Skin Cancer Identification By Machine Learning

bangkit

01

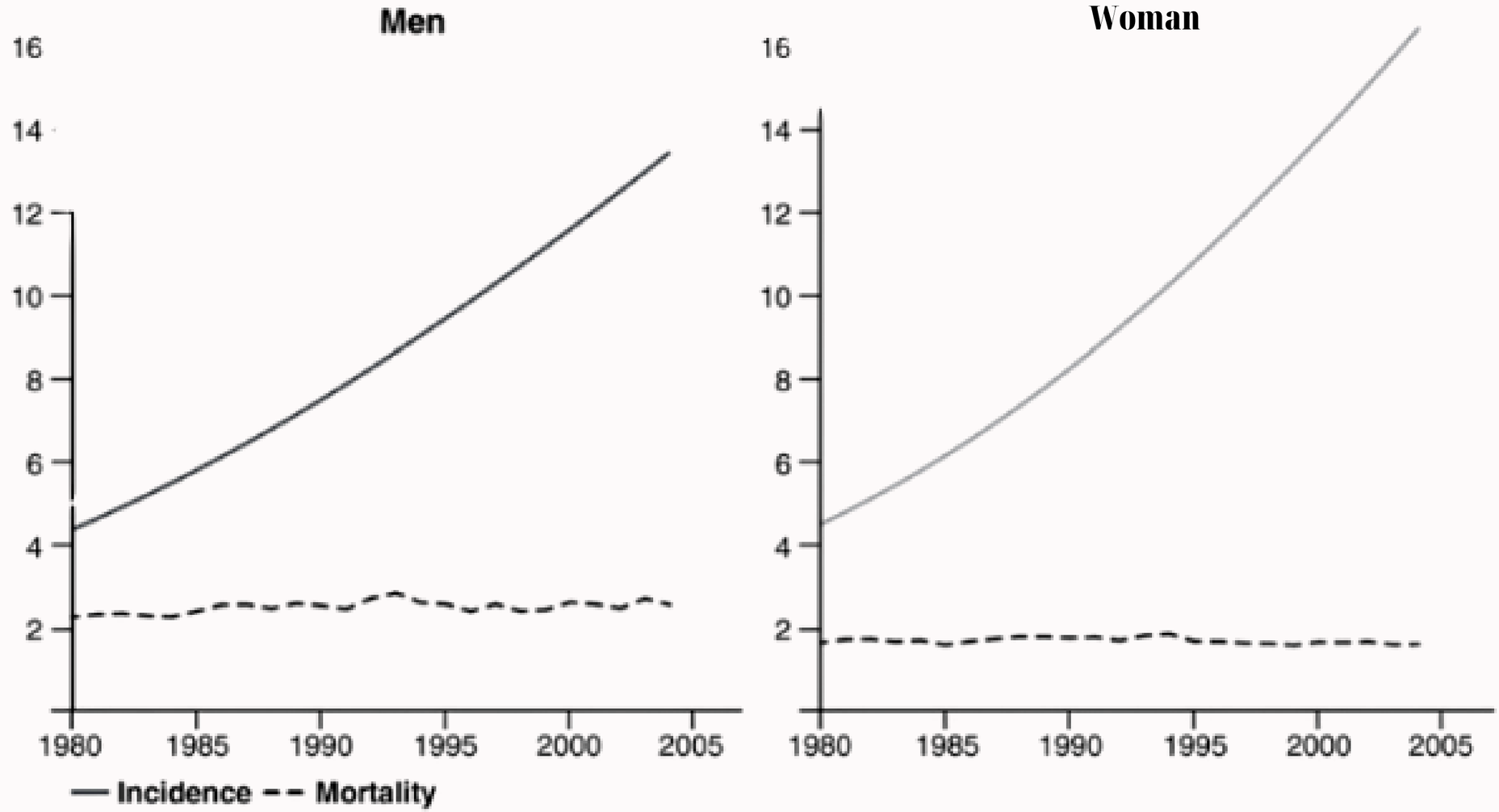
Background

Malignant Melanoma of the skin is the 19th most commonly occurring cancer in men and women. There were nearly 300,000 new cases in 2018.

-World Cancer Research Fund

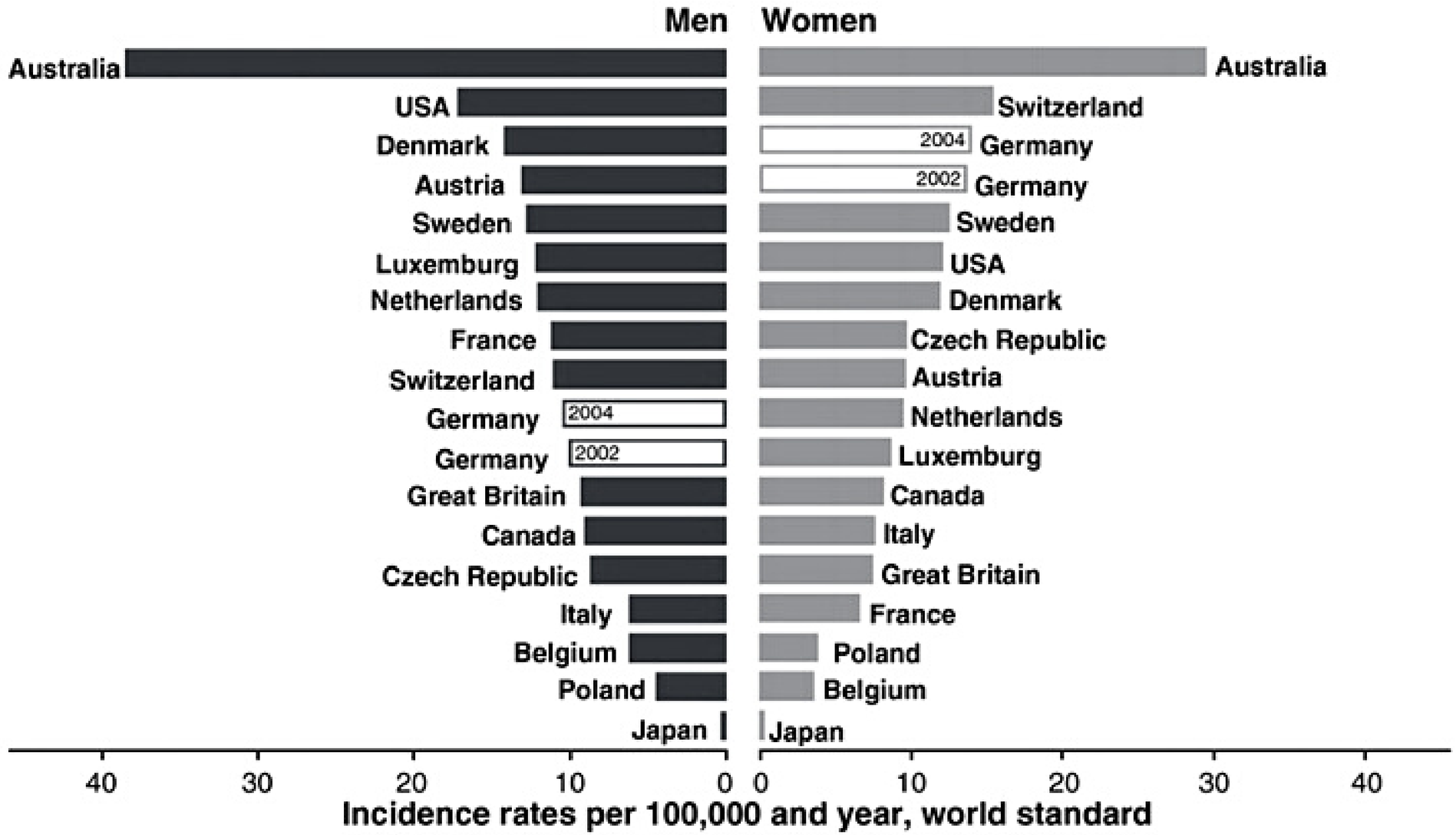
Cutaneous malignant melanoma is the most rapidly increasing cancer in white populations. The highest incidence rates have been reported from Queensland, Australia with 56 new cases per year per 100,000 for men and 43 for women.

-Claus Garbe, University of Tuebingen



Age-standardized (European standard population) incidence and mortality rates in the Federal Republic of Germany during 25 years. Estimates of incidence rates are based on data from several cancer registries in different Federal States.

Source: Melanoma epidemiology and trends (Journal of Clinics and Dermatology)



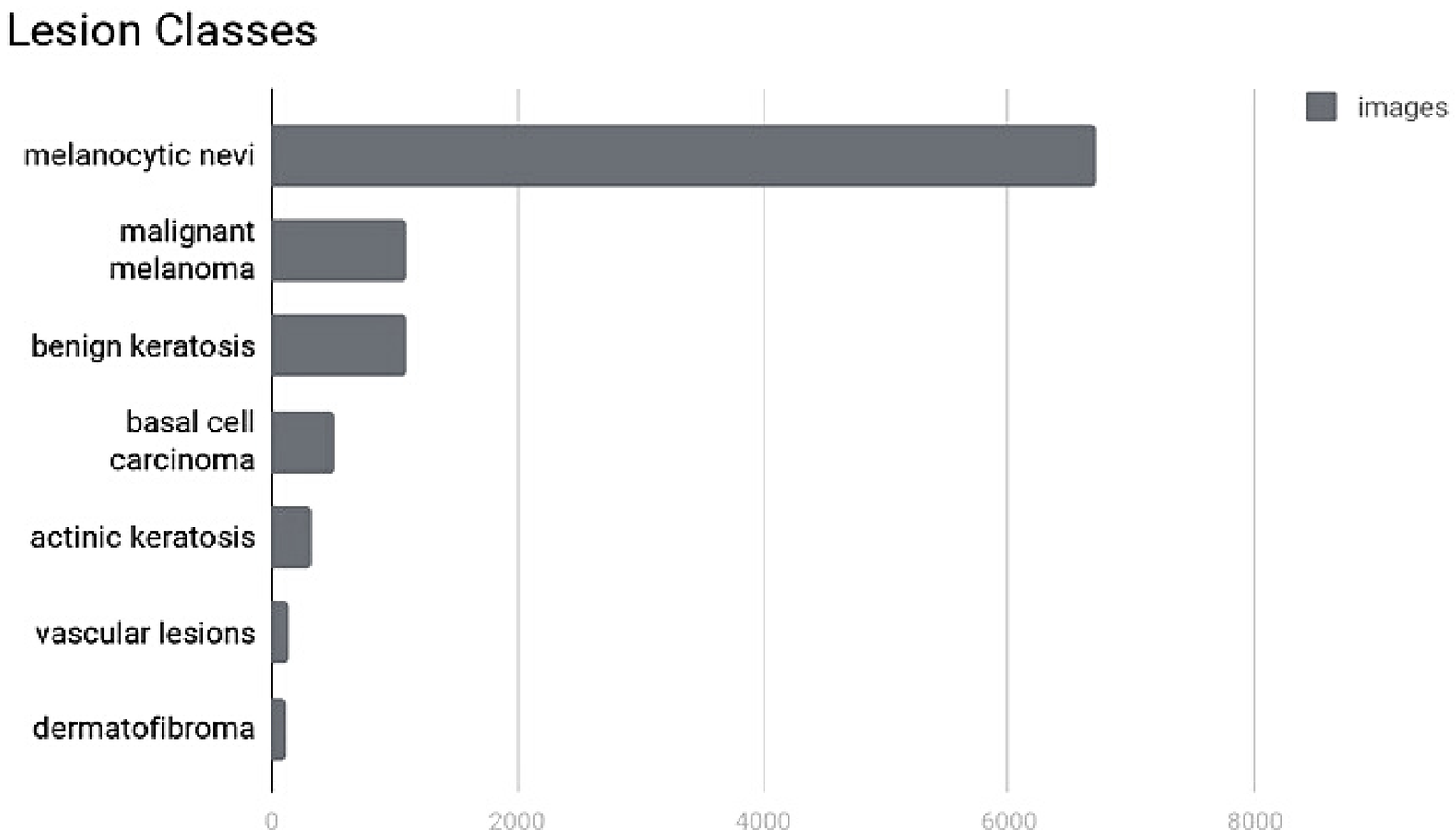
Age-standardized (world standard population) incidence rates from 17 countries worldwide for the year 2002. USA, United States of America.

Source: Melanoma epidemiology and trends - Journal of Clinics and Dermatology

SKIN CANCER MNIST HAM1000

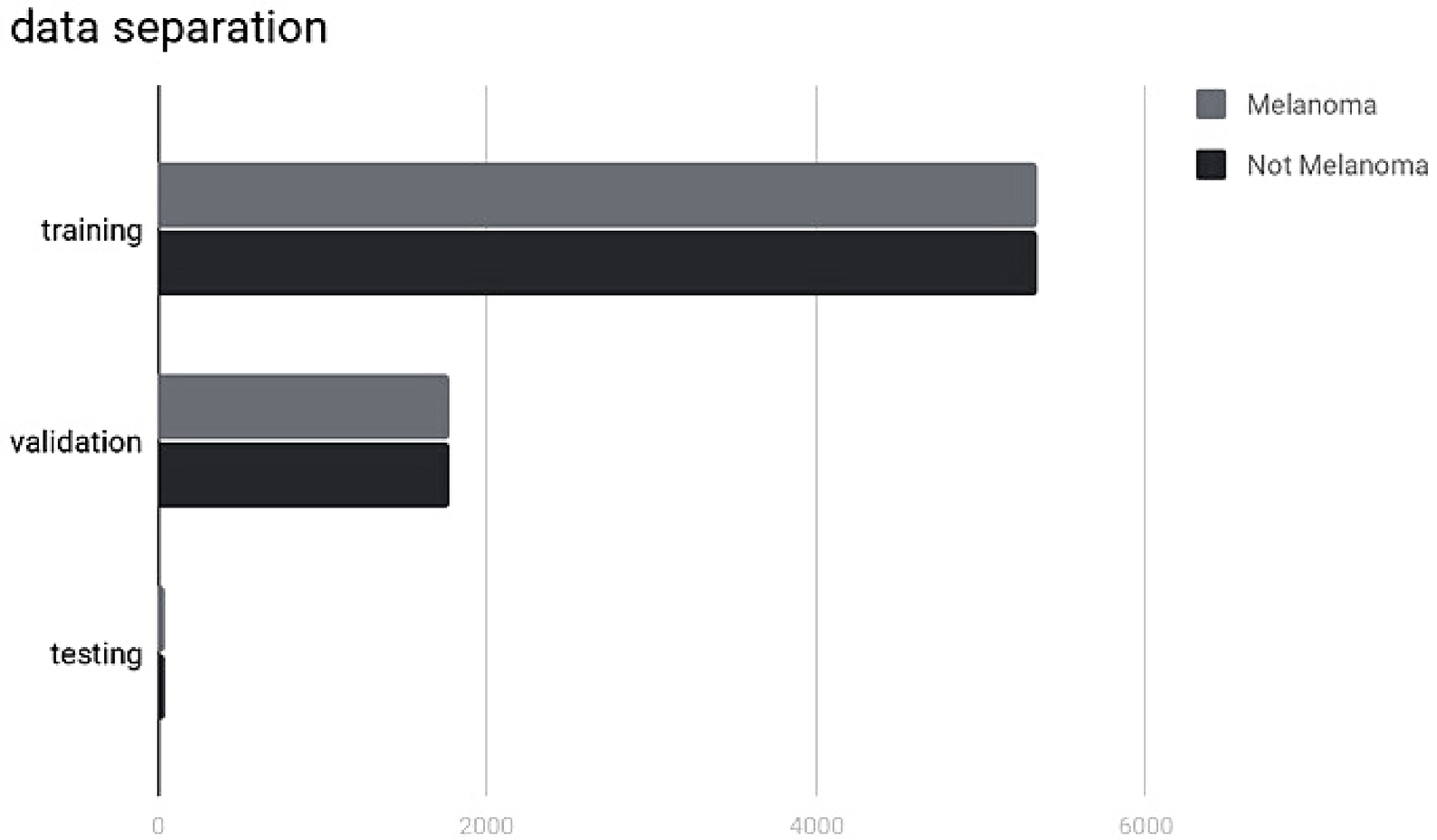
Training of neural networks for automated diagnosis of pigmented skin lesions is hampered by the small size and lack of diversity of available dataset of dermatoscopic images. This problem is tackled by releasing the HAM10000 ("Human Against Machine with 10000 training images") dataset.

The final dataset consists of 10015 skin lesion (damaged tissue) images divided into seven different classes.

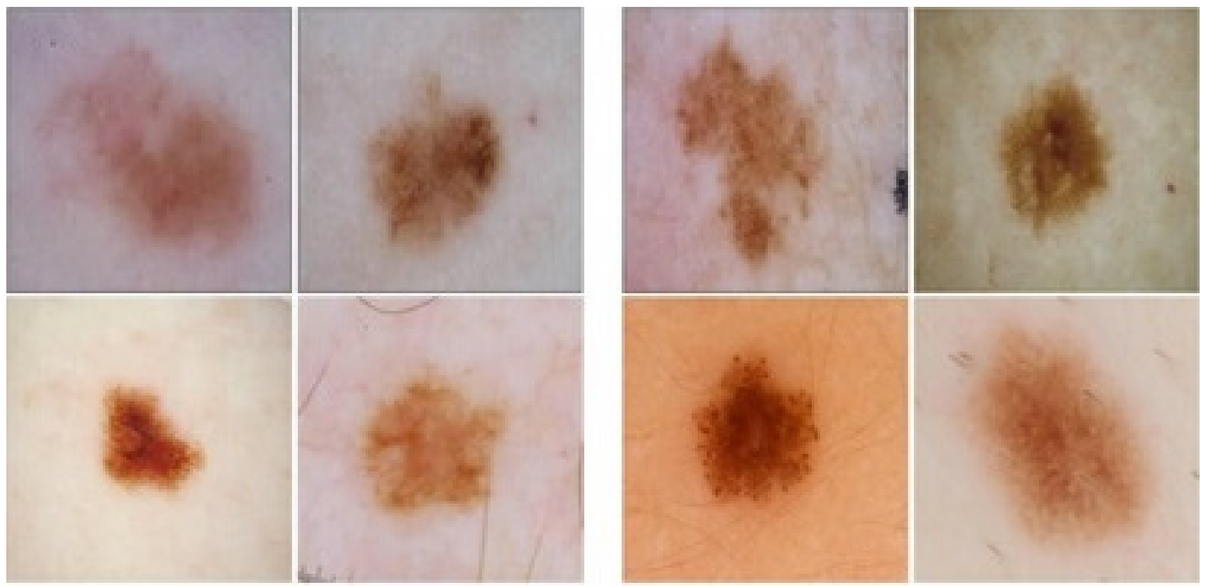


SKIN CANCER DATASET:
Alexander Scarlat

Extracted from the Skin Cancer Mnist HAM1000 Dataset



WHY SKIN CANCER?



1. Malignant Melanoma can be identified visually

Table 1 Anatomic sites of cutaneous melanoma according to sex [a]

Anatomic Site	Men		Women	
	Percent	Median age, y [b]	Percent	Median age, y [b]
Face	8.2	66	10.1	70
Scalp	5.1	64	2.0	61
Neck	2.2	57	1.6	56
Anterior trunk	16.3	55	7.7	45
Posterior trunk	39.3	55	17.1	48
Genital region	0.2	59	0.8	65
Upper extremity	12.2	58	18.4	59
Lower extremity	16.5	52	42.3	56

[a] The analysis is based on 78,809 cases of the database of the German Central Malignant Melanoma Registry (updated March 2008).

[b] The median age is given at the time point of diagnosis.

The site-specific incidence of melanoma varies according to age. The incidence of melanoma localized on the trunk and on the lower extremity decreases with advancing age, whereas a significant increase of melanoma localized on head and neck areas can be found in older patients.41,42 Nearly 80% of melanomas in patients aged 80 years and older were found on head and neck areas.
Source: Melanoma epidemiology and trends - Journal of Clinics and Dermatology

WHY SKIN CANCER?

2. Specific Medical Guideline

Every type of skin lesion can be treated by specific medical guideline regarding the type and the stadium

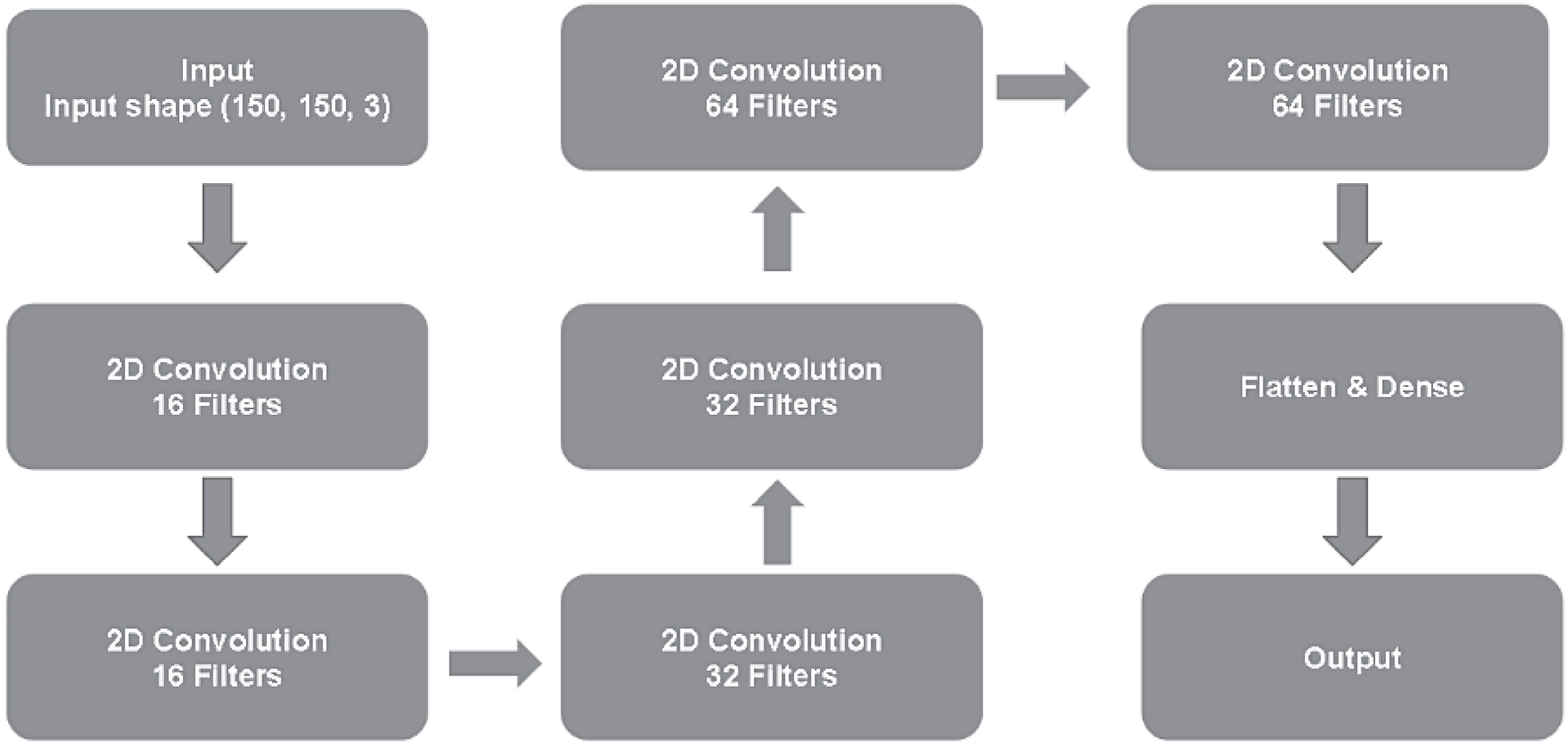
Build Machine Learning model that can identify skin lesion types

Build website application to predict skin lesion type and give appropriate medical guideline

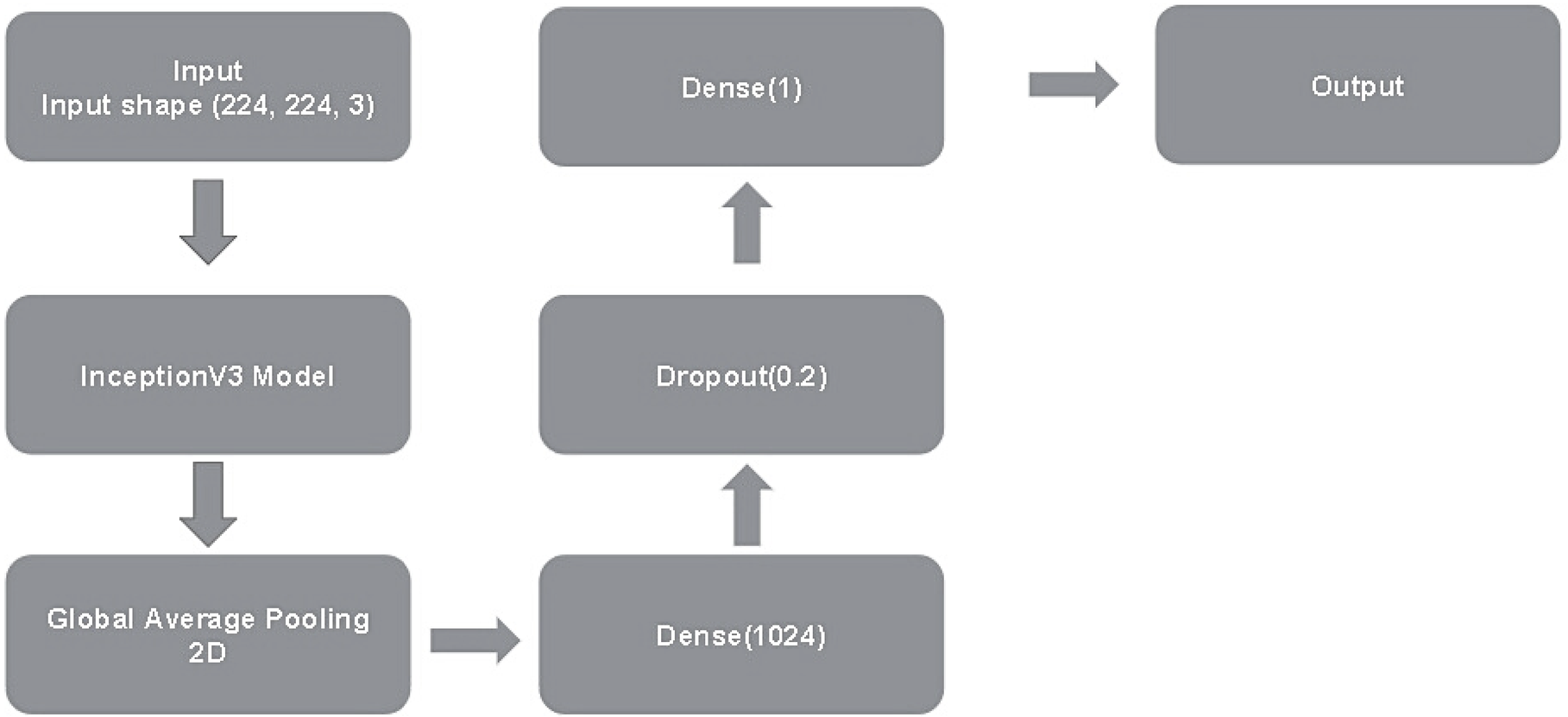
02

Model

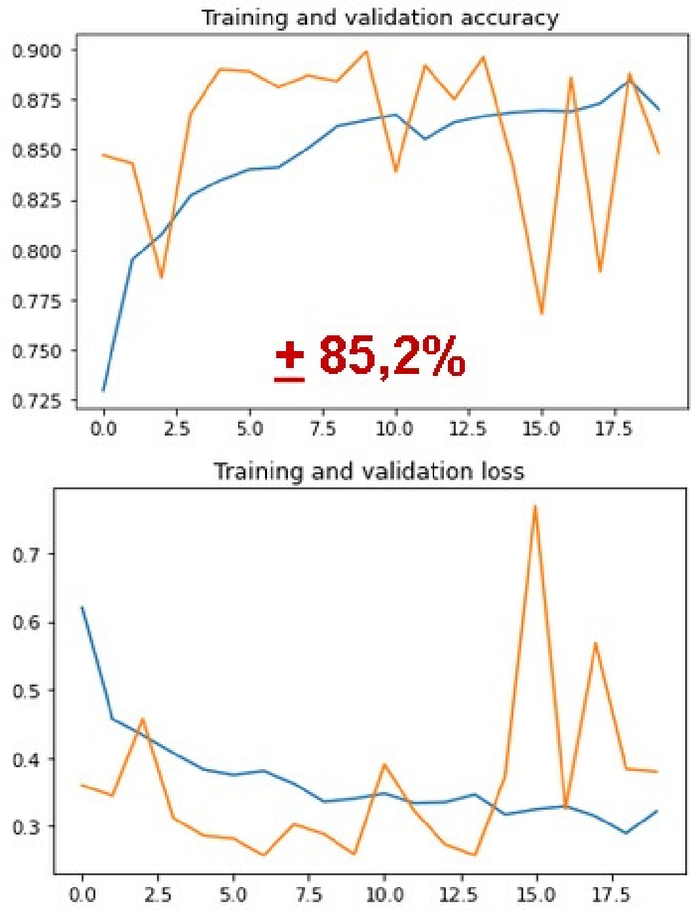
Baseline CNN Model



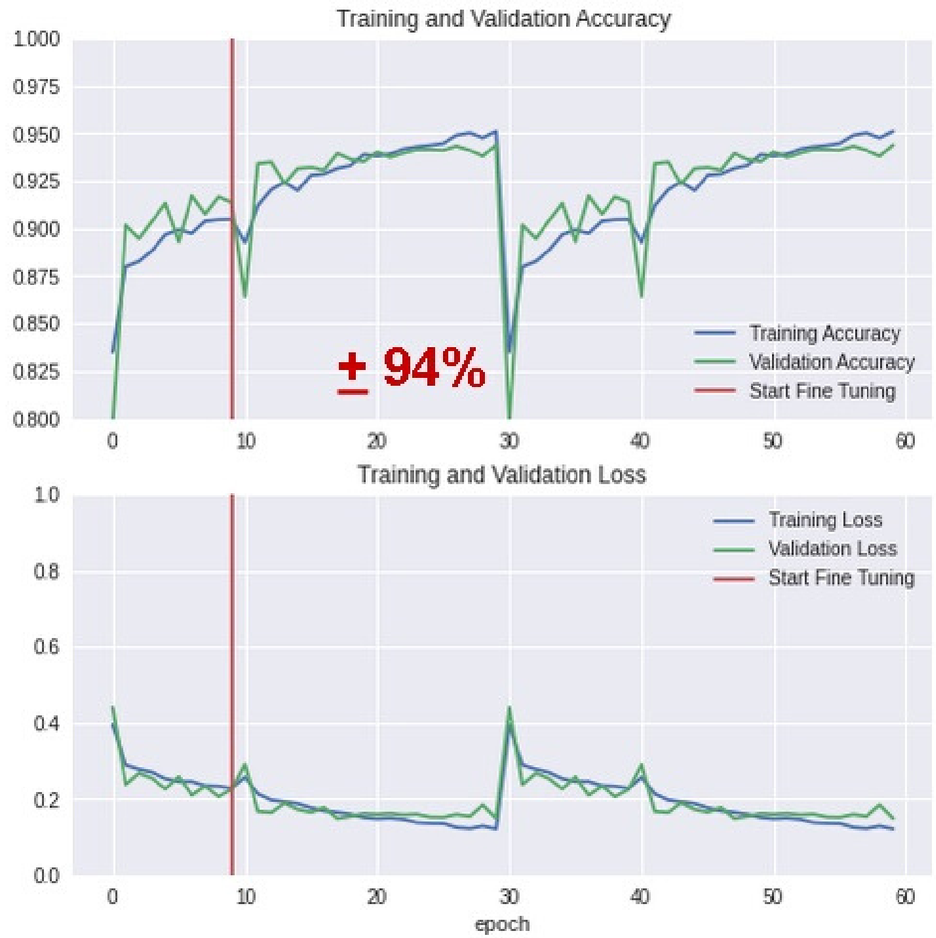
Improved CNN Model



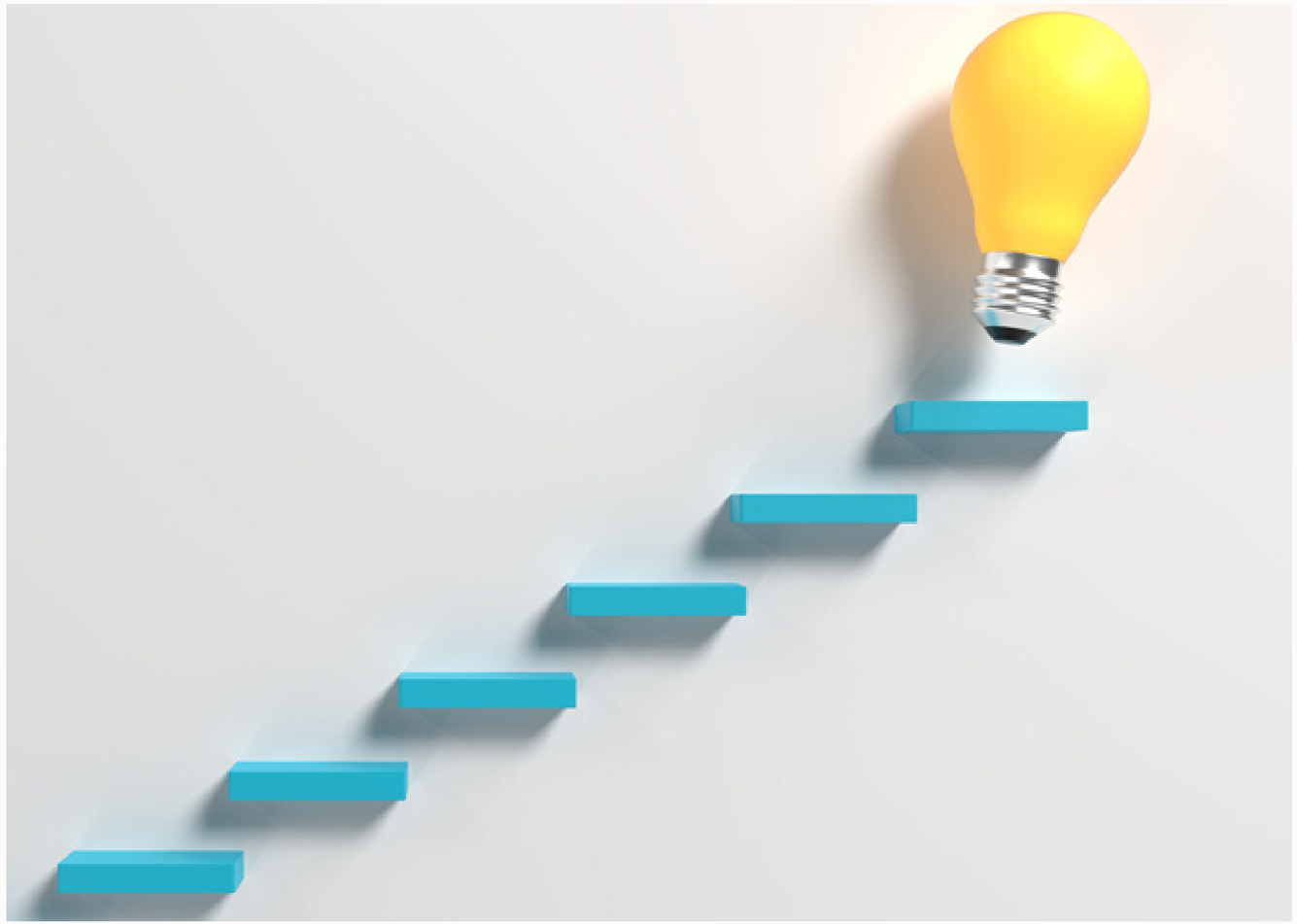
Preimprovement



Improvement



03



Improvement

Improvement Parameters

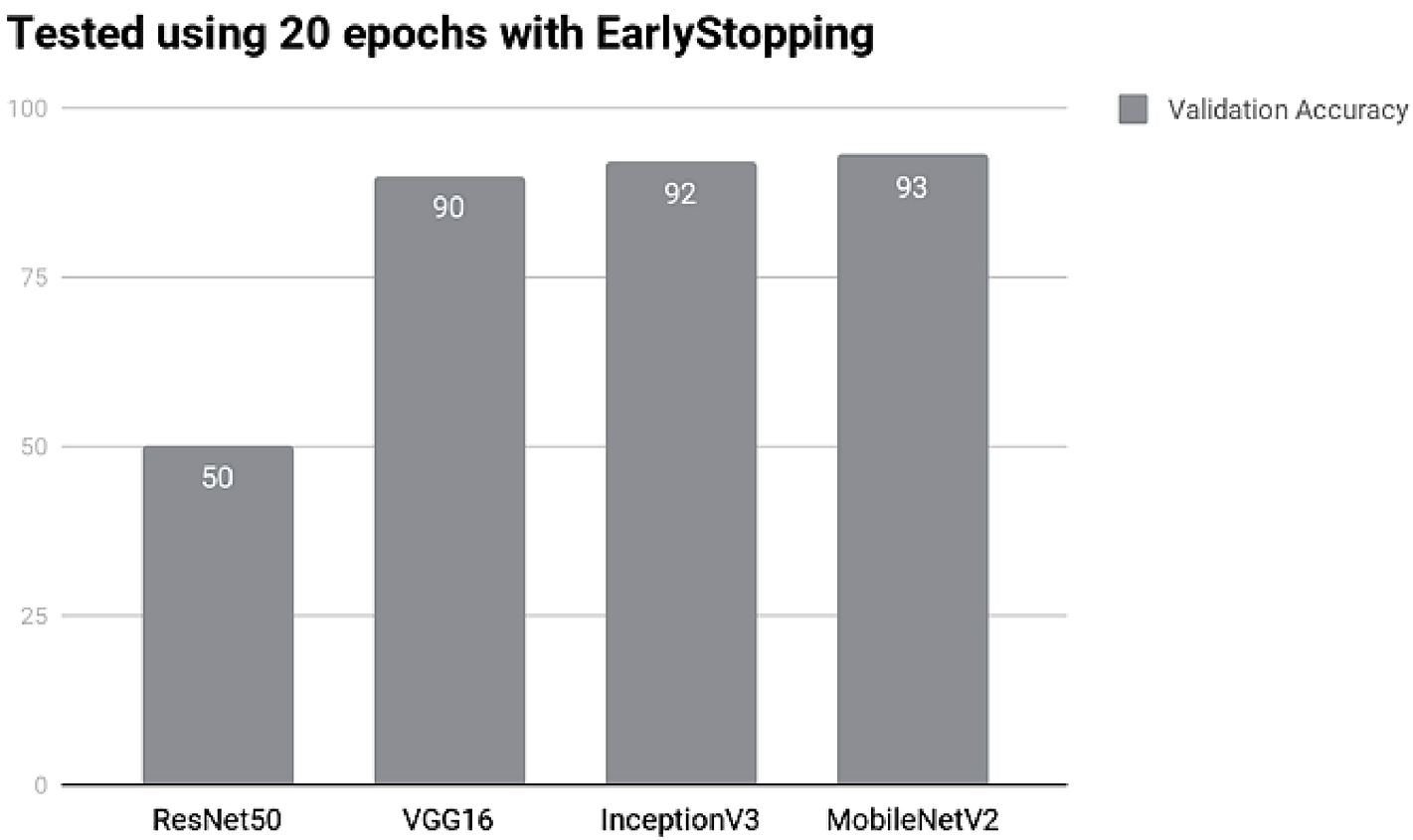
Neural Network Architectures

Data Augmentation

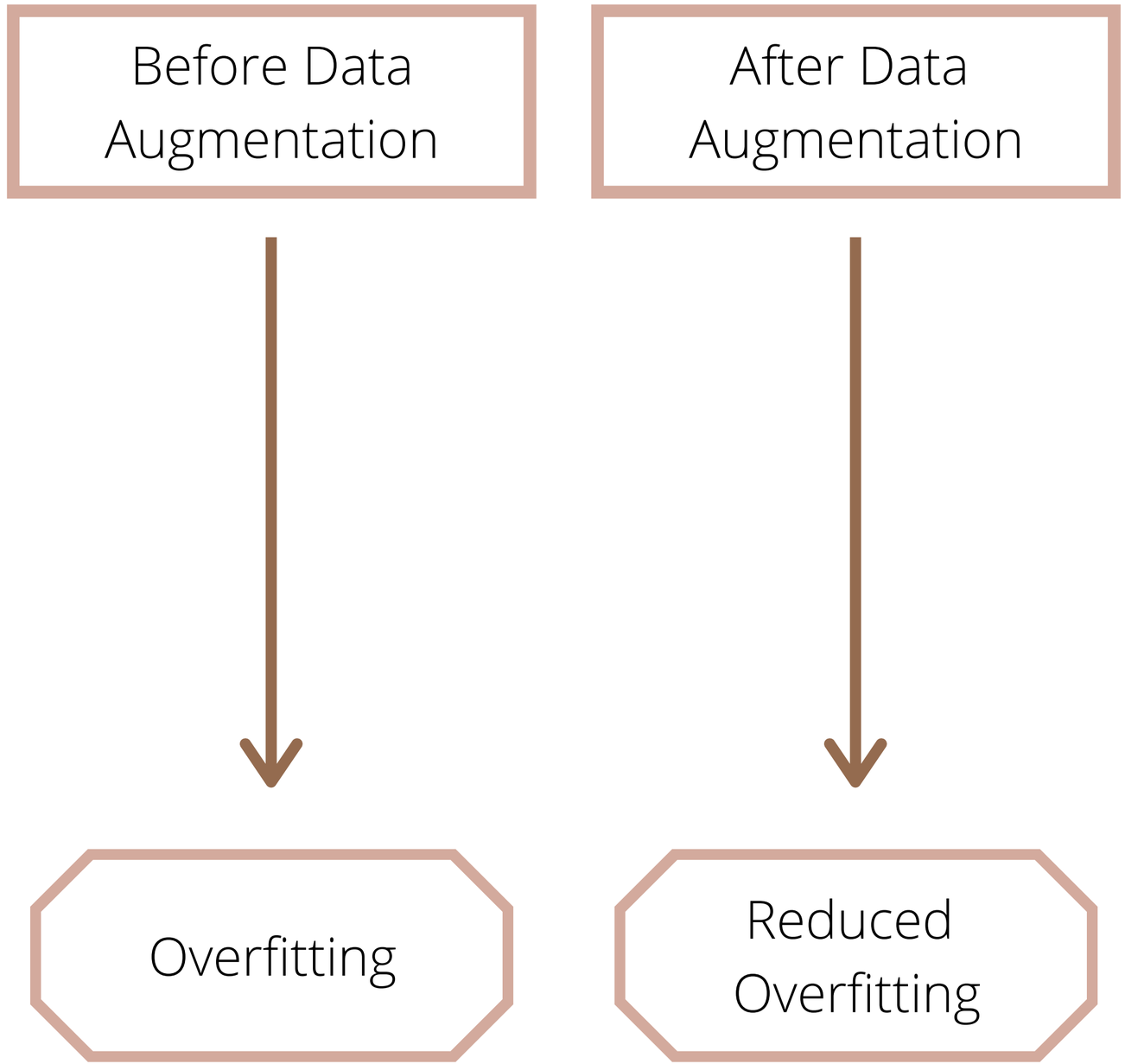
Optimizer

Learning Rate

Neural Network Architectures



Data Augmentation



Optimizer

Adam ⇒ fastest converge

RMSprop ⇒ 2nd converge

Adagrad ⇒ 3rd converge

SGD ⇒ slowest converge

Learning Rate

0.01 ⇒ fast but random fit

0.001 ⇒ well speed & fit

0.0001 ⇒ slow but well fit

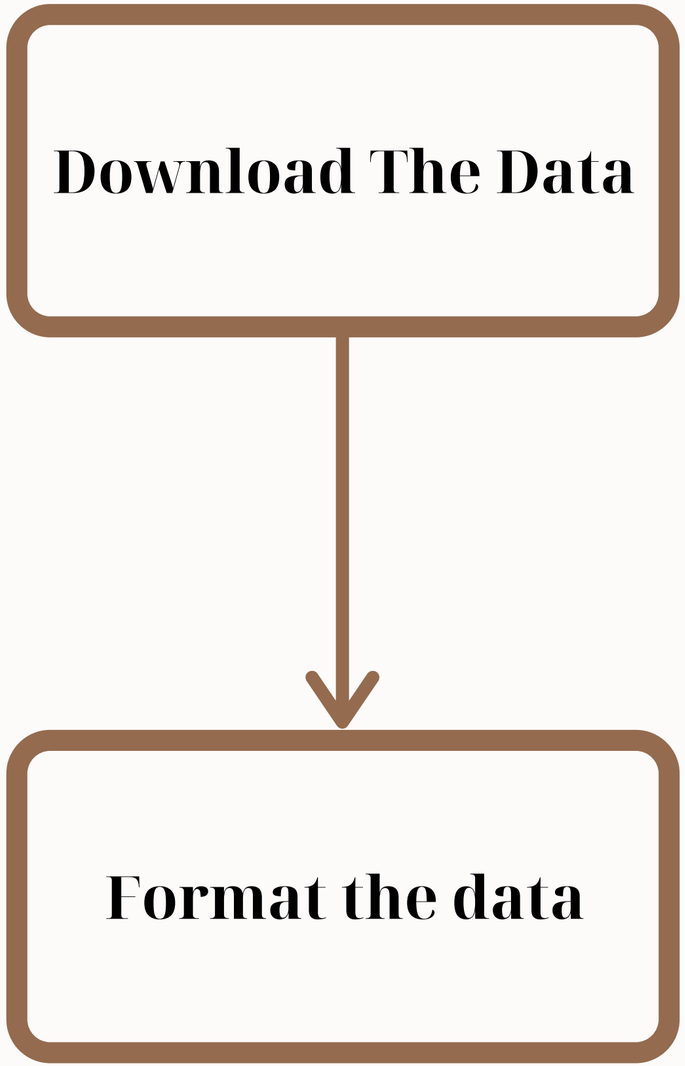
04

Methodology

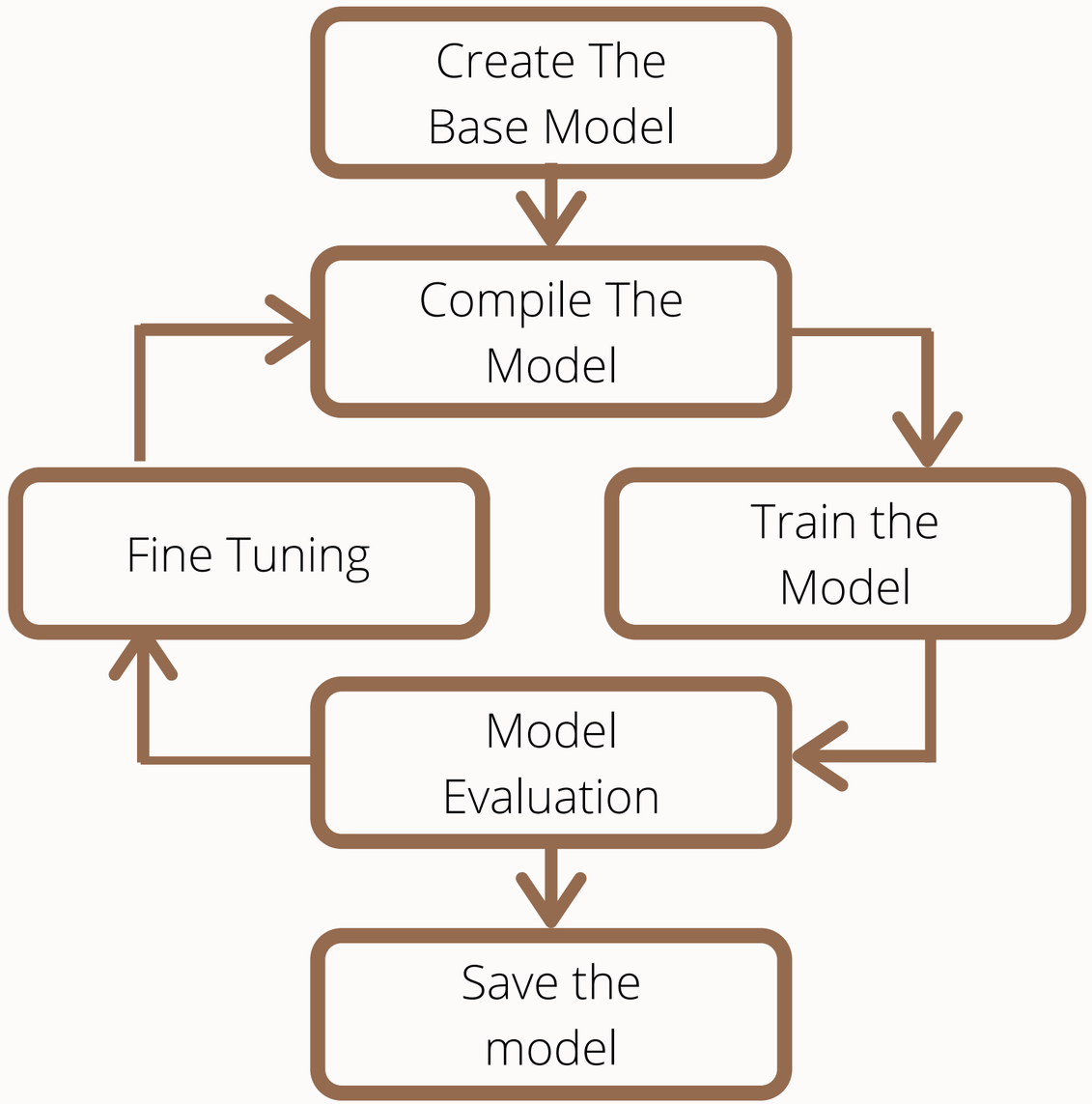
Step by Step

Preprocessing → **Modelling** → **Deployment**

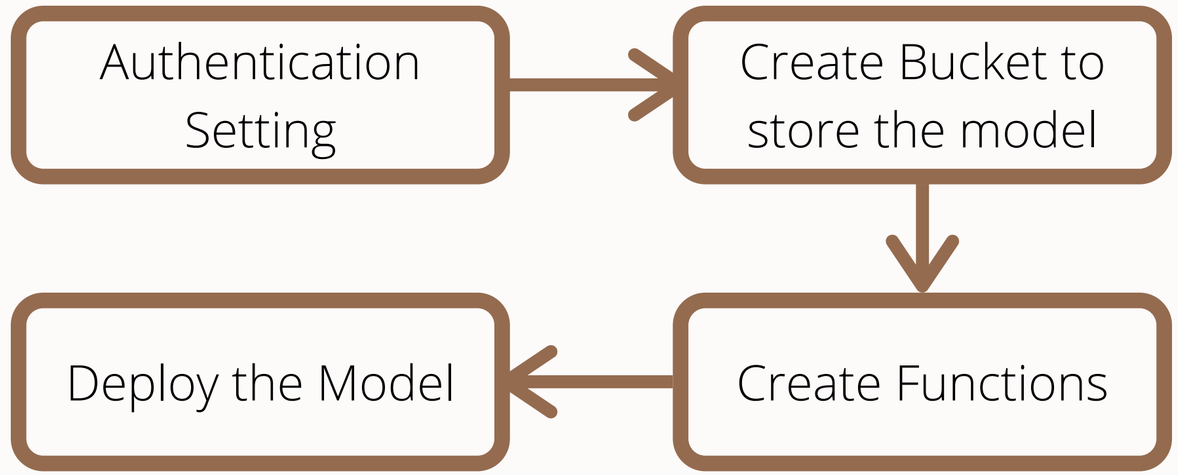
Data Preprocessing/ Data Preparation



Modelling


Create The Base Model
Compile The Model
Fine Tuning
Train the Model
Model Evaluation
Save the model

Deployment (Using Google Cloud Functions)

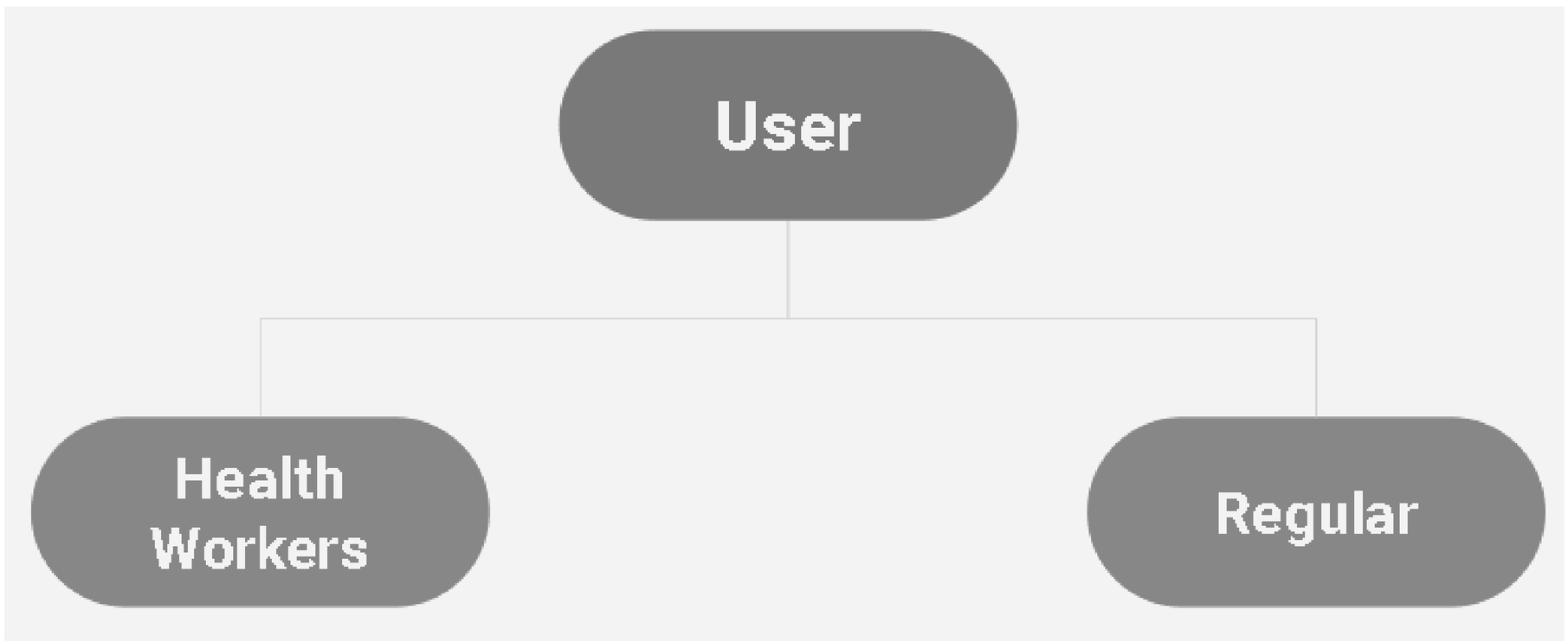


Functions	
Upload image to Cloud Storage	Model Prediction
Image preprocessing / preparation	Delete image from Cloud Storage after predicted
Get model from Cloud Storage	Parsing multipart form data

06

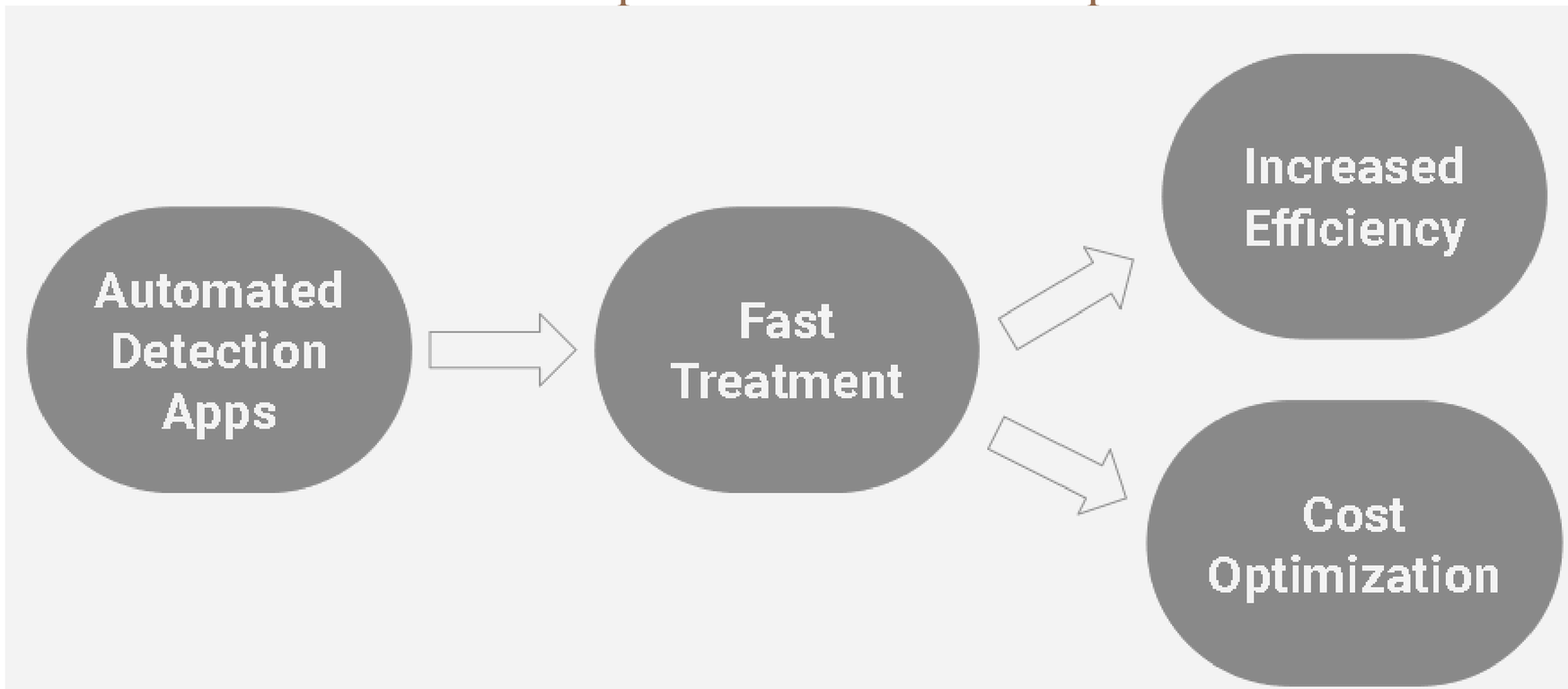
Implementation

Skin Cancer Detection for two users segment



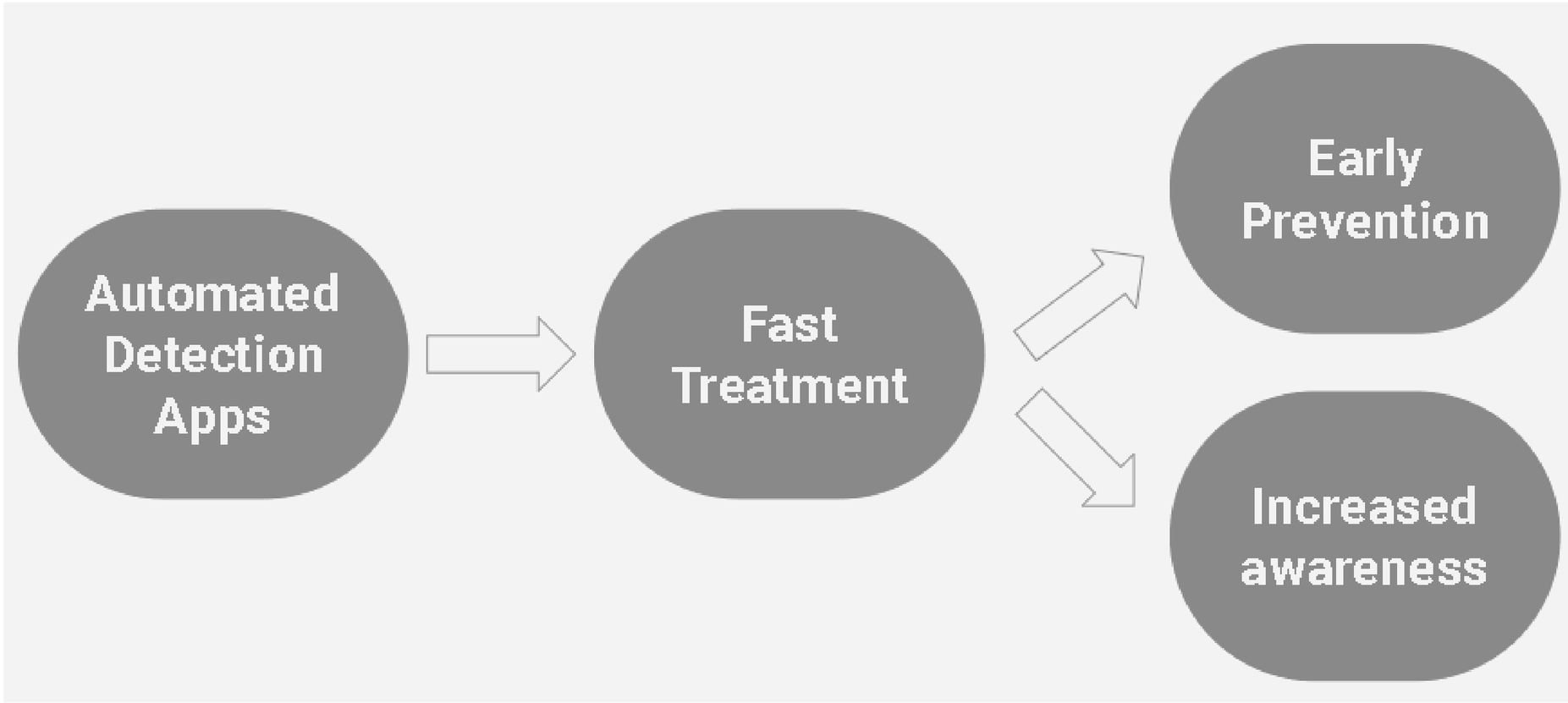
Website Detection for Health Workers

Automate the diagnosys process of melanoma detection through a simple website to accelerate the patient whole treatment process



Website Detection for Regular User

Fast Detection of Melanoma Appearance and Symptom for mass use



Website Demo