SKIN TYPE DETECTION SYSTEM

AI-Powered Analysis using MobileNetV2

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The Evolution of Diagnostics

✕Manual Analysis

Traditional skin assessment relies heavily on subjective human perception. Factors like ambient lighting and lack of expertise often lead to misclassification (e.g., confusing 'Oily' with 'Combination'), resulting in ineffective treatments.

✓AI Precision

Our solution leverages Computer Vision to eliminate bias. By analyzing pixel-level texture patterns using deep learning, we provide an instant, consistent, and objective skin profile.

Dataset Analytics

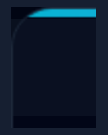
2,250
Total Samples

5
Classes (Dry, Oily, etc)

450
Images Per Class

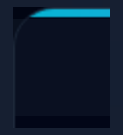
⚖ **Perfectly Balanced Dataset**

Technology Stack



Python

Core Logic & Data Processing



TensorFlow

MobileNetV2 Implementation

OpenCV

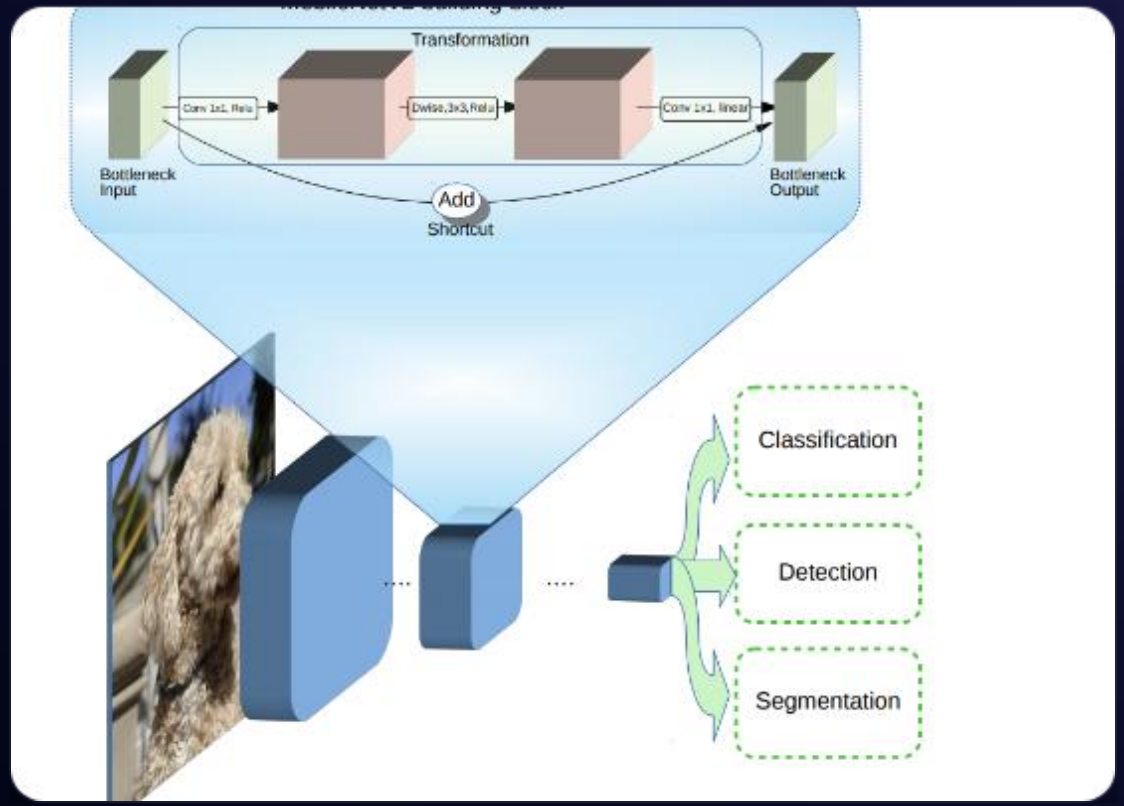
Real-time Face Extraction

FastAPI

High-Performance REST API

Engine: MobileNetV2

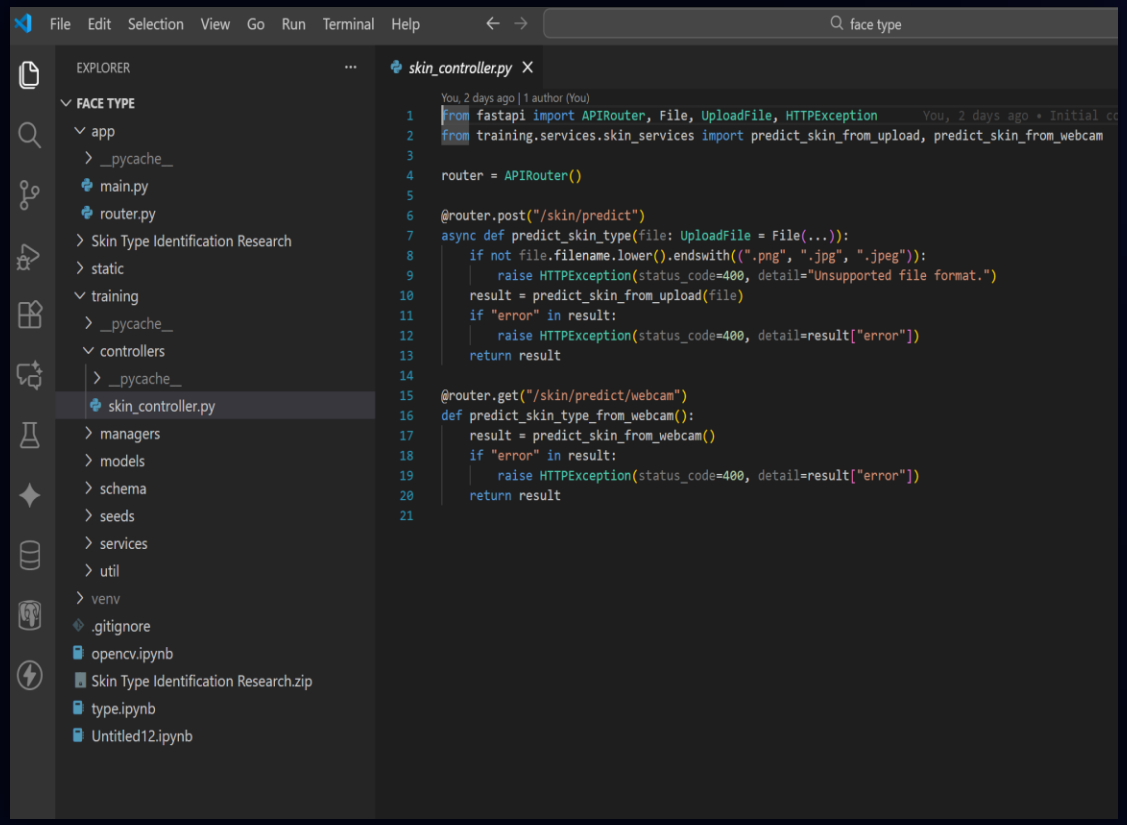
- **Transfer Learning:** Pre-trained on ImageNet to inherit feature extraction capabilities.
- **Lightweight Design:** Uses depth-wise separable convolutions for speed, crucial for real-time webcams.
- **Custom Head:** Removed top layers; added GlobalAveragePooling2D and a dense Softmax layer (5 units).
- **Optimization:** Trained using Adam optimizer with Categorical Crossentropy loss.



Training Results

Validation accuracy exceeds training accuracy, indicating excellent generalization.

Backend Architecture



Modular Design Pattern

Controllers: Handle HTTP requests (e.g., /predict).

Services: Encapsulate ML inference logic.

Utils: Helper functions for image preprocessing.

Endpoints

```
POST /predict/image
```

```
POST /predict/webcam
```

Development Roadmap

Phase 1

Data Collection & Preprocessing (Balancing Classes)

Phase 2

Model Training (MobileNetV2 Transfer Learning)

Phase 3

Backend Development (FastAPI Integration)

Phase 4

Testing & Validation (Real-time Webcam)

Live Inference Flow

1. Capture

Webcam stream is captured frame-by-frame. OpenCV detects the face region.

2. Process

Face is cropped, resized to 224x224, and pixels are normalized [0,1].

3. Predict

Model outputs confidence scores. Highest probability determines the label.

QUESTIONS?

Ready to deploy AI-driven dermatology solutions.(Nepika | Face Skin Analysis)

rathour-anushka/skin-type-detection-using-face-recognition

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