Image Colorizer - Technical Documentation

Overview

Image Colorizer is a web application that allows users to change the color of objects in images using AI-powered image segmentation and color manipulation techniques.

Technologies Used

Backend

- Django 4.2.7: Web framework for handling requests, routing, and templating
- Python 3.10: Programming language for backend logic and image processing
- SQLite: Database for storing image metadata and user preferences

Image Processing

- PIL/Pillow: Image manipulation library for opening, resizing, and saving images
- OpenCV (cv2): Computer vision library for advanced image processing and mask creation
- NumPy: Numerical computing library for array operations on image data
- rembg: Background removal library using deep learning models (U2Net)
- colorsys: Python module for color space conversions (RGB, HSV)

Frontend

- HTML/CSS/JavaScript: Core web technologies for UI implementation
- Bootstrap 5.3: CSS framework for responsive design and UI components
- jQuery 3.6: JavaScript library for DOM manipulation and AJAX requests
- CSS Transitions/Animations: For smooth UI interactions and loading states

Key Features

- Object detection and background separation using AI
- Real-time color changes with AJAX
- Color intensity and edge smoothness adjustments
- Optimized processing for large images (auto-resizing)
- Shadow removal algorithms
- Mask caching for improved performance

Performance Optimizations

- Image resizing for large images (max dimension: 1024px)
- JPEG compression for faster loading
- Mask caching to avoid regeneration
- Debounced UI controls to prevent excessive API calls

Deployment

- Static files served via Django's staticfiles system

- Media files for storing uploaded and processed images
- Compatible with PythonAnywhere and other Django hosting platforms

System Requirements

- Python 3.8+ with pip
- 2GB+ RAM recommended for image processing
- Sufficient disk space for image storage