



Internship Project Report DermalScan:
AI Facial Skin Aging Detection App

Submitted By:

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Infosys Springboard Virtual Internship

Milestone 2 : Model Training and Evaluation

Module 3 Report – Model Development & Training

Objective

To build a robust deep-learning model that accurately classifies facial dermatological conditions into:

- Wrinkles
- Dark Spots
- Puffy Eyes
- Clear Skin

Dataset

- Initially ~300 images per class
- **Expanded to ~500 images per class** to improve dataset richness
- Total usable images: ~1800+ after cleaning
- Removed corrupted & tiny images
- Ensured balanced class distribution
- Standardized resolution to 224×224

Model

- Base Architecture: **EfficientNet**
- Reason:
 - High performance with fewer parameters
 - Strong generalization
 - Stable training behavior

Training Strategy

Phase 1 – Transfer Learning

- Base frozen

- Trained classifier head

Phase 2 – Fine Tuning

- Select layers unfrozen
- Lower learning rate
- Improved deeper feature learning

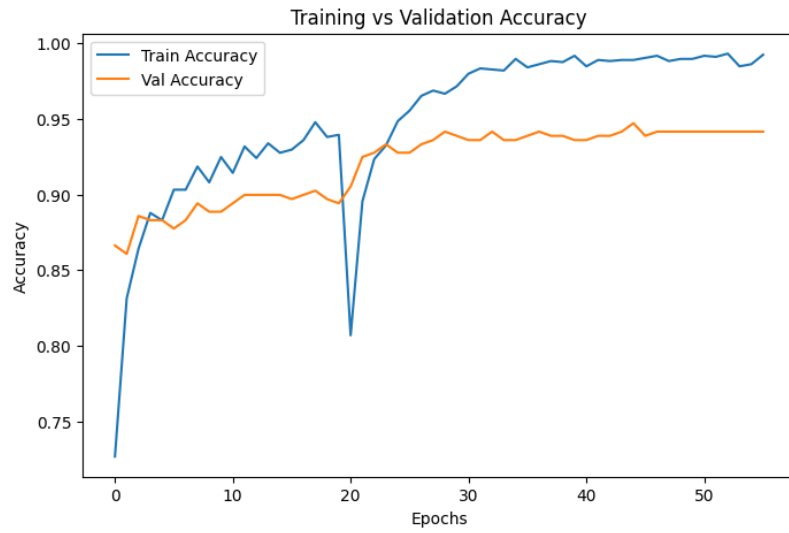
Training Configuration

- Input Size: 224×224
- Batch Size: 32
- Optimizer: Adam
- Loss: Categorical Crossentropy
- Regularization: Dropout + Early Stopping
- Epochs: Extended to **50+** due to strong performance

Performance

- Training Accuracy: ~99%
- Validation Accuracy: ~94%
- Stable learning curves
- Strong confusion matrix with minimal misclassification

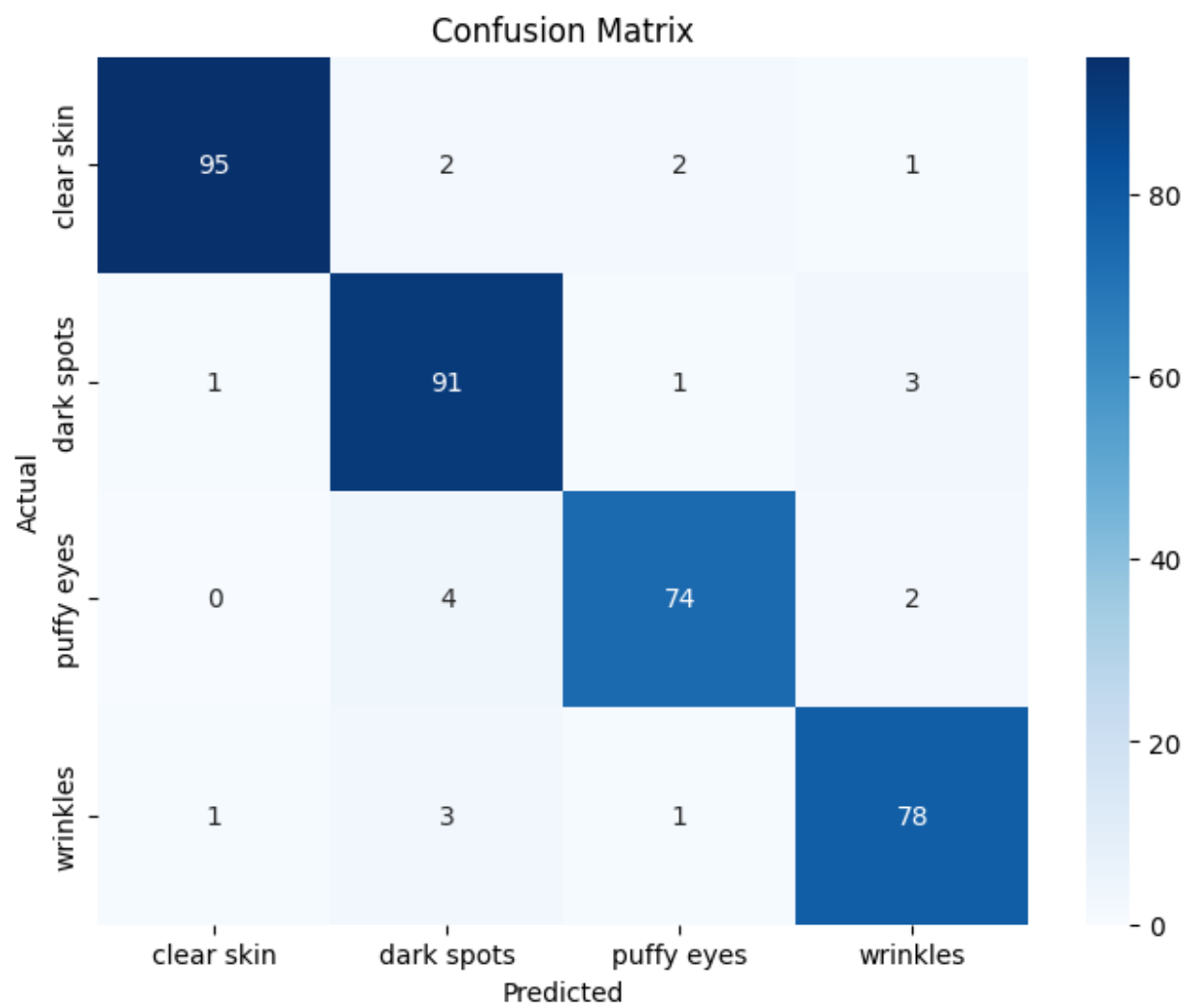
Results:



Classification Report:

Label	Precision	Recall	F1-Score	Support
clear skin	0.98	0.95	0.96	100

dark spots	0.91	0.95	0.93	96
puffy eyes	0.95	0.93	0.94	80
wrinkles	0.93	0.94	0.93	83
accuracy			0.94	359
macro avg	0.94	0.94	0.94	359
weighted avg	0.94	0.94	0.94	359



Module 4 – DermalScan Intelligent Detection System

Project Overview

Module-4 focuses on developing an intelligent **face-based dermal condition analysis system** capable of detecting and labeling:

- **Wrinkles**
- **Puffy Eyes**
- **Dark Spots**
- **Clear Skin Condition**
along with **Age Estimation** using advanced Deep Learning and Computer Vision.

Objectives:

- Detect a face reliably
- Analyze key dermal regions
- Display precise bounding boxes for detected conditions
- Show percentage confidence values
- Estimate age realistically
- Maintain clean, minimal, industry-grade visual output

Methodology

1. Face Detection

- Haar Cascade Face Detection used to extract face region.

2. Region-Wise Analysis

- **Forehead Zone → Wrinkles**
- **Eye Zone → Puffy Eyes**
- **Lower Face Zone → Dark Spots, Wrinkles**

- Controlled anatomical partitioning ensures stability and accuracy.

3. Dermal Classification

- Custom EfficientNet-based model predicts:
 - Wrinkles
 - Dark Spots
 - Puffy Eyes
 - Clear Skin

4. Clear Skin Logic

Clear Skin = $100 - (\text{Wrinkles} + \text{Puffy Eyes} + \text{Dark Spots impact})$

5. Age Estimation

- OpenCV AgeNet Model
- Age range estimation displayed minimally on image

Output:

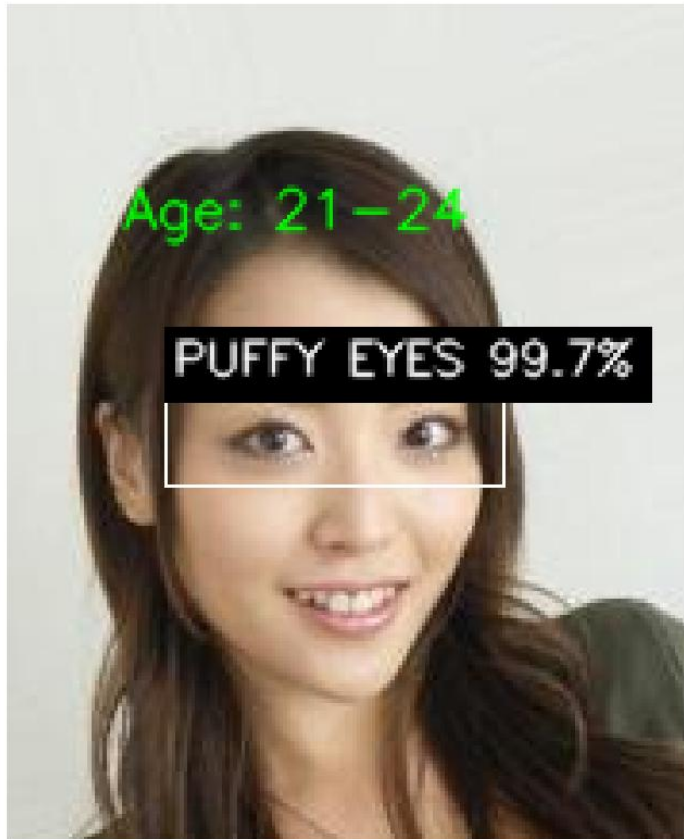
AGE : 21-24

WRINKLES : 0.73%

PUFFY EYES: 99.74%

DARK SPOTS: 3.26%

CLEAR SKIN: 70.08%



Results

- System successfully detects face dermal regions
- Identifies relevant conditions ONLY when significant
- Produces meaningful clear skin score
- Outputs stable and professional visualization
- Works efficiently in real-time or static image mode