessible via public URL
- SQL database for persistent storage
- Responsive design for mobile and desktop browsers
- Automated CI/CD deployment from GitHub via Render



ALLERGEN & DIETARY COVERAGE



SYSTEM DESIGN

Technology Stack

Frontend	HTML, CSS, JavaScript
Backend	Flask (Python 3)
Database	SQLAlchemy (SQLite / PostgreSQL)
OCR	Google Cloud Vision API
Hosting	Render



IMPLEMENTATION

Core Overview

- Backend**
 - Handles scan, save, delete, and filter API requests. Processes file uploads and returns structured JSON responses.
- OCR Engine**
 - Processes uploaded images through Google Cloud Vision API for document-level text extraction with preprocessing.
- Allergen and Dietary Detection**
 - Identifies allergens and dietary categories using keyword-based matching.
- Barcode Scanner**
 - Live camera barcode scanning with BarcodeDetector API and ZXing fallback. Automatic product lookup on detection.



VERIFICATION

Testing Approach

- End-to-end testing of scan → detect → save → retrieve workflows
- OCR accuracy compared between Tesseract and Google Cloud Vision across multiple label formats
- Allergen detection verified against known product ingredient lists
- Cross-browser testing: Chrome, Firefox, Opera, Safari
- REST API endpoint validation with edge cases and error handling
- Barcode scanning tested with BarcodeDetector and ZXing fallback across browsers



SUMMARY

FitLabel is a web-based ingredient label scanner combining OCR text extraction with allergen and dietary analysis.

- Instantly identify allergens in food products
- Check compatibility with 7 dietary restrictions
- Save and manage scan history
- Access data from any device via the web

Deployed live at: fitlabel.onrender.com