



# The AI - Dermatologist

CAPSTONE PROJECT PRESENTATION

Presented by:  
**Team DermaScientists**

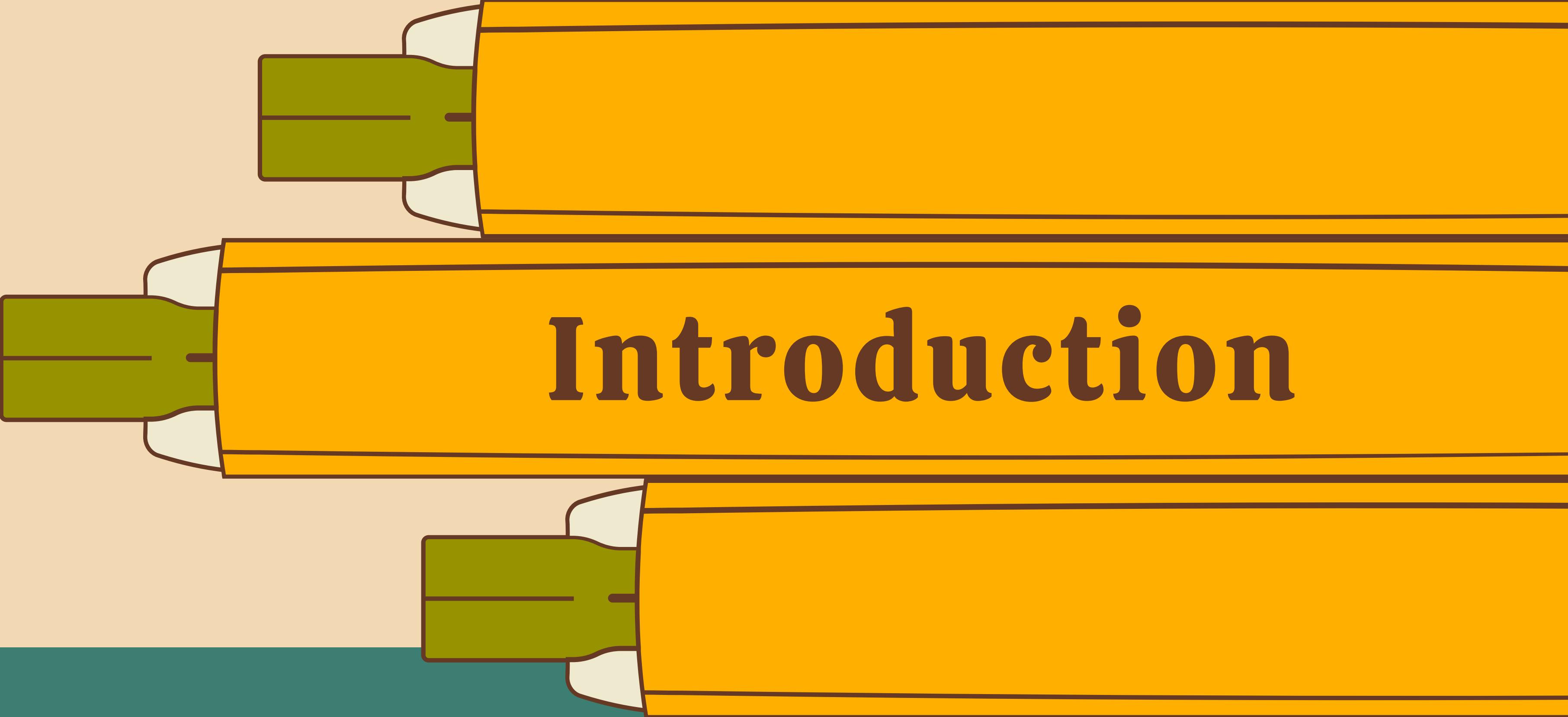
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# Introduction

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In 1991, Ministry of Health and Welfare put the number of dermatologists to be around 2000 for a population of 843 million.

Now the situation is better. However, these dermatologists are concentrated in the cities and large towns. The rural population, which is around 80% of the total has no easy access to a dermatologist.

- Thappa DM, Kumari R. Emergence of dermatology in India. Indian Dermatol Venereol Leprol 2009;75:86-92



# Problem Statement

Skin and hair care is often overlooked because it is expensive and people do not have time to visit dermatologist or do not have access to dermatologist.

# Outline



OBJECTIVE



DATASET



PROCESS



LIMITATIONS

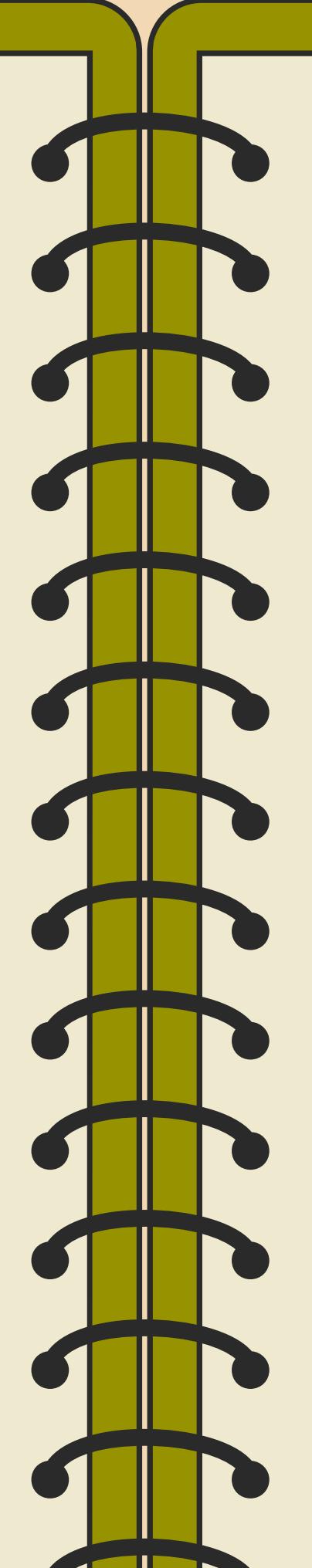
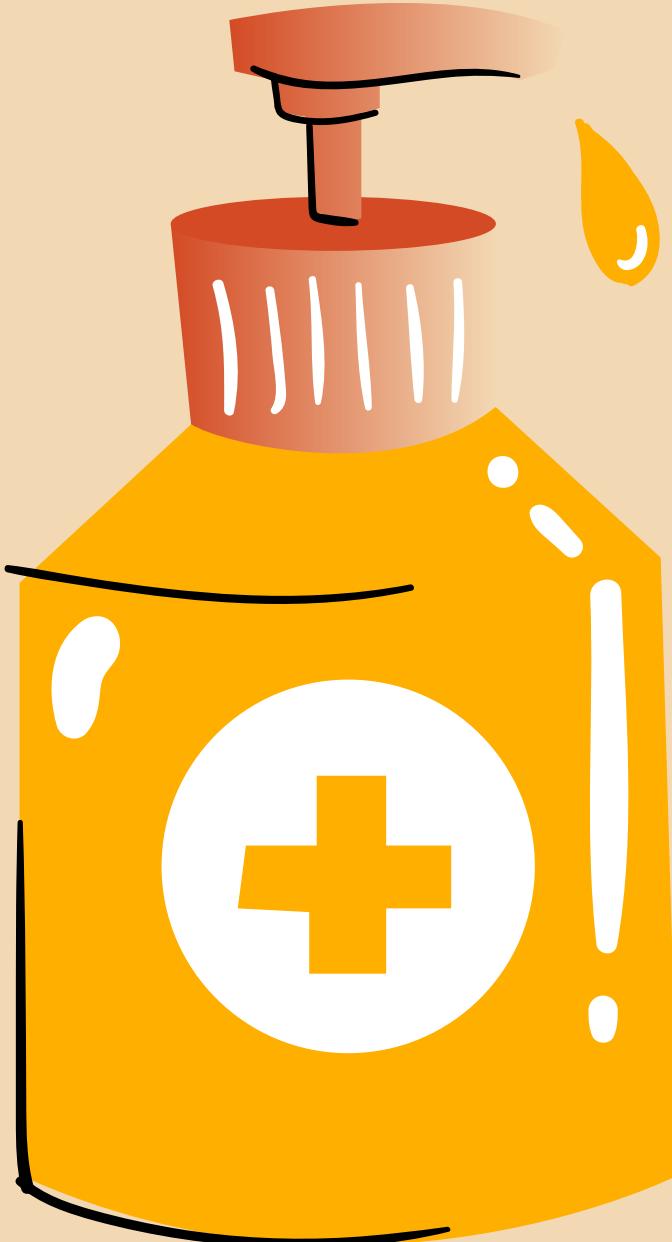


FUTURE SCOPE



DEMO

# Objectives



Easy access to skin and hair care solutions.



Reducing the cost of visiting a dermatologist.



Saving the time of visiting a dermatologist.



## SKIN

- Corn callus
- Tinea
- Warts
- Keloid
- Pityriasis Versicolor
- Healthy skin

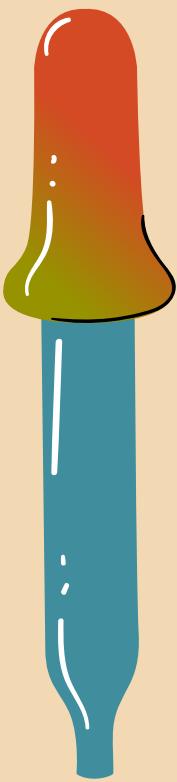
# Dataset

## HAIR

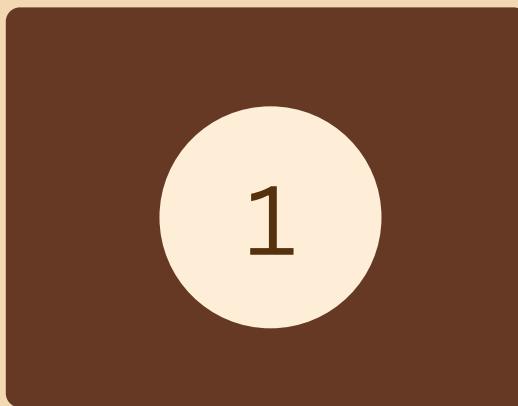
- Acne Keloidalis
- Alopecia Areata
- Dandruff
- Healthy hair

Sources: Google images, Dermnet





# Process



Binary  
Class

Combined  
Class

Independent  
Class

# Binary Class

- Used combination of a hair and a skin category in a single model.
- Followed trial and error method to understand performance of CNN.
- Expected to achieve 90% accuracy, instead achieved between the range of 68% - 78% using simple CNN.
- Tuned hyperparameters to increase the accuracy.



# Combined Class

- Created a single model which can predict multiple hair and skin disease categories.
- Used VGG16 and Inception V3 architectures.
- Predominantly used VGG16.
- Tried various hyperparameter tuning.
- Despite the above, failed to achieve the expected accuracy.

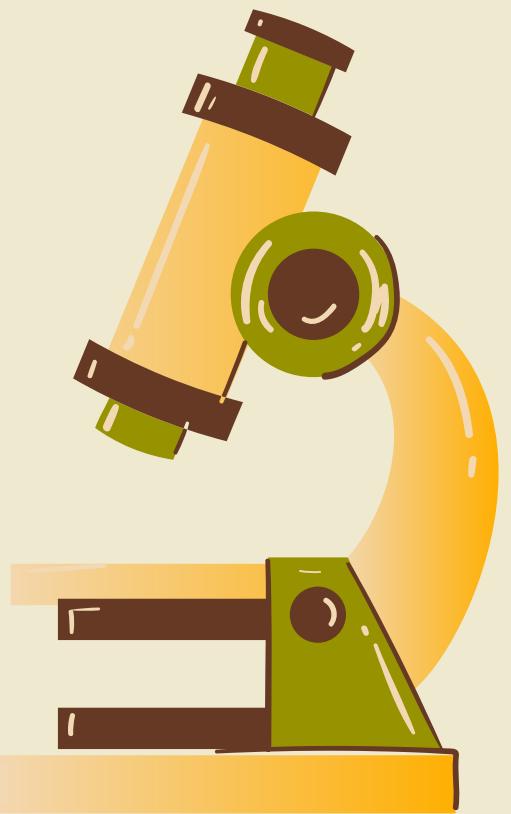


# Data Pre-Processing

Cropping and sharpening  
to the affected area.

Removing Blurred and  
out-of-focus images

Data Augmentation



# Independent Class

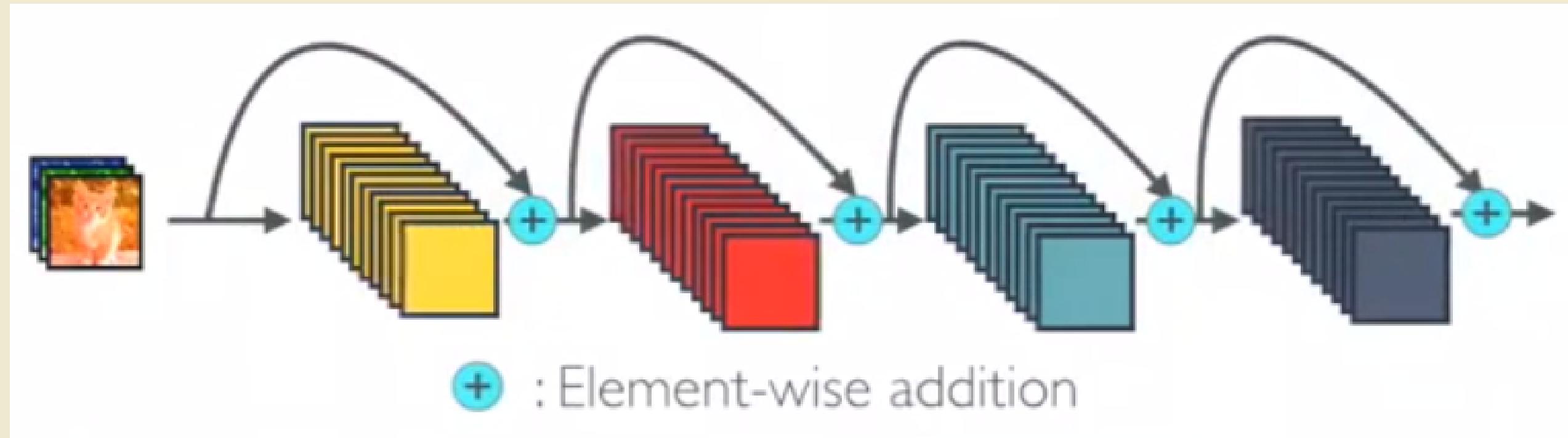
- Creating two independent models for hair and skin.
- Using DenseNet architecture gave better results.



# Densenet Architecture

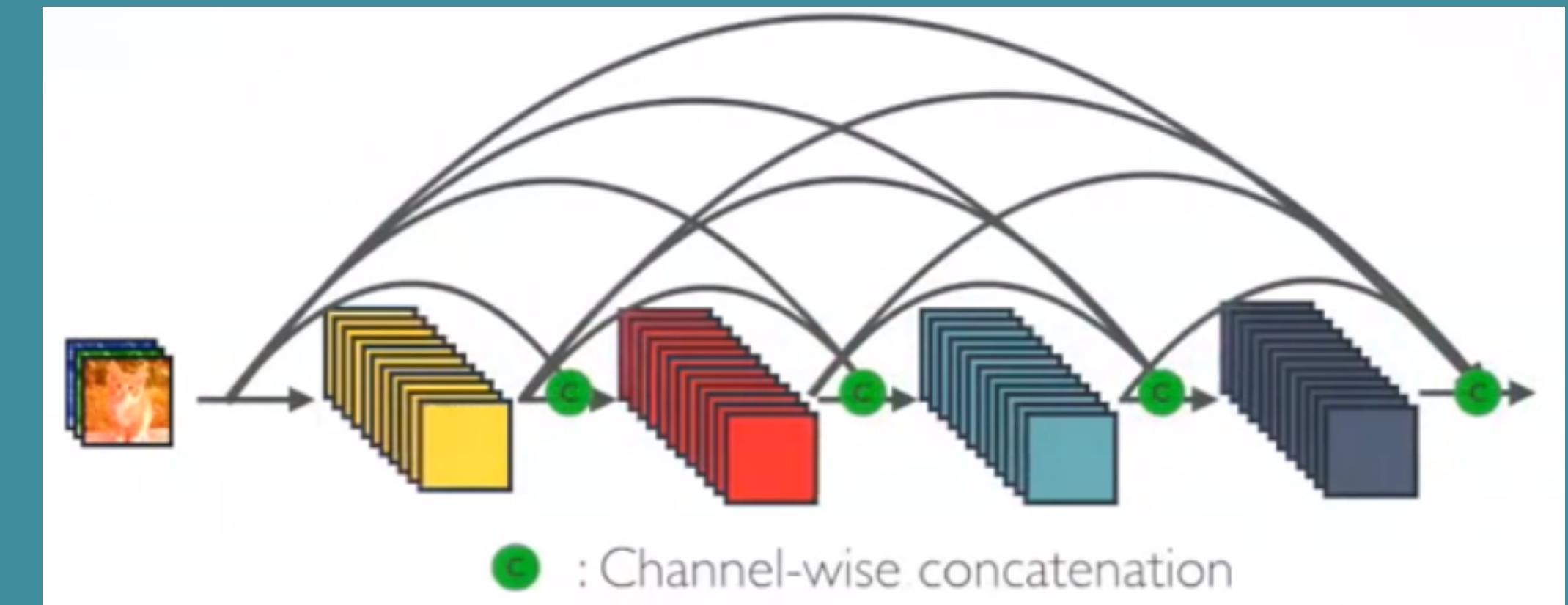
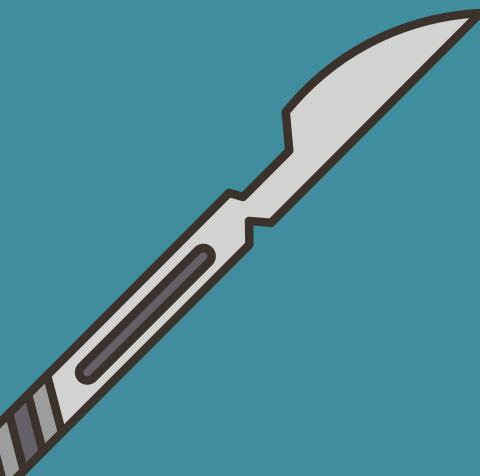


# Resnet



vs

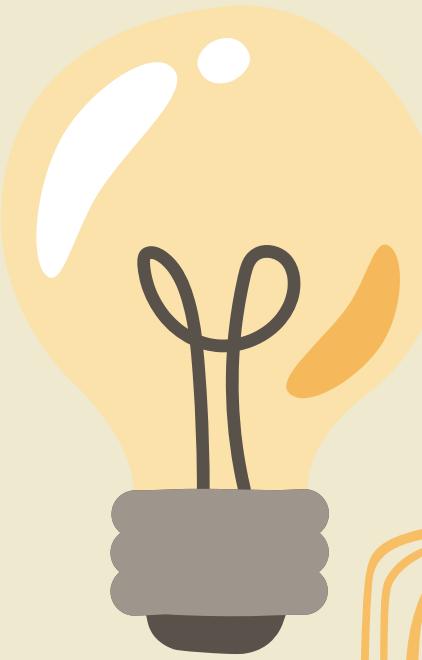
# Densenet



# DenseNet

- In DenseNet, each layer obtains additional inputs from all preceding layers and passes on its own feature-maps to all subsequent layers.
- Concatenation is used.
- Each layer is receiving a “collective knowledge” from all preceding layers which improves the gradient propagation.





# Advantages of Densenet

Strong Gradient Flow

More Diversified Features

Parameter and Computational Efficiency

Maintain low complexity features

# Performance Metrics



Classification Report:

	precision	recall	f1-score	support
Pityriasisversicolor	0.93	1.00	0.96	50
	0.84	0.95	0.89	55
	0.85	0.94	0.90	50
	1.00	0.76	0.86	50
	0.96	0.94	0.95	50
	1.00	0.94	0.97	50
	accuracy		0.92	305
	macro avg	0.93	0.92	305
	weighted avg	0.93	0.92	305

Hair Diseases Model



Skin Diseases Model

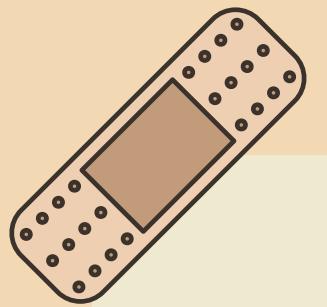
Classification Report:

	precision	recall	f1-score	support
Acne	0.90	0.88	0.89	49
Keloidalitis	0.66	1.00	0.79	50
AlopeciaAreata	0.92	0.71	0.80	48
Dandruff	1.00	0.72	0.84	50
Healthscalp				
accuracy			0.83	197
macro avg	0.87	0.83	0.83	197
weighted avg	0.87	0.83	0.83	197

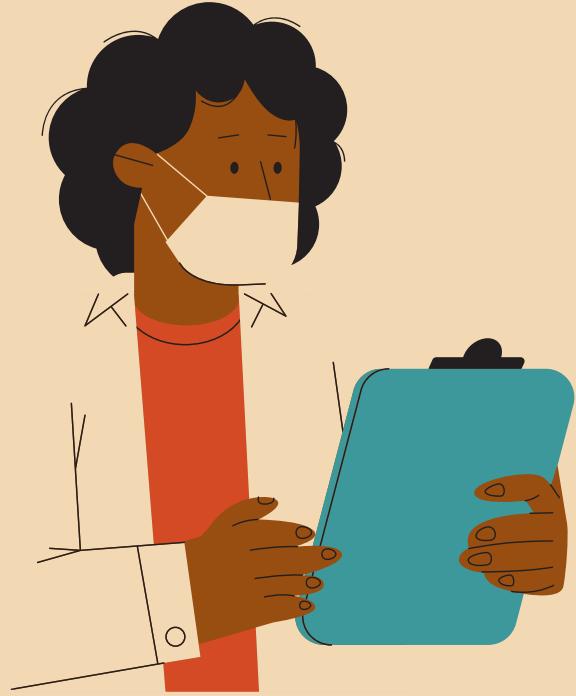
# Limitations



Authentic data  
source - Quality  
and Quantity



Complex model  
architecture



# Future Scope



Adding more disease classes



Consider the medical history of the patients as features



Predict severity level of the disease

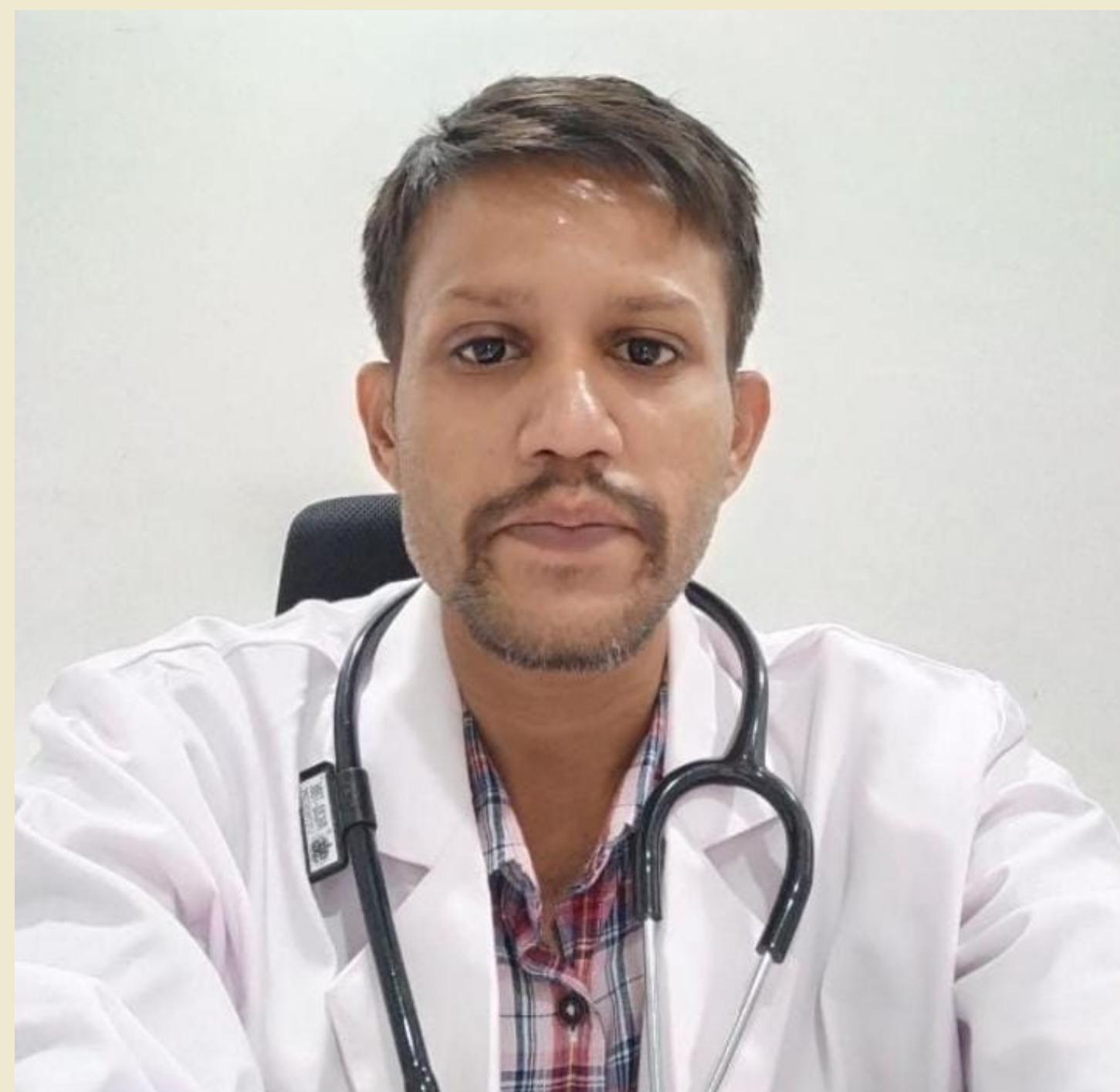


Adding more disciplines of medicines

# Demonstration







**Dr. Vignesh Kumar  
MBBS, MD DVL**

*Thank You*





Our Mentor  
Prof. Gourab Nath

*Thank You*

A stylized illustration of a woman with long dark hair, wearing a pink dress over a blue jacket with yellow buttons. She is standing next to a road sign that reads "Live Demo".

# Live Demo

# Thank you for listening!

Don't hesitate to ask any questions!

