

AI SKIN ANALYZER

for skin health



TEAM MEMBERS

AHMED ISMAIL EL SAYED
TOKA MAGDY FEKRY
ANN MICHEL YACOUB
HAYA MOHAMED MAHMOUD
MOATASEM ABOUBAKR
MOHAMED SAMEH



UNDER THE SUPERVISION OF ENG: ABDELRHMAN ELMASHTOLY

INTRODUCTION

Our project introduces an intelligent AI system designed to analyze skin conditions with accuracy, speed, and accessibility. By combining deep learning image classification with a smart skincare chatbot, the system helps users understand their skin concerns, receive personalized recommendations, and make informed decisions about their daily routines.



WHY DO WE NEED A SKIN ANALYZER?

skin issues are Complex
Accessibility & Cost
Early Detection is Key



WHAT OUR AI SYSTEM DOES

- Classifies the skin into 5 key conditions (acne, pores, blackheads, wrinkles, and dark circles)
- Provides personalized skincare routines and product suggestions
- Supports users with an integrated AI chatbot for explanations and guidance



DATA COLLECTION

DATA SOURCES

- Kaggle datasets
- Roboflow public datasets



DATASET DISTRIBUTION

- Acne: 2,060 images
- Blackheads: 1,970 images
- Dark Spots:
 - Pores: 1,632 images
- Wrinkles: 1,982 images



DATA PREPROCESSING (IMAGE AUGMENTATION)

Rescale: Normalizes pixel values to improve model stability.

Rotation Range: Random rotations to make the model rotation-invariant.

Horizontal Flip: Adds variation by flipping images left-right.

Vertical Flip: Enhances robustness by flipping images top-bottom.

Brightness Range: Adjusts brightness to handle different lighting conditions.

→ These augmentations increase dataset diversity, reduce overfitting, and help the model achieve better generalization.



MODEL ARCHiTECTURE



CUSTOM CNN MODEL

Convolution Blocks:

Block 1: Conv2D 32 → BatchNorm → ReLU → Conv2D 32 → BatchNorm →
ReLU → MaxPooling

Block 2: Conv2D 64 → BatchNorm → ReLU → Conv2D 64 → BatchNorm →
ReLU → MaxPooling

Block 3: Conv2D 128 → BatchNorm → ReLU → Conv2D 128 → BatchNorm
→ ReLU → MaxPooling

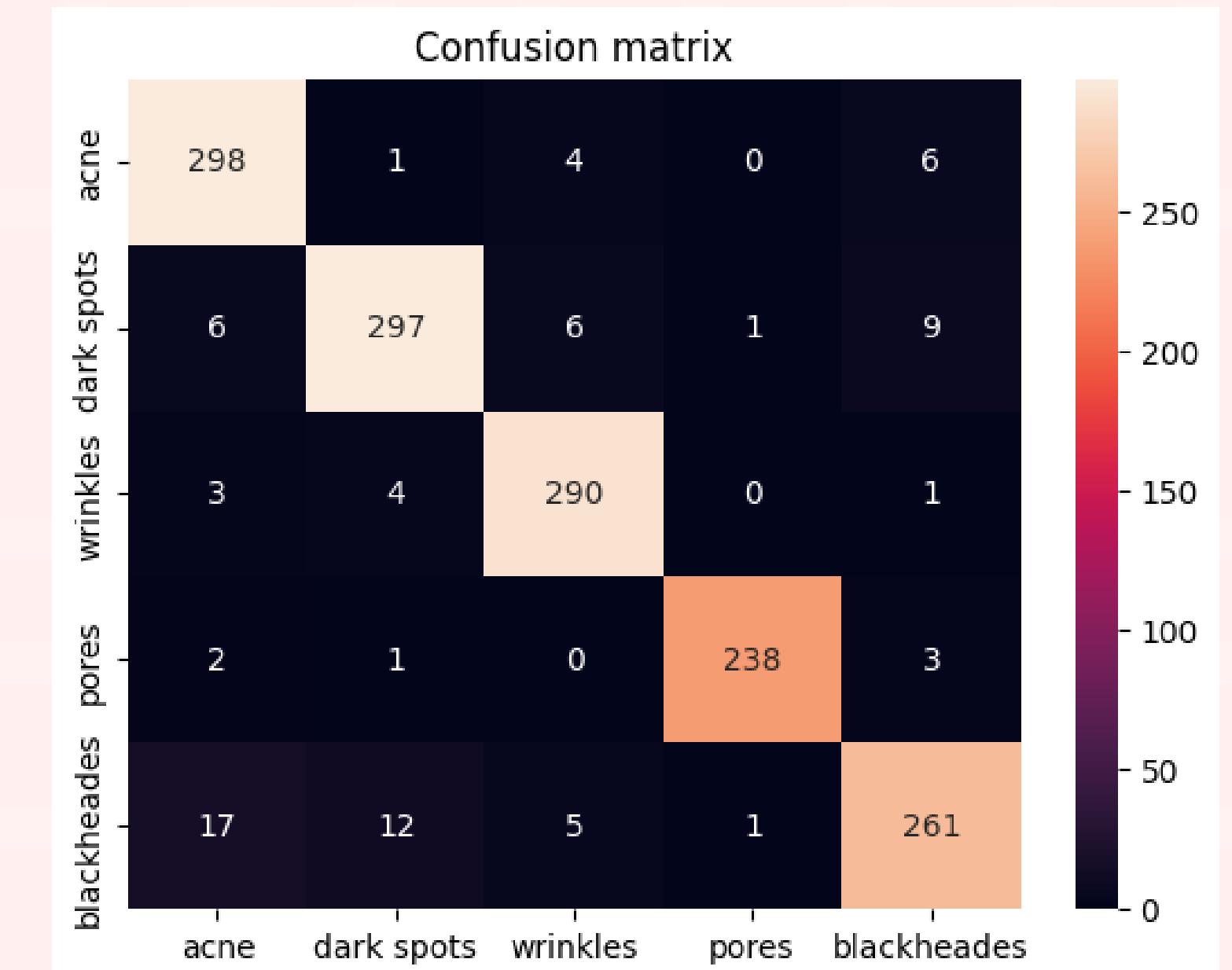
Block 4: Conv2D 256 → BatchNorm → ReLU → MaxPooling

Dense Head:

Flatten → Dense 512 → BatchNorm → ReLU → Dropout 0.3 → Dense 5
(Softmax)

CONFUSION MATRIX & CLASSIFICATION REPORT

	precision	recall	f1-score	support
acne	0.91	0.96	0.94	309
dark spots	0.94	0.93	0.94	319
wrinkles	0.95	0.97	0.96	298
pores	0.99	0.98	0.98	244
blackheads	0.93	0.88	0.91	296
accuracy			0.94	1466
macro avg	0.95	0.95	0.95	1466
weighted avg	0.94	0.94	0.94	1466



VGG16 MODEL

Base Model:

Pretrained VGG16 used as feature extractor

All base layers frozen (not trainable)

Custom Dense Head:

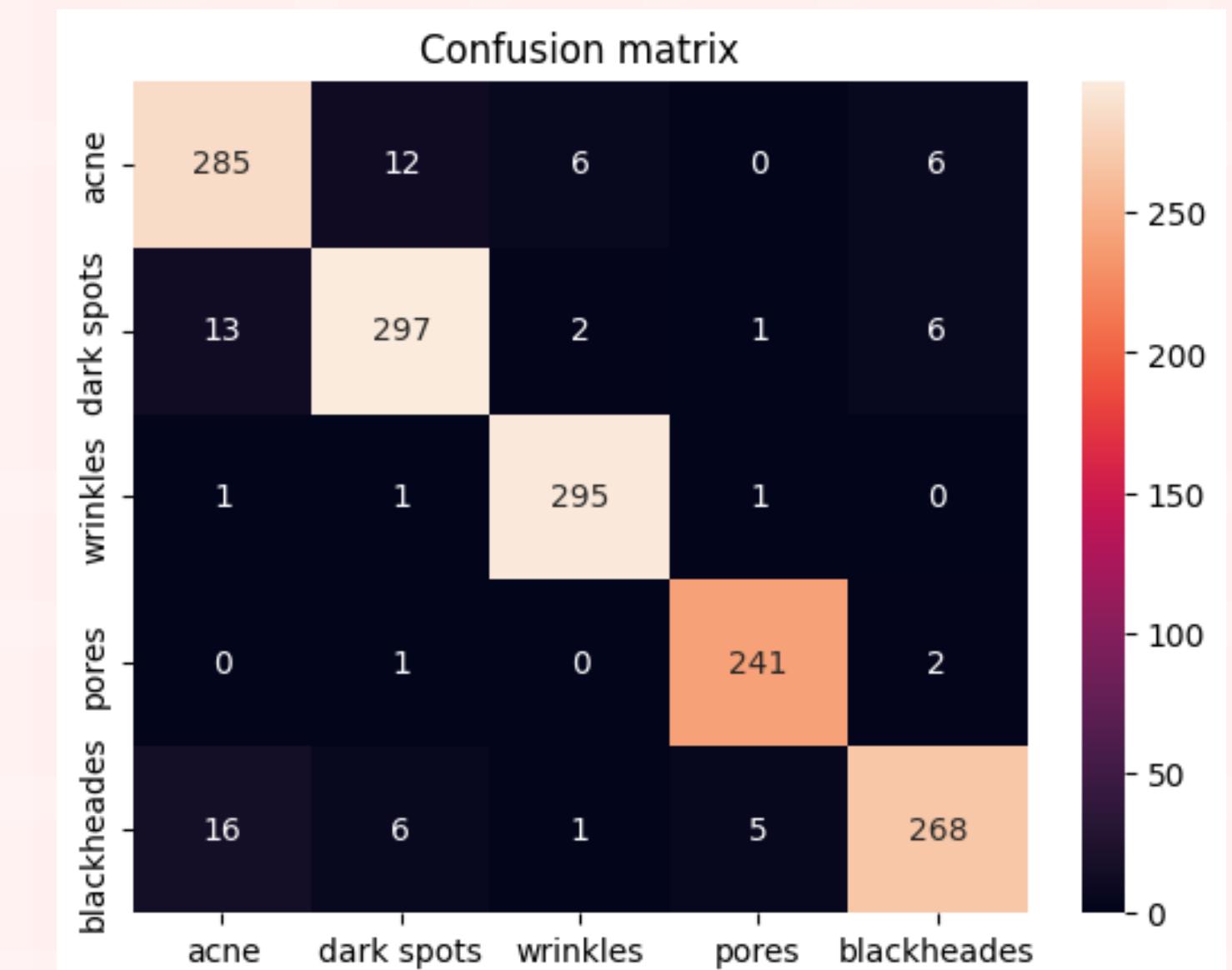
Flatten → Dense 512 → ReLU → BatchNorm → Dropout 0.5

Dense 128 → ReLU → BatchNorm → Dropout 0.3

Output Dense → Softmax

CONFUSION MATRIX & CLASSIFICATION REPORT

	precision	recall	f1-score	support
acne	0.90	0.92	0.91	309
dark spots	0.94	0.93	0.93	319
wrinkles	0.97	0.99	0.98	298
pores	0.97	0.99	0.98	244
blackheads	0.95	0.91	0.93	296
accuracy			0.95	1466
macro avg	0.95	0.95	0.95	1466
weighted avg	0.95	0.95	0.95	1466



RESNET50 MODEL

Base Model:

Pretrained ResNet50 used as feature extractor
All base layers trainable (fine-tuning enabled)

Custom Dense Head:

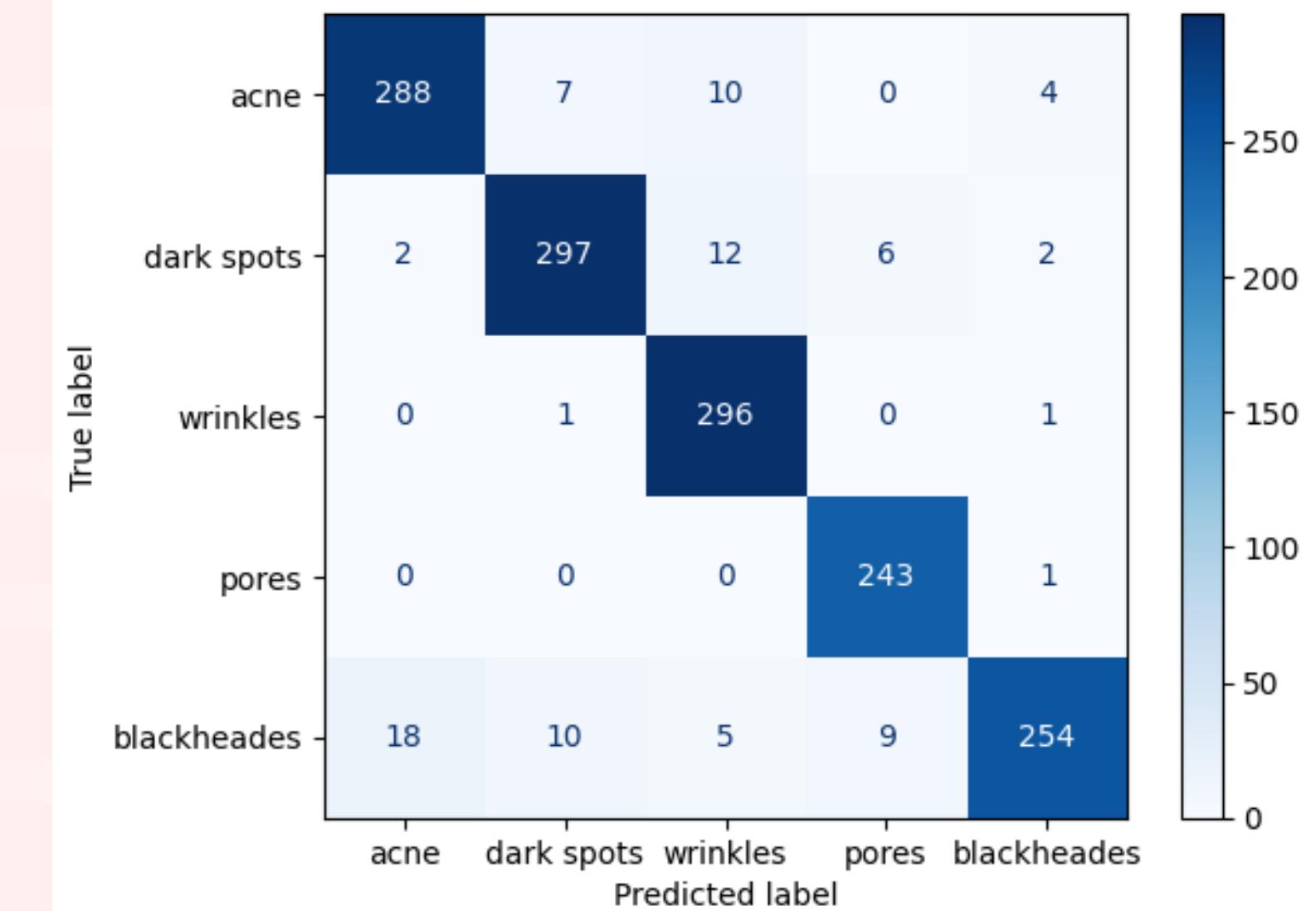
Flatten → Dense 512 → ReLU → Dropout 0.5
Output Dense → Softmax → 5 classes

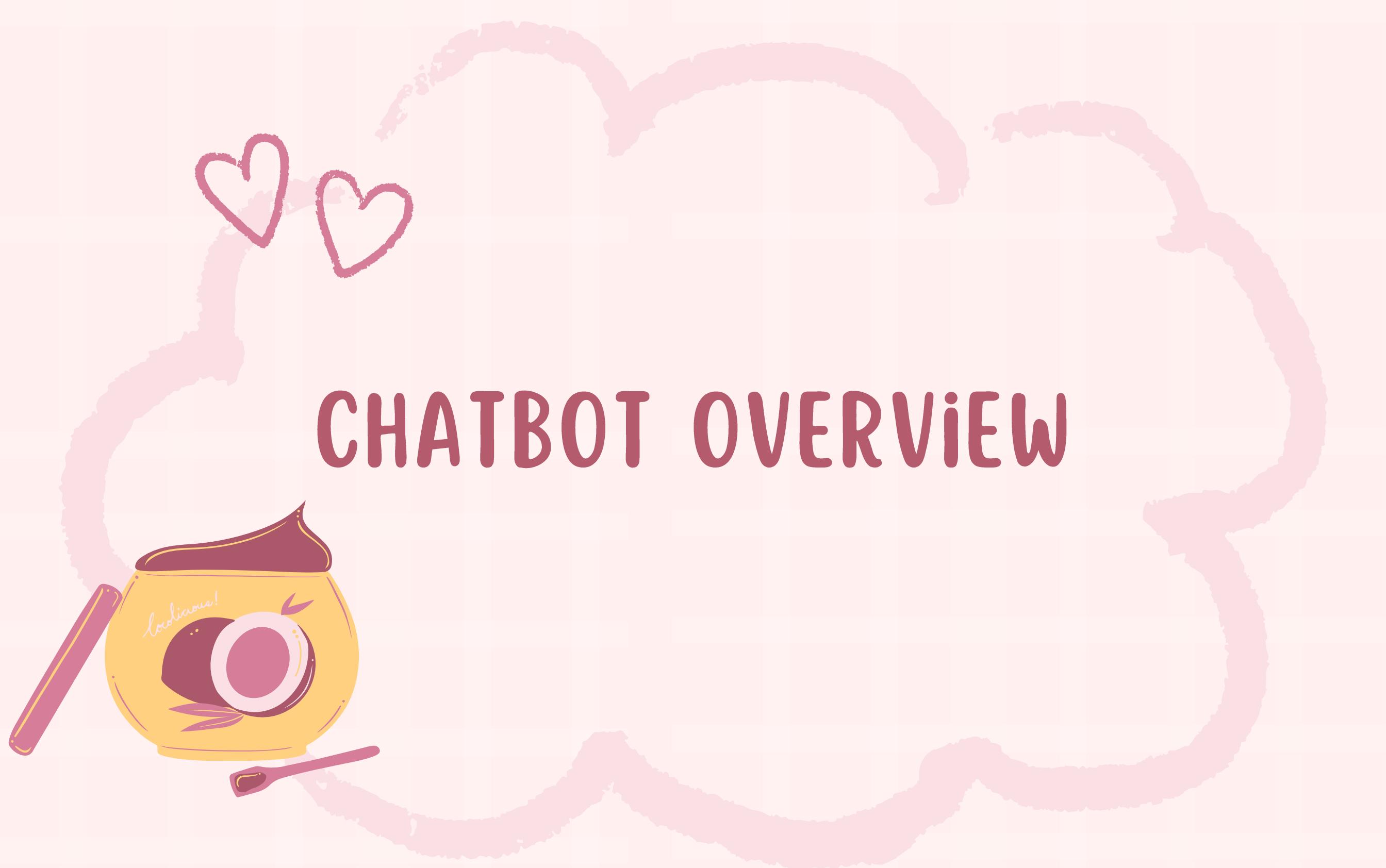
CONFUSION MATRIX & CLASSIFICATION REPORT

Classification Report:

	precision	recall	f1-score	support
acne	0.94	0.93	0.93	309
dark spots	0.94	0.93	0.94	319
wrinkles	0.92	0.99	0.95	298
pores	0.94	1.00	0.97	244
blackheads	0.97	0.86	0.91	296
accuracy			0.94	1466
macro avg	0.94	0.94	0.94	1466
weighted avg	0.94	0.94	0.94	1466

Confusion Matrix - ResNET Model





CHATBOT OVERVIEW

AI SKiNCARE ASSISTANT

Interprets and explains the detected skin condition.

Provides personalized skincare routines and product recommendations.

Responds to user queries with clear, supportive guidance.

HOW THE CHATBOT WORKS

- Powered by LangChain to manage the full RAG pipeline
- Uses RAG (Retrieval-Augmented Generation) to search stored knowledge
- Retrieves routines, product details, and skin condition insights
- Built with FAISS + Embeddings for fast and precise vector search
- Uses Mistral LLM + custom prompts to generate grounded, reliable answers

CHALLENGES



CHALLENGES & SOLUTIONS

Wrong chatbot answers → Implemented a smart router function to direct queries to the appropriate response logic.

Irrelevant questions → Applied similarity filtering to ensure only contextually relevant responses are provided.

Smart Router Steps:

1. Similarity Check → If irrelevant → friendly rejection
2. Skincare Question? → Yes → use RAG for accurate answers
3. Advanced Question? → Yes → use LLM Fallback Model

CHALLENGES & SOLUTIONS

No available dataset for skin issues → Collected data manually from Kaggle and RobFlow to create a custom dataset for training.

Library version conflicts (LangChain & TensorFlow) → Resolved by running the LangChain chatbot model on Kaggle, and using FastAPI + ngrok to provide an HTTP endpoint.

This allows the model to run locally on a Streamlit GUI for classification and chatbot functionality without library version conflicts.



SYSTEM WORKFLOW

Skin-AI Full System

 Skin Issue Detection  Skincare Assistant Chatbot

Upload an image to detect a skin issue

Model loaded from Kaggle Hub

Choose an image

 Drag and drop file here
Limit 200MB per file • PNG, JPG, JPEG

Browse files

Disclaimer: This system is for educational purposes only. Always consult a qualified dermatologist for medical advice.

Built with ❤ by Skin-AI Team • Powered by DEPI

Upload an image to detect a skin issue

Model loaded from Kaggle Hub

Choose an image

Drag and drop file here

Limit 200MB per file • PNG, JPG, JPEG

Browse files

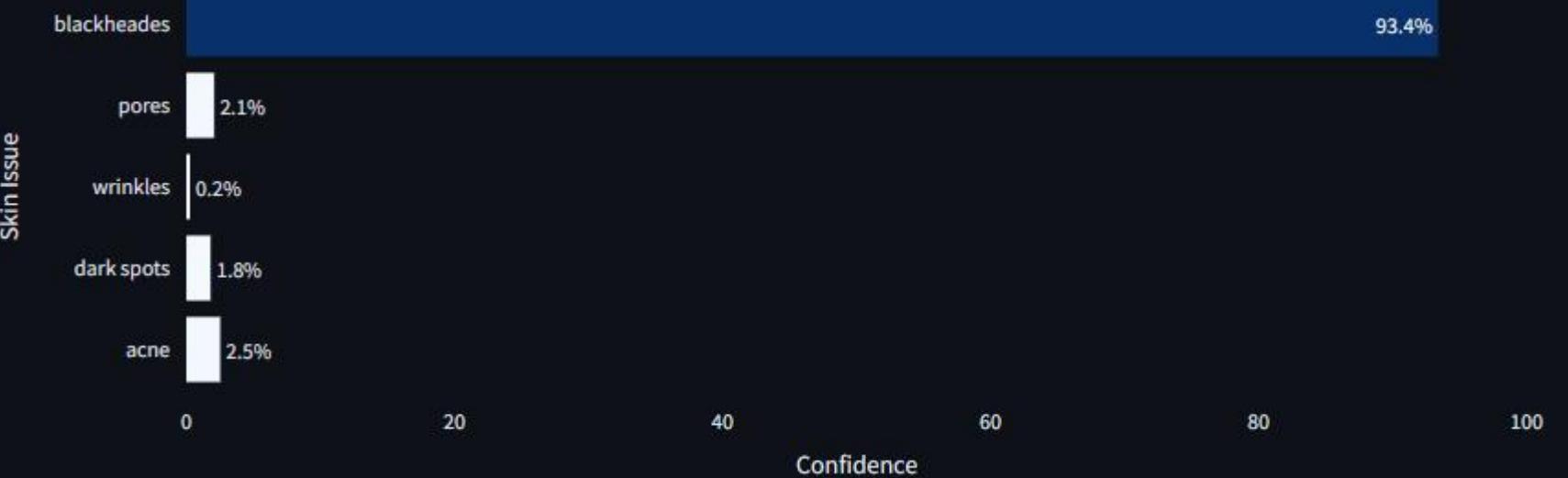
 360_F_1419958115_fL6umGDMYecFoOR9akjIFwkMQXtAIUO5.jpg 28.2KB 



Uploaded Image

Confidence Chart

Prediction Confidence (%)



Analyze Image 

Upload an image to detect a skin issue

Model loaded from Kaggle Hub

Choose an image

Drag and drop file here

Limit 200MB per file • PNG, JPG, JPEG

Browse files

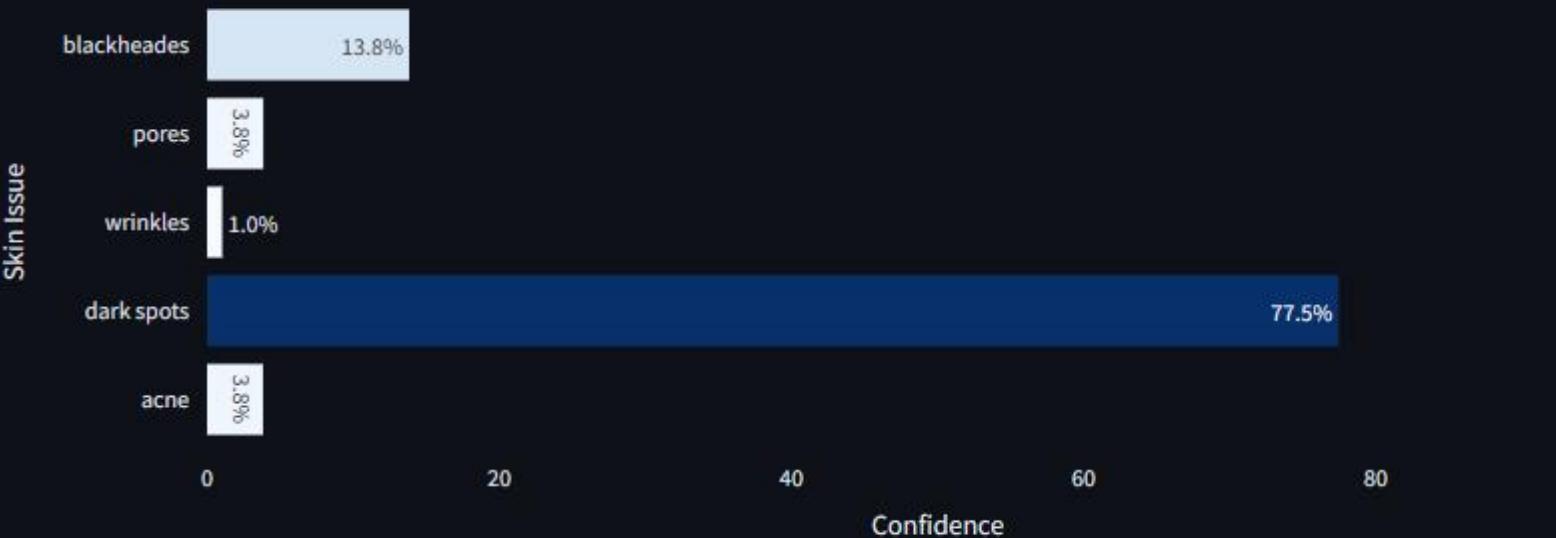
 closeup-asian-woman-with-dark-spots-freckles-problems-scaled.jpg 439.4KB



Uploaded Image

Confidence Chart

Prediction Confidence (%)



Analyze Image 

Skin AI System

localhost:8501

Deploy :

Model loaded from Kaggle Hub

Choose an image

Drag and drop file here
Limit 200MB per file • PNG, JPG, JPEG

Browse files

filtersquality90.jpg 28.2KB

X

Confidence Chart

Prediction Confidence (%)

Skin Issue	Confidence (%)
blackheads	23.5%
pores	71.4%
wrinkles	0.0%
dark spots	0.6%
acne	4.5%

0 20 40 60 80 100

Confidence



Upload an image to detect a skin issue

Model loaded from Kaggle Hub

Choose an image

Drag and drop file here

Limit 200MB per file • PNG, JPG, JPEG

Browse files

acne-severe.jpg 128.5KB



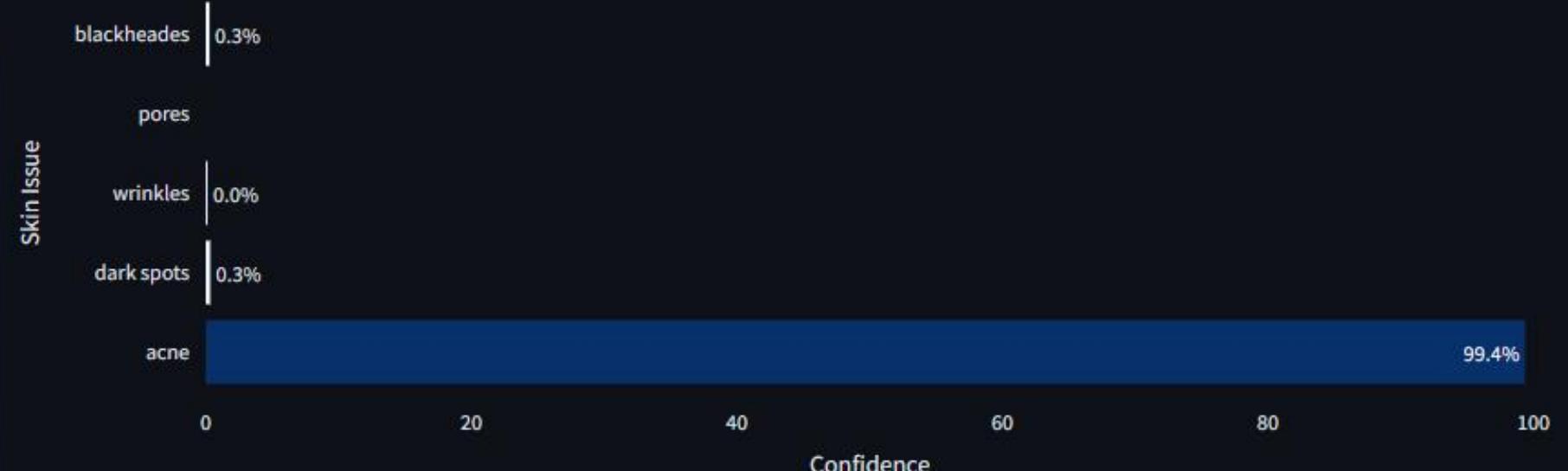
Uploaded Image

Analyze Image

Detected: ACNE (99.38%)

Confidence Chart

Prediction Confidence (%)



localhost:8501

Deploy :

Upload an image to detect a skin issue

Model loaded from Kaggle Hub

Choose an image

Drag and drop file here
Limit 200MB per file • PNG, JPG, JPEG

Browse files

iStock-508211701-1.jpg 286.6KB

X

Confidence Chart

Prediction Confidence (%)

Skin Issue

blackheads 4.6%

pores 0.3%

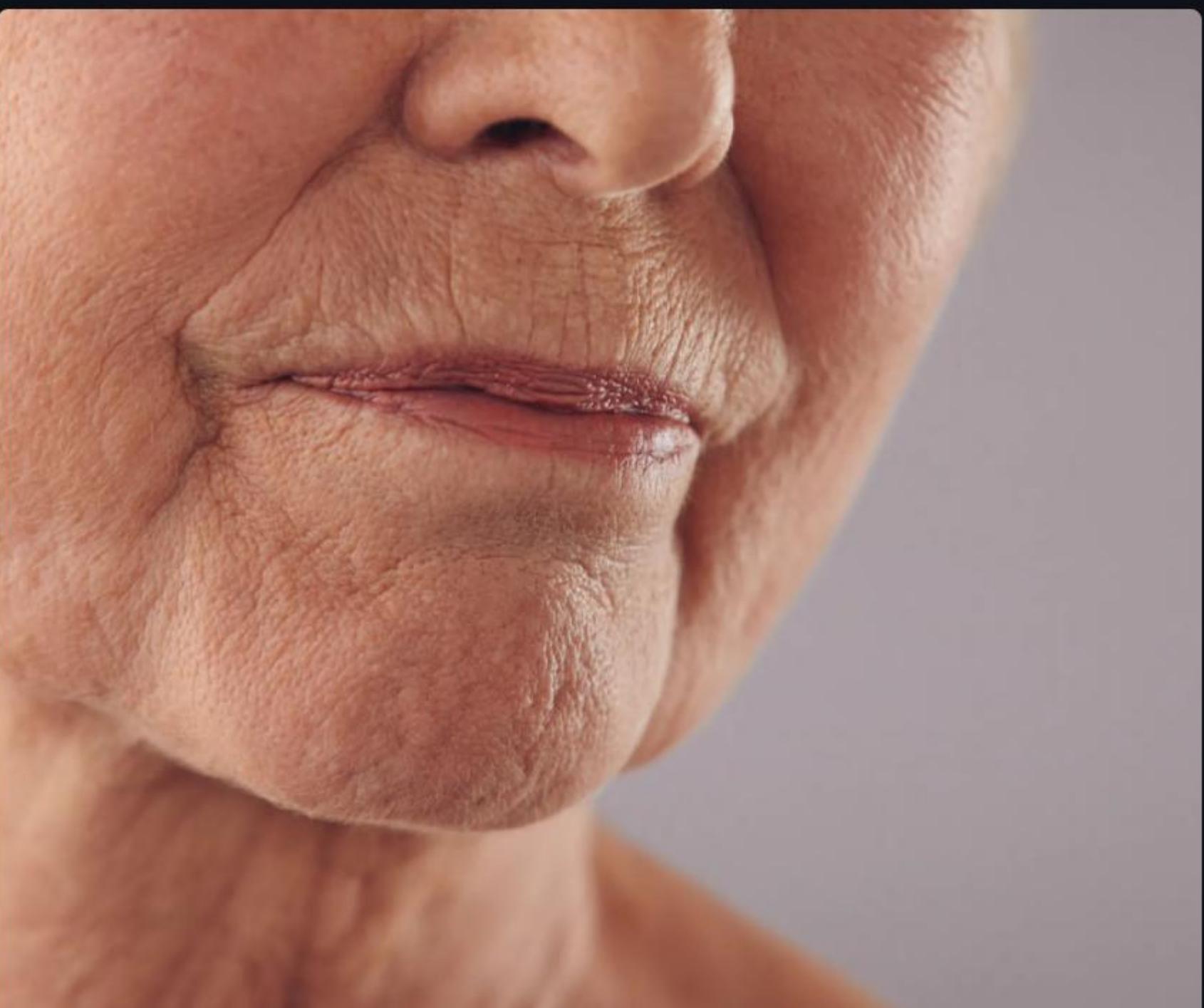
wrinkles 92.9%

dark spots 1.0%

acne 1.2%

0 20 40 60 80 100

Confidence



A detailed horizontal bar chart titled "Confidence Chart" showing the prediction confidence percentages for various skin issues. The x-axis represents "Confidence" from 0 to 100. The y-axis lists "Skin Issue". The chart shows a high confidence prediction for wrinkles at 92.9%, followed by blackheads at 4.6%, acne at 1.2%, dark spots at 1.0%, and pores at 0.3%.

Skin Issue	Confidence (%)
blackheads	4.6%
pores	0.3%
wrinkles	92.9%
dark spots	1.0%
acne	1.2%

Skin-AI Full System

 Skin Issue Detection  Skincare Assistant Chatbot

Chat with the AI Skincare Assistant

I have dark spots and fine lines; can I use the same products for both?

To address both dark spots and fine lines, it's essential to focus on a routine that targets both concerns. For nighttime, I recommend using the Even Tone Night Routine (for dark spots) and making a slight modification to also include a retinol product for fine lines. Here's the adjusted routine:

1. Cleanse: Use a gentle cleanser suitable for your skin type (normal or combination) to remove makeup and impurities.
2. Apply glycolic acid toner: Glycolic acid helps to exfoliate the skin, reducing the appearance of dark spots and fine lines.
3. Use niacinamide serum: Niacinamide is an effective ingredient in skincare that helps reduce the appearance of dark spots and has additional benefits for the skin.
4. Apply retinol serum: Retinol is a powerful ingredient known for its ability to smooth fine lines and wrinkles, as well as stimulate collagen production.
5. Moisturize with brightening cream: Choose a creamy moisturizer that contains ingredients like vitamin C, licorice root extract, or arbutin, which help to brighten the skin and reduce dark spots.
6. Tips:
 - Avoid layering vitamin C and glycolic acid in the same routine. Instead, use them on alternate nights.
 - Be consistent with your skincare routine, and give it time to see results.
 - Always wear sunscreen during the day to protect your skin from harmful UV rays.

Ask something about your skin... 

Disclaimer: This system is for educational purposes only. Always consult a qualified dermatologist for medical advice.

Skin-AI Full System

 Skin Issue Detection  Skincare Assistant Chatbot

Chat with the AI Skincare Assistant

What are the reasons for eczema, and how can I treat it?

Eczema is a chronic skin condition characterized by inflammation, itchiness, and patches of rough, scaly, or discolored skin. Causes of eczema can include genetics, immune system dysfunction, environmental factors, and certain triggers like stress, allergens, and harsh soaps.

To manage eczema, follow these steps:

1. Use a gentle, fragrance-free, and hypoallergenic cleanser to minimize irritation.
2. Apply a moisturizer immediately after bathing or washing hands to lock in moisture.
3. Consider using over-the-counter topical corticosteroids, anti-itch creams, or antihistamines as needed to reduce inflammation and itching.
4. Avoid scratching affected areas to prevent further irritation and infection.
5. Consider seeing a dermatologist for proper diagnosis, prescription medication, and personalized treatment options.

In the morning:

1. Cleanse your skin gently.
2. Apply a moisturizer to soothe your skin.
3. Layer on a broad-spectrum sunscreen of at least SPF 30 to protect your skin from harmful UV rays.

Ask something about your skin... 

Skin-AI Full System

 Skin Issue Detection  Skincare Assistant Chatbot

Chat with the AI Skincare Assistant

2. Apply a moisturizer immediately after bathing or washing hands to lock in moisture.
3. Consider using over-the-counter topical corticosteroids, anti-itch creams, or antihistamines as needed to reduce inflammation and itching.
4. Avoid scratching affected areas to prevent further irritation and infection.
5. Consider seeing a dermatologist for proper diagnosis, prescription medication, and personalized treatment options.

In the morning:

1. Cleanse your skin gently.
2. Apply a moisturizer to soothe your skin.
3. Layer on a broad-spectrum sunscreen of at least SPF 30 to protect your skin from harmful UV rays.

At night:

1. Remove makeup and other products gently with a mild cleanser.
2. Moisturize with a heavy cream or ointment to hydrate your skin overnight.
3. Use a cool compress if you're experiencing itchiness.

What is the fastest animal in the world?

Sorry, this question is outside the scope of this chatbot.

Ask something about your skin... >



THANK YOU

