Skin Cancer Identification By Machine Learning

01

Background


MELANOMA?

Malignant melanoma is the most lethal and aggressive form of skin cancer [4, 2]

White People

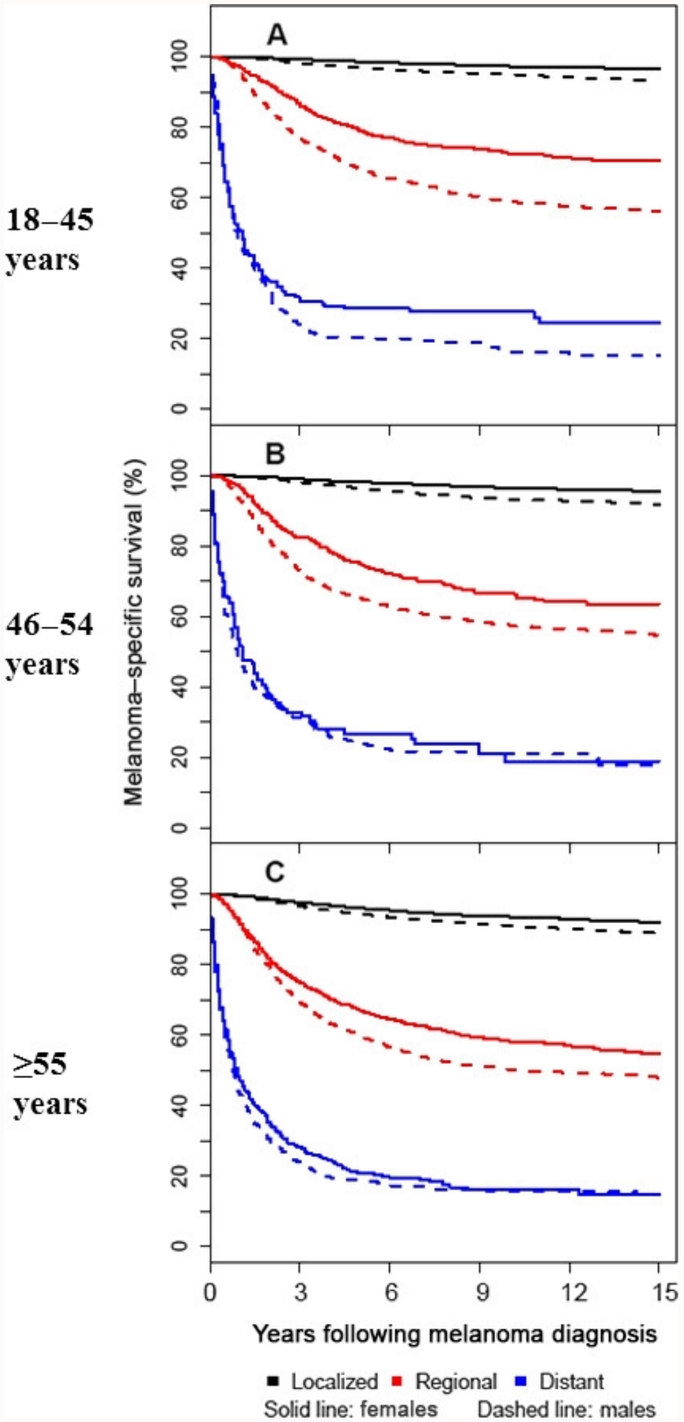
Skin cancer is the **most common cancer** in the US [8].

87,110 individuals are predicted to be diagnosed with **melanoma** in the United States alone, **melanoma** accounts for the **majority of skin cancer deaths** [2]

Asian People

Rare occurrence, but have **thicker tumors** with an **advanced disease** state at time of presentation ultimately resulting in **poorer overall prognosis** and **greater morbidity and mortality.** [3]

Melanoma Specific Survival [5]

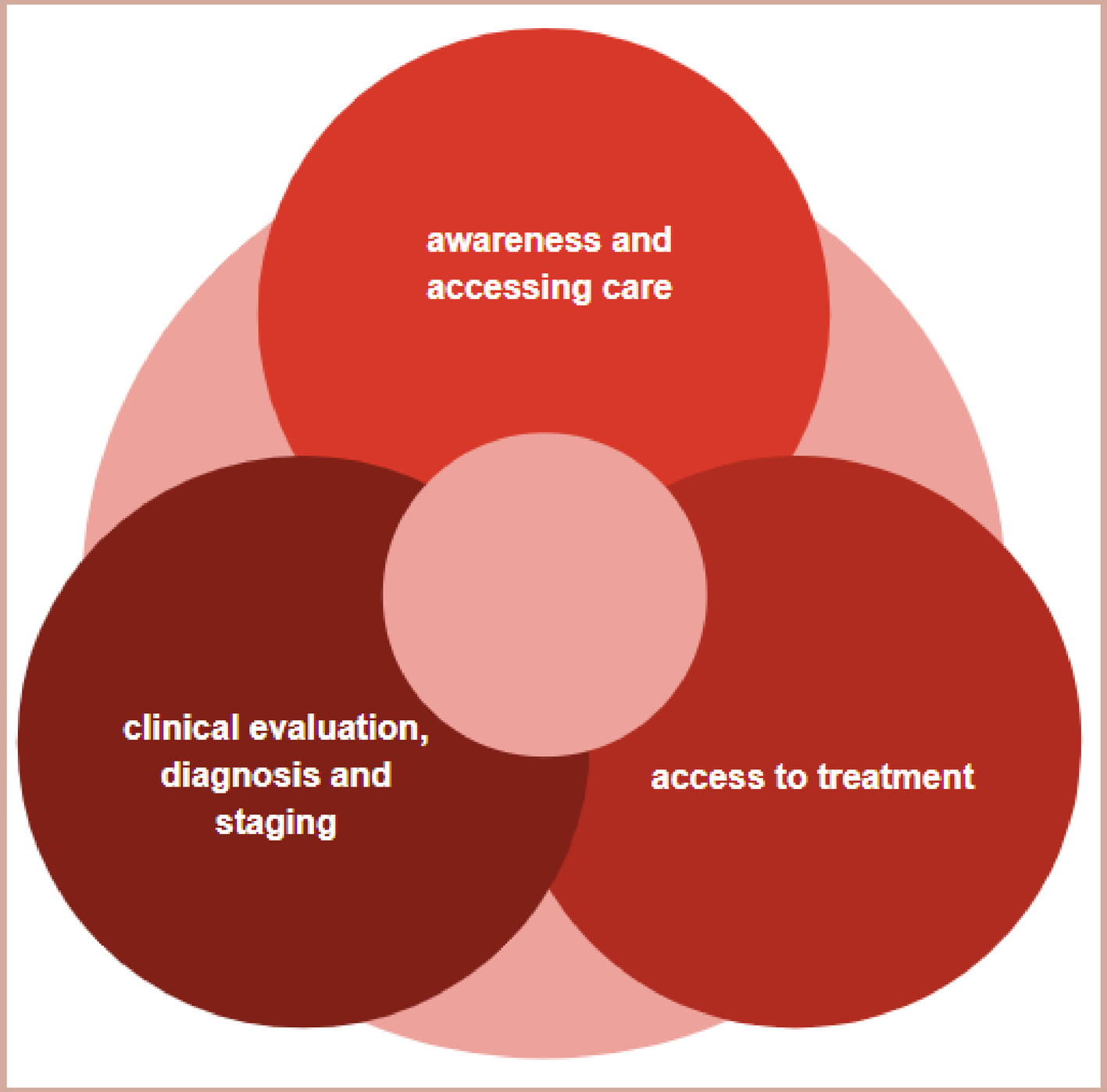


The Biggest Problem is....

Melanoma can **mimic** many kind of skin lesions.

Increased time to diagnosis is associated with increased stage, thickness, and likelihood of distant metastasis. Thus, early patient and clinician melanoma detection is crucial for improving outcomes [6]

“Reducing cancer mortality with 3 steps of early diagnosis” - WHO



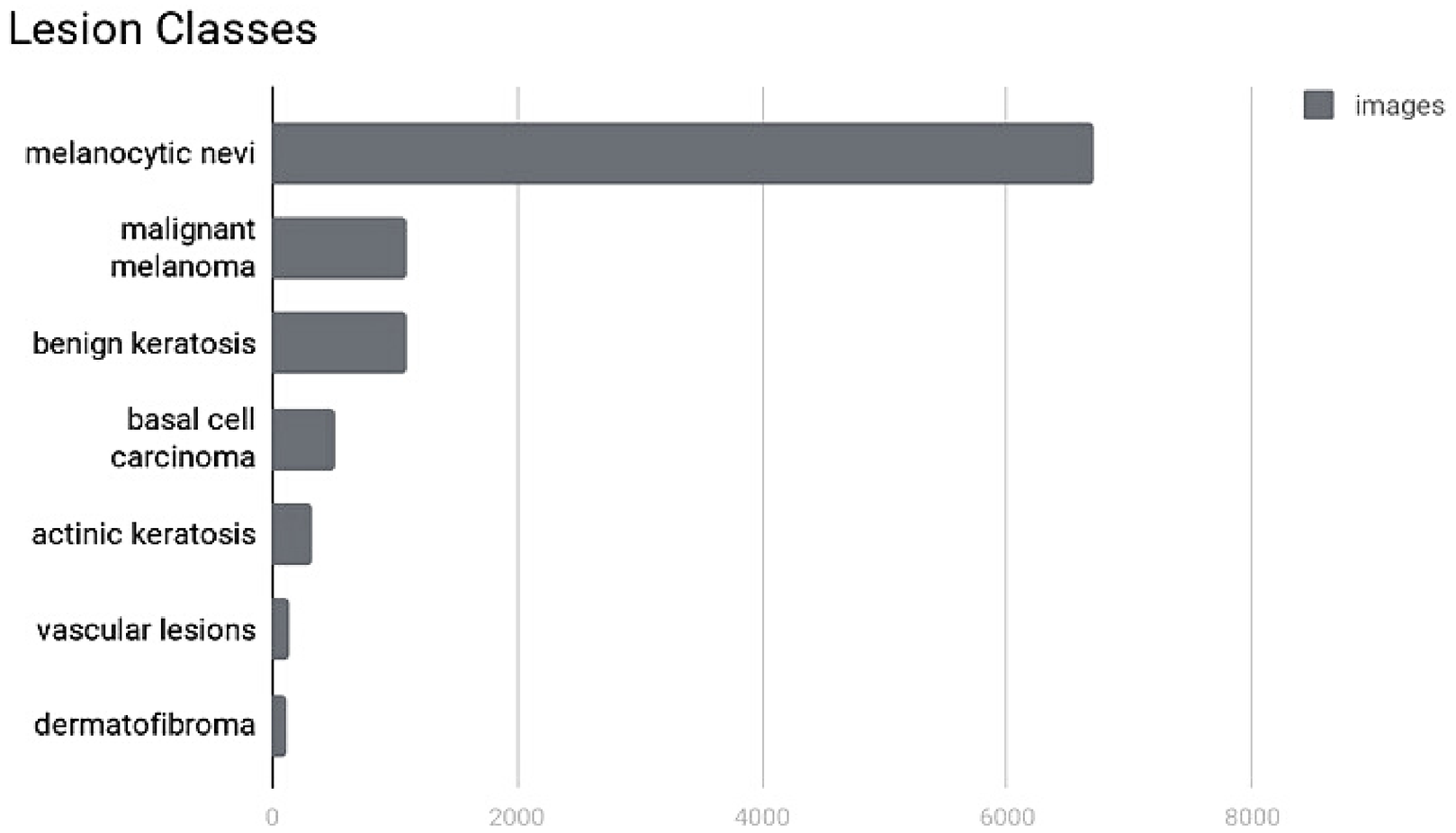
So what we've done here is....

...providing a **decision-support application** for early melanoma diagnosis

SKIN CANCER MNIST HAM1000

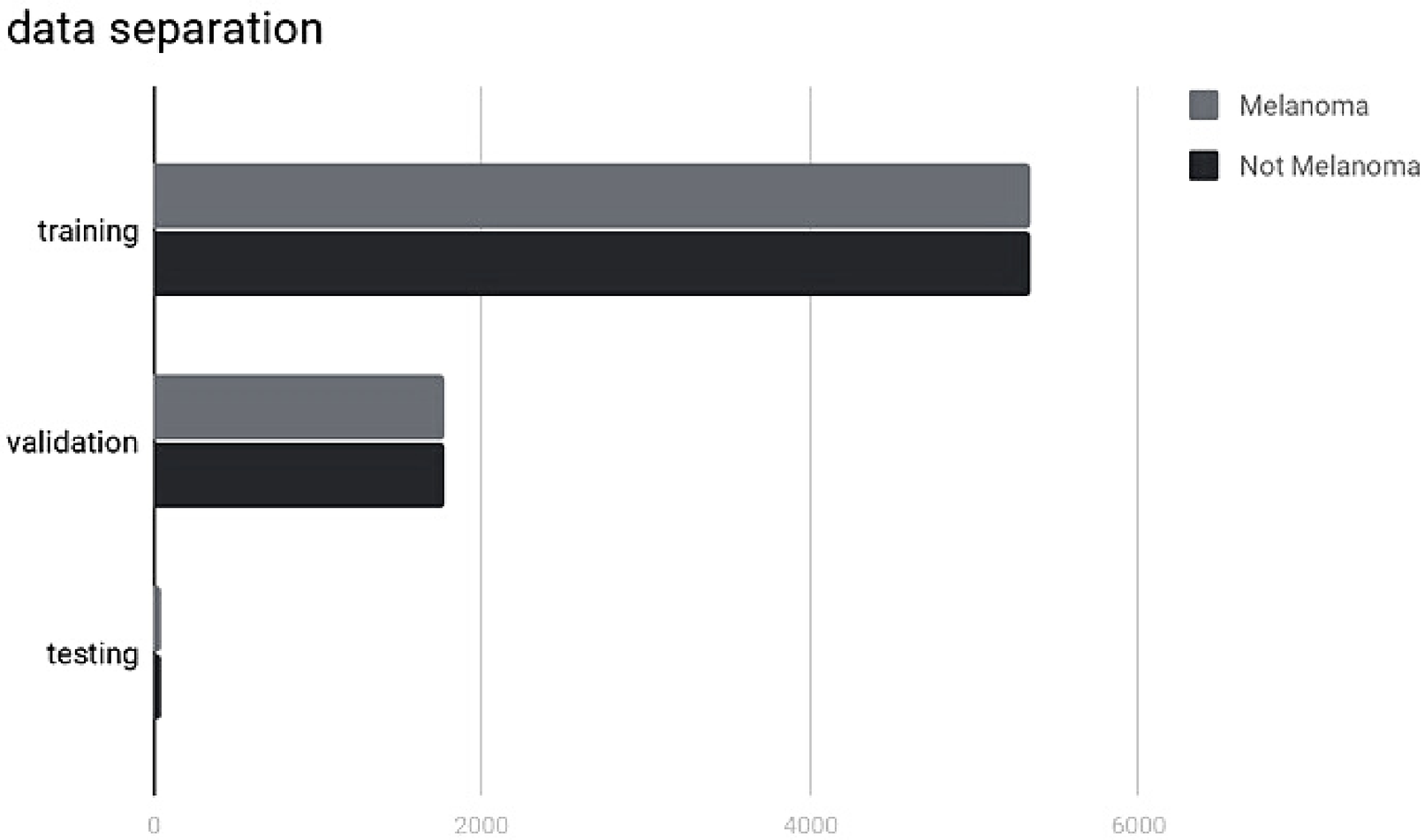
Training of neural networks for automated diagnosis of pigmented skin lesions is hampered by the small size and lack of diversity of available dataset of dermatoscopic images. This problem is tackled by releasing the HAM10000 ("Human Against Machine with 10000 training images") dataset.

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



SKIN CANCER DATASET:
Alexander Scarlat

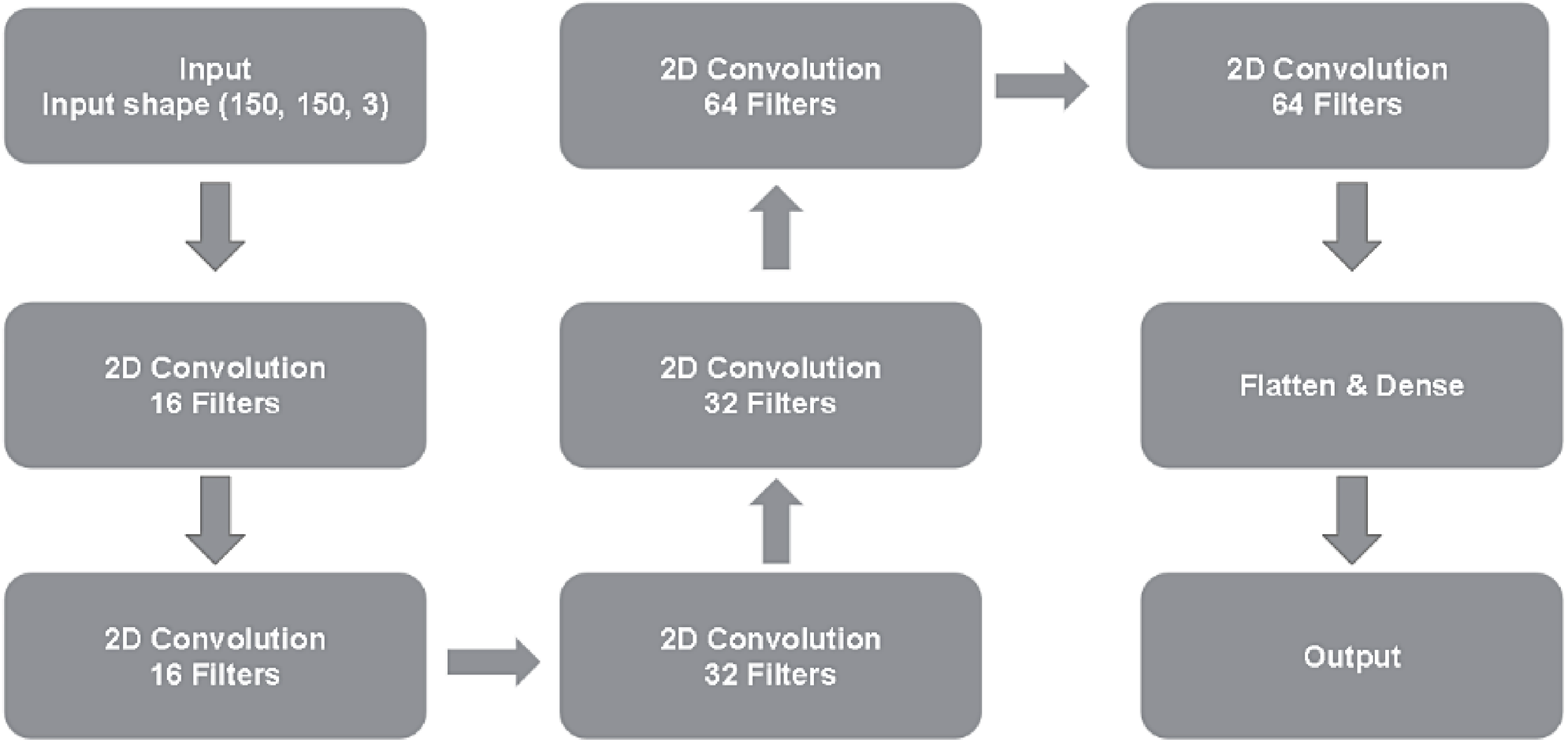
Extracted from the Skin Cancer Mnist HAM1000 Dataset



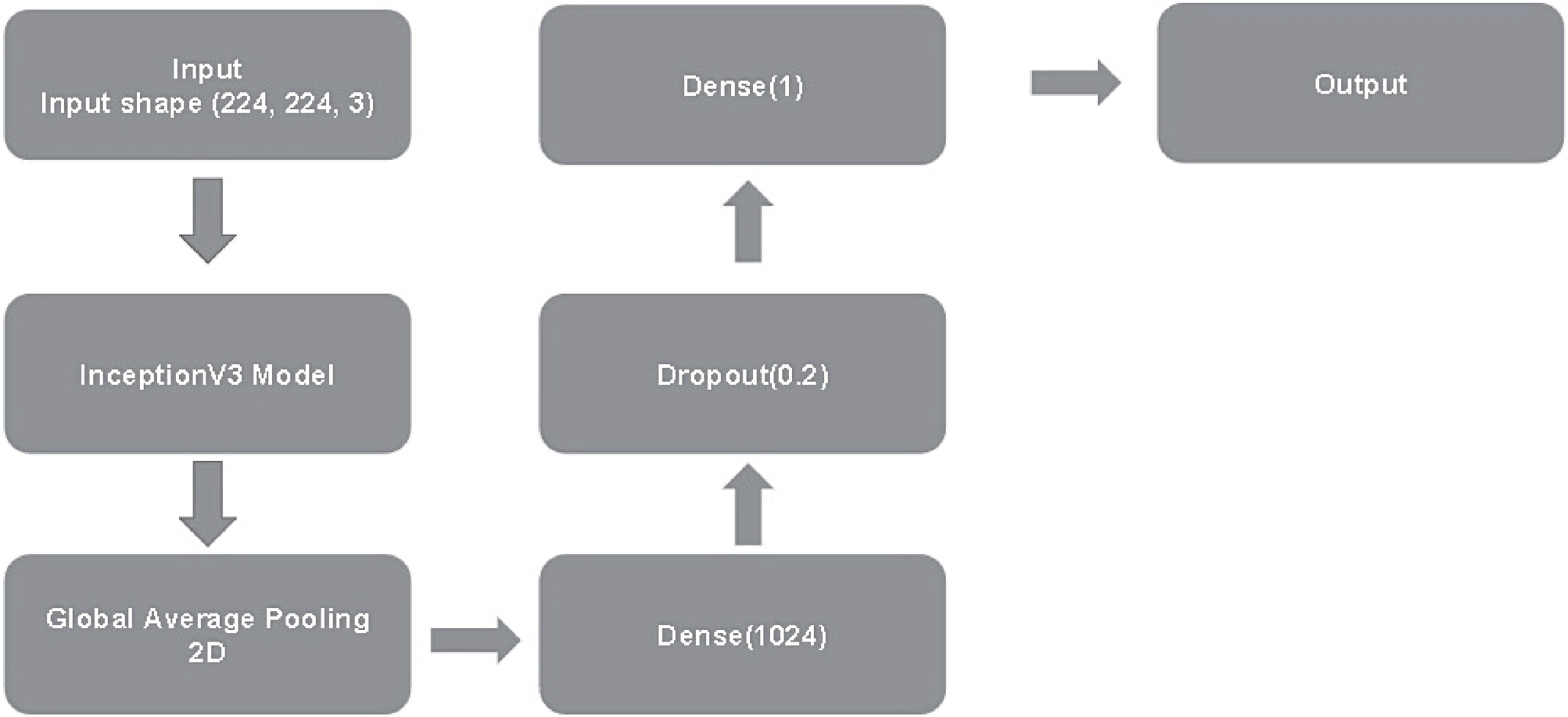
02

Model

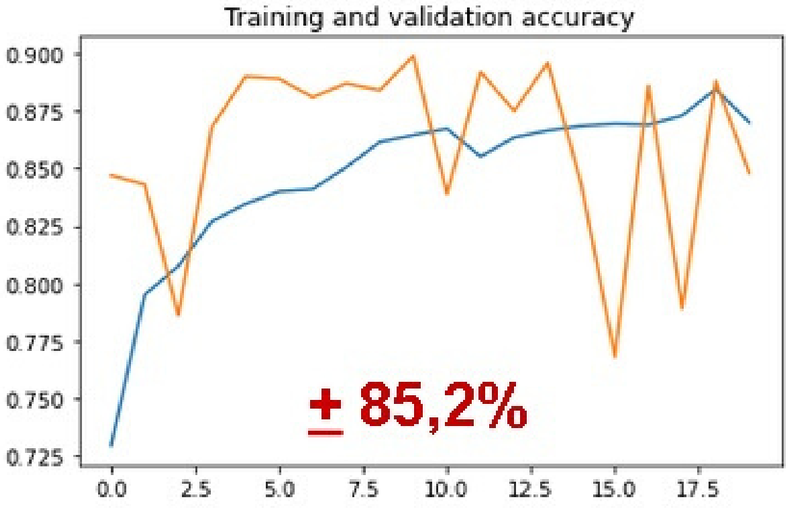
Baseline CNN Model



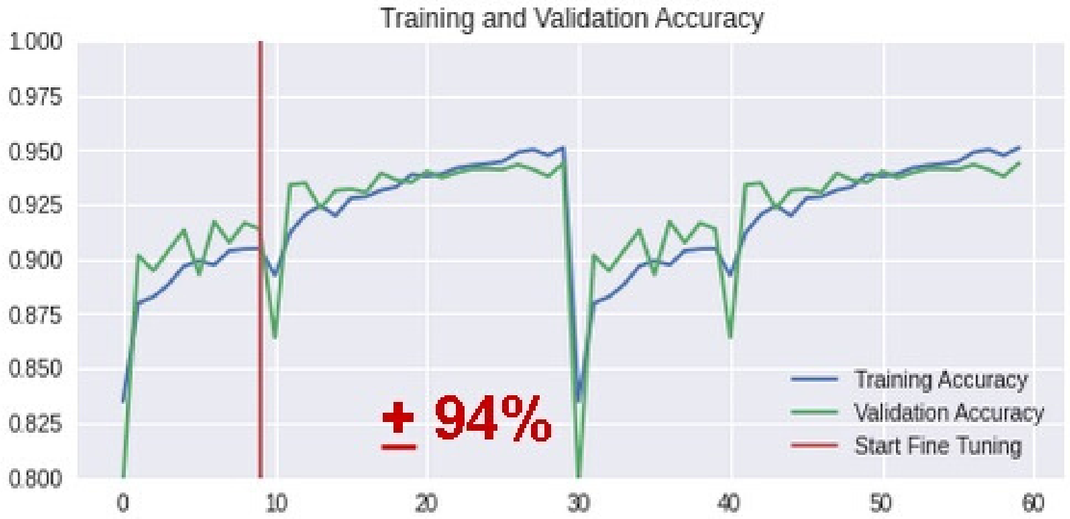
Improved CNN Model



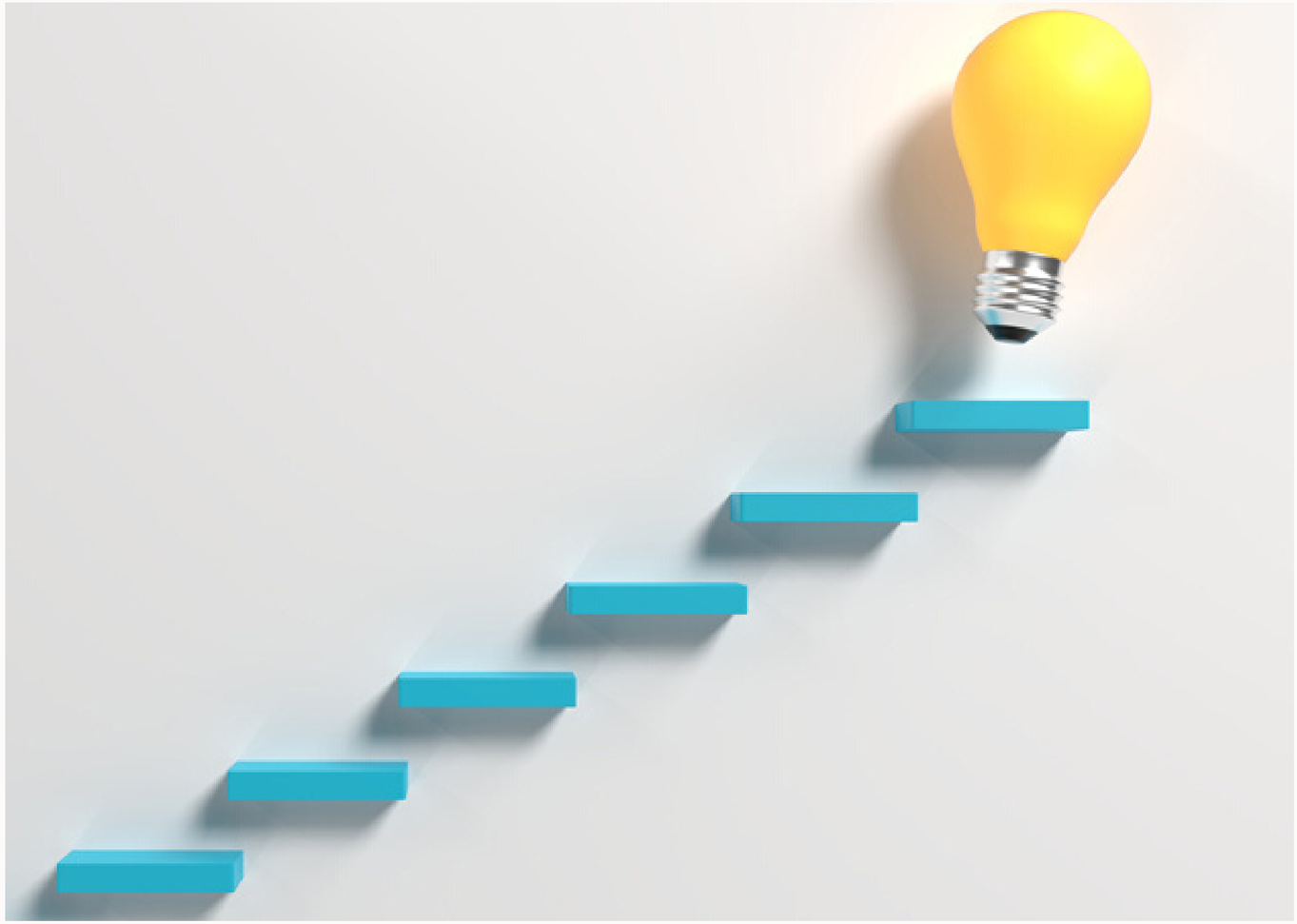
Preimprovement



Improvement



03



Improvement

Improvement Parameters

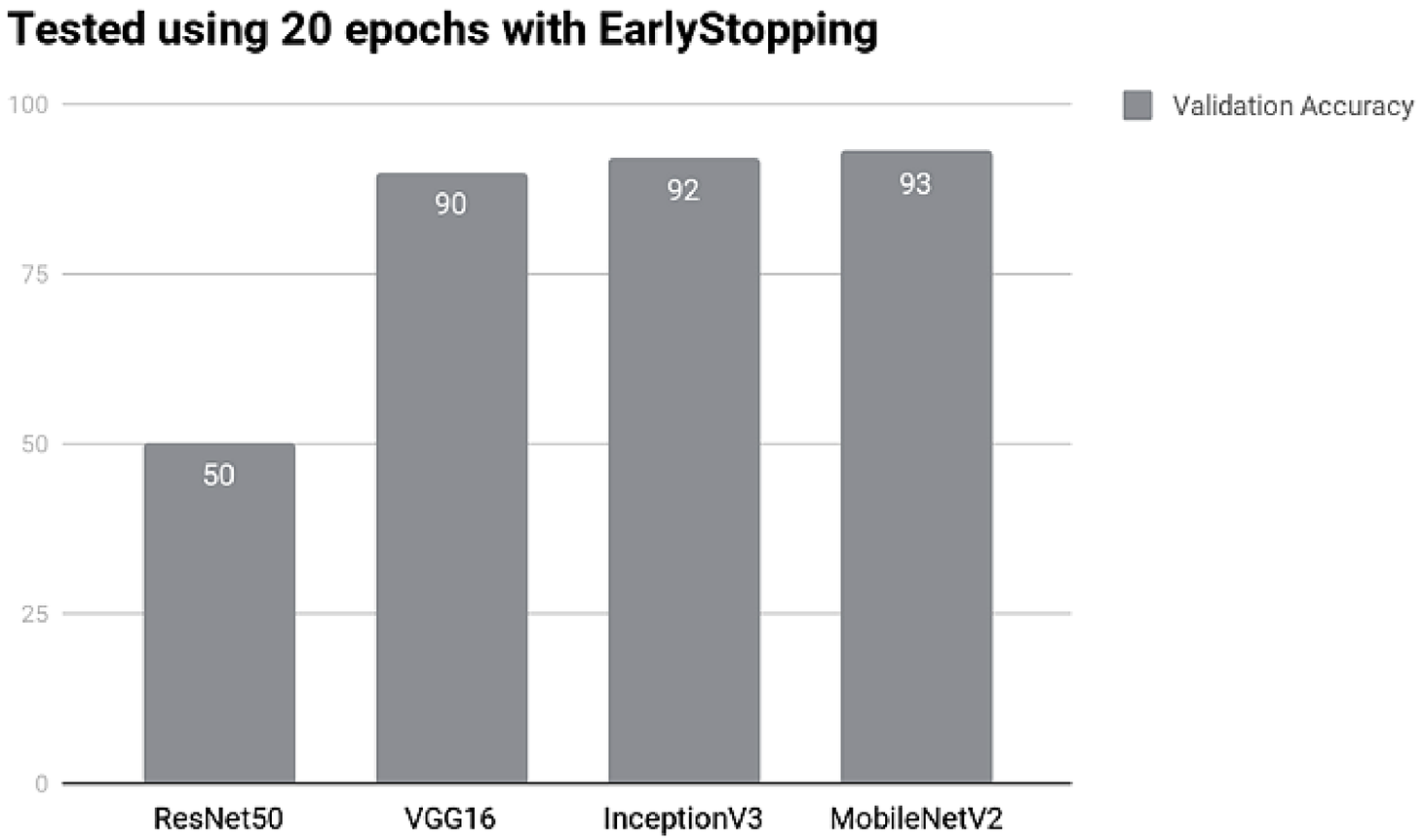
Neural Network Architectures

Data Augmentation

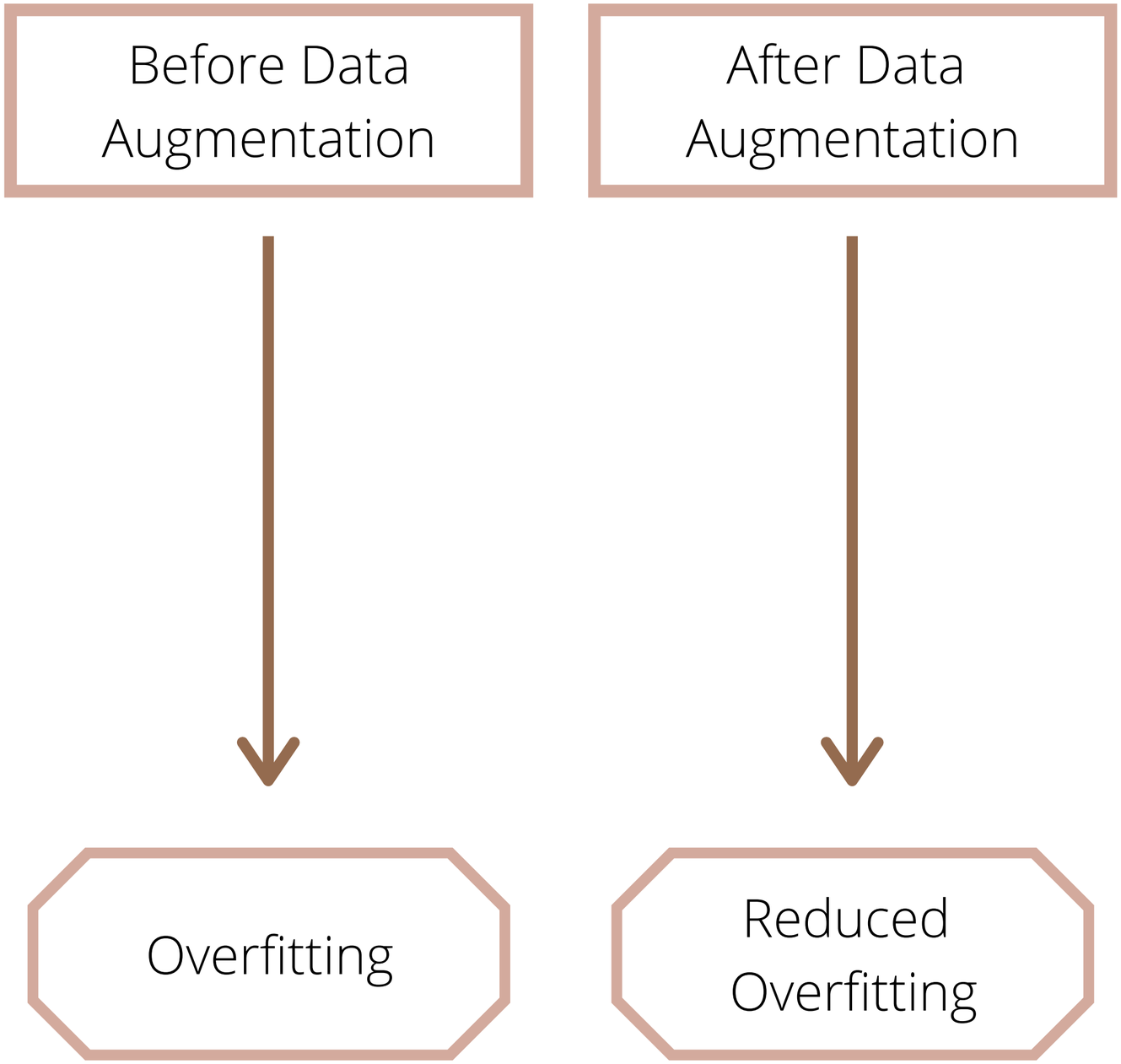
Optimizer

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

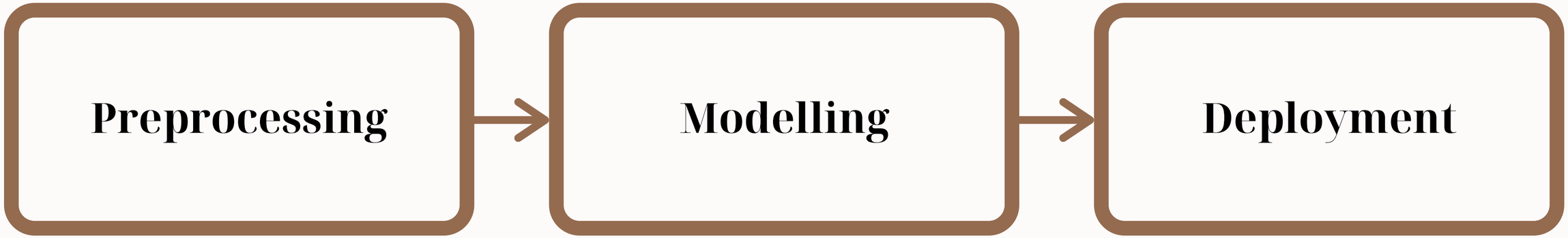
0.001 ⇒ well speed & fit

0.0001 ⇒ slow but well fit

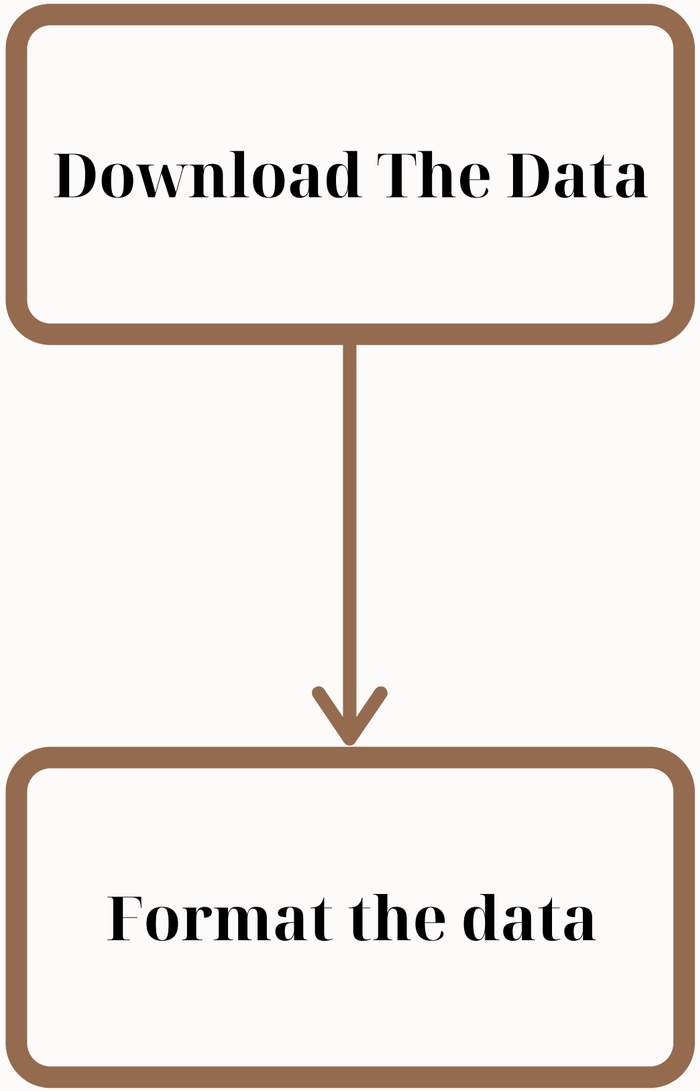
04

Methodology

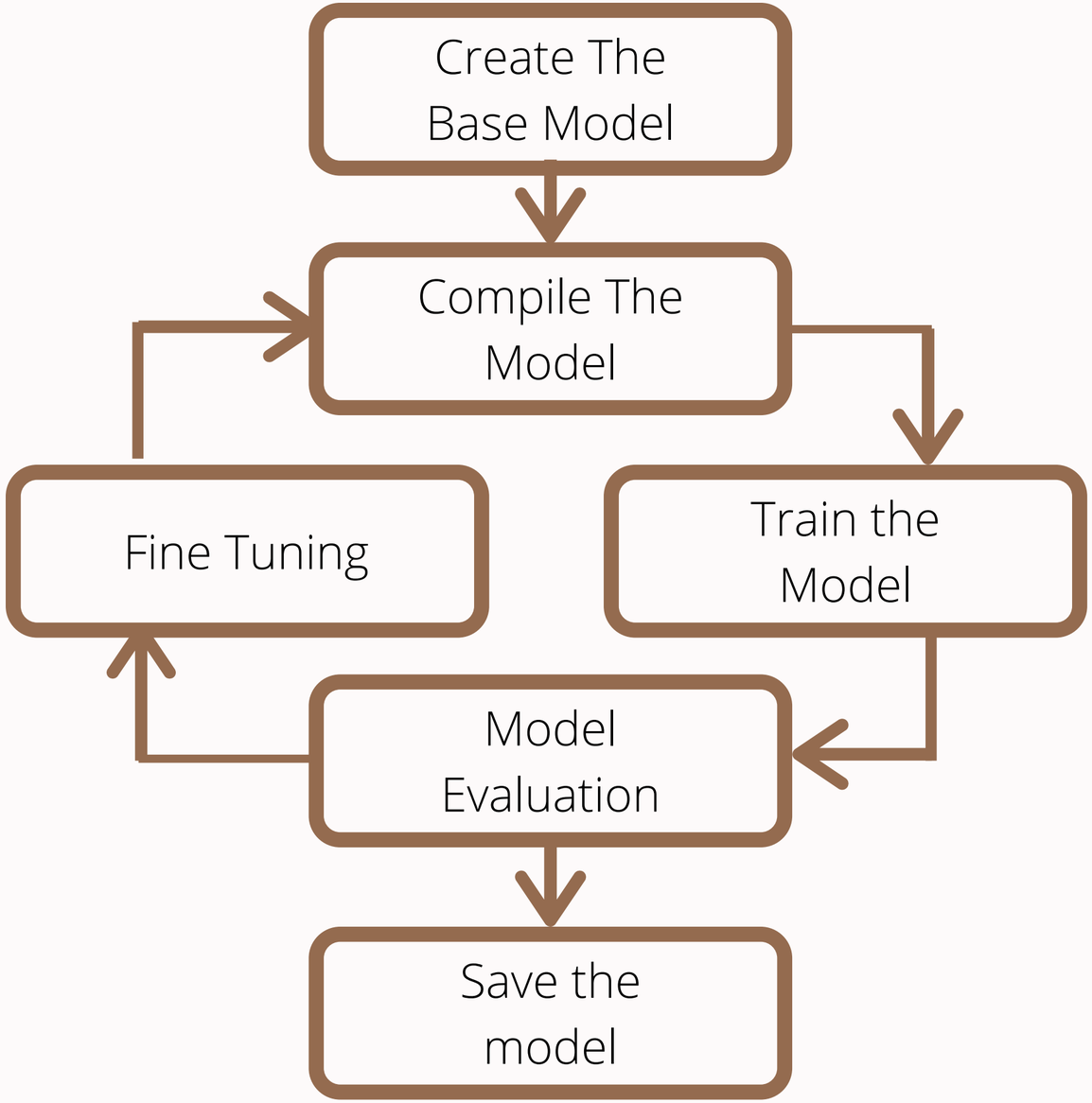
Step by Step



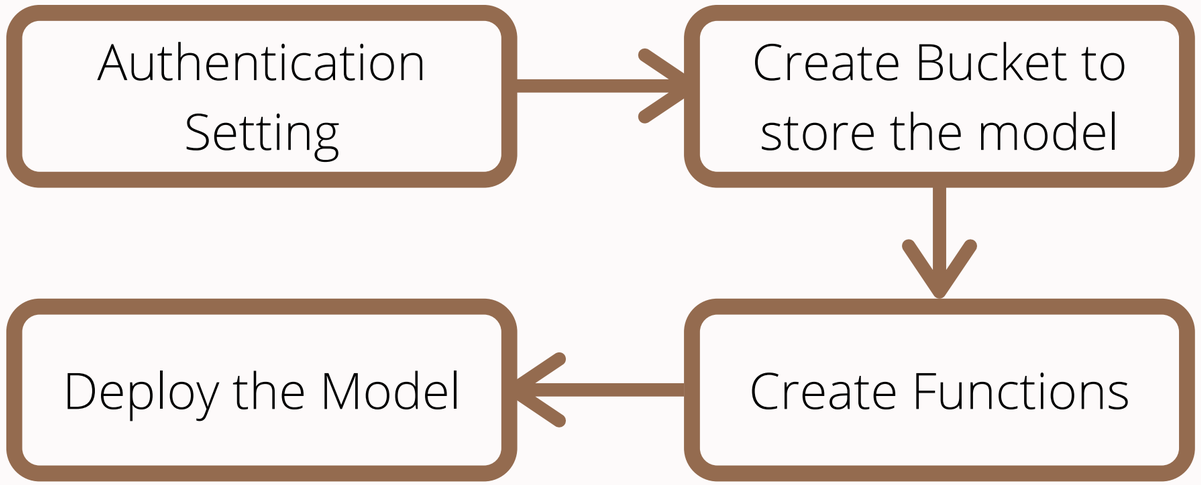
Data Preprocessing/ Data Preparation



Modelling


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

Deployment (Using Google Cloud Functions)

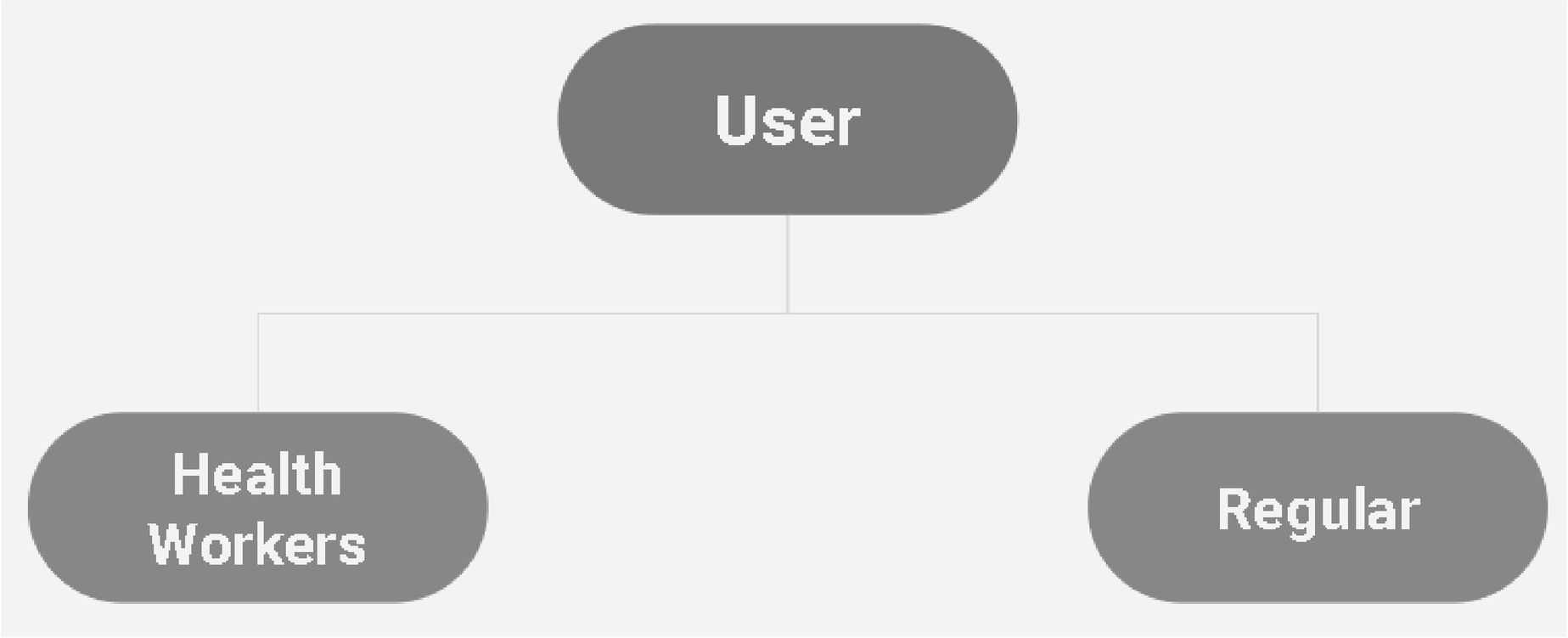


Functions	
Upload image to Cloud Storage	Model Prediction
Image preprocessing / preparation	Delete image from Cloud Storage after predicted
Get model from Cloud Storage	Parsing multipart form data

06

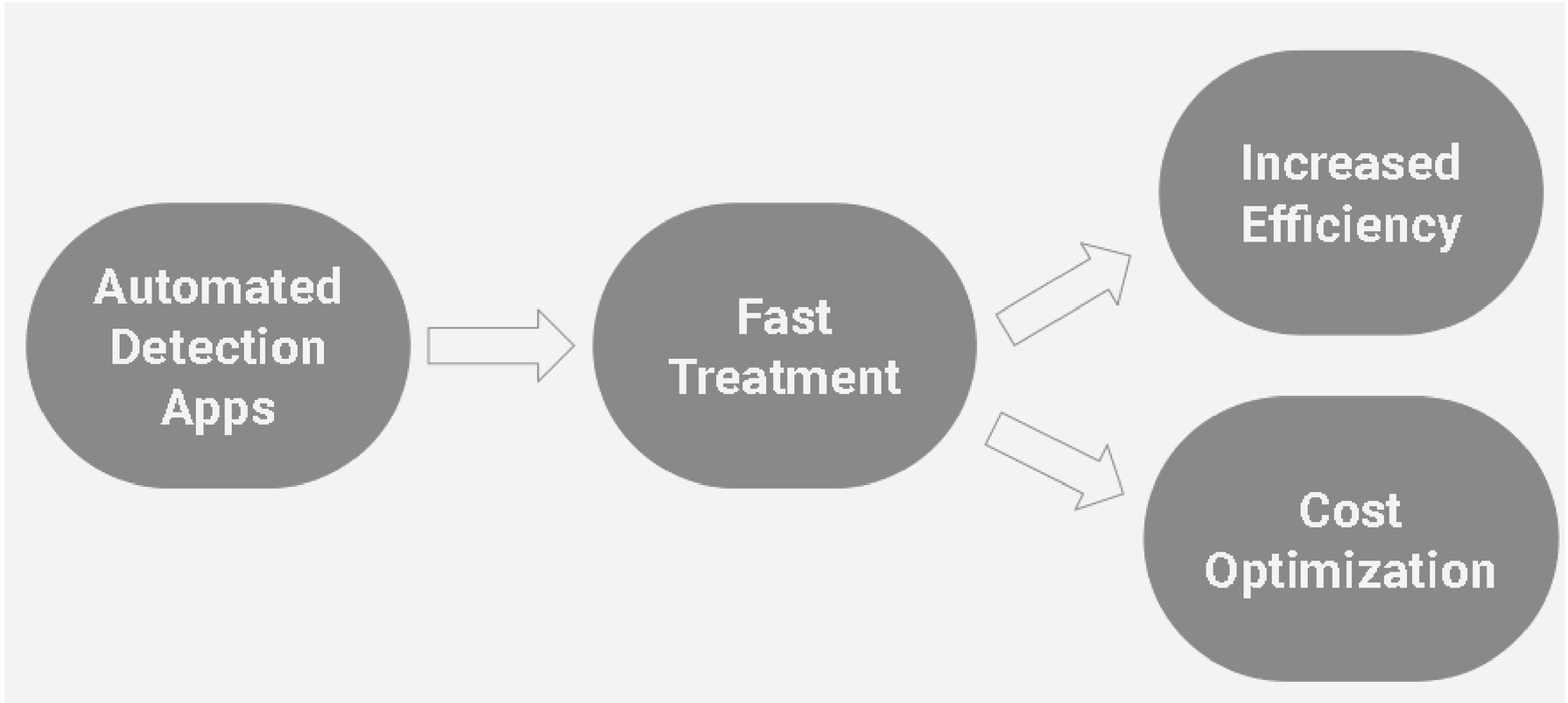
Implementation

Skin Cancer Detection for two users segment



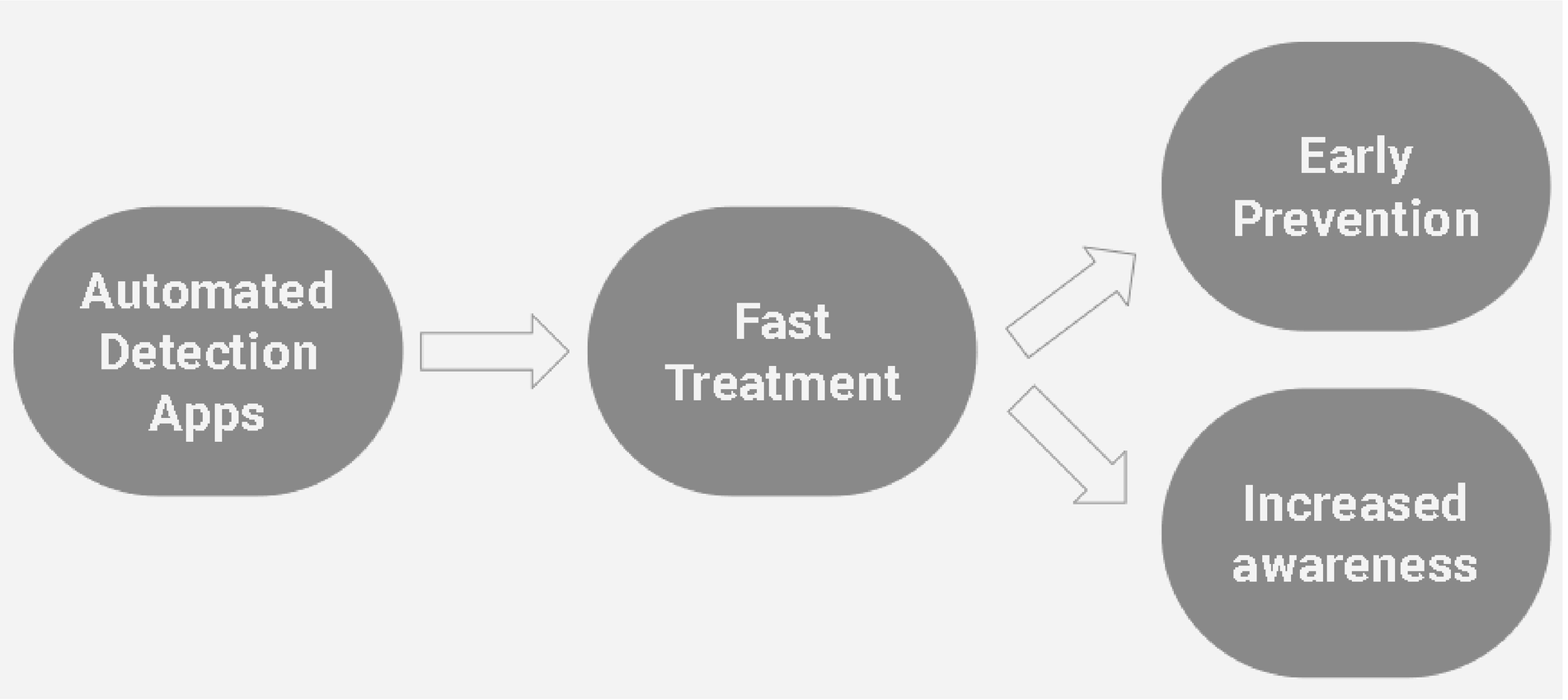
Website Detection for Health Workers

Automate the diagnosis process of melanoma detection to help medical workers make decision regarding the skin cancer appearance

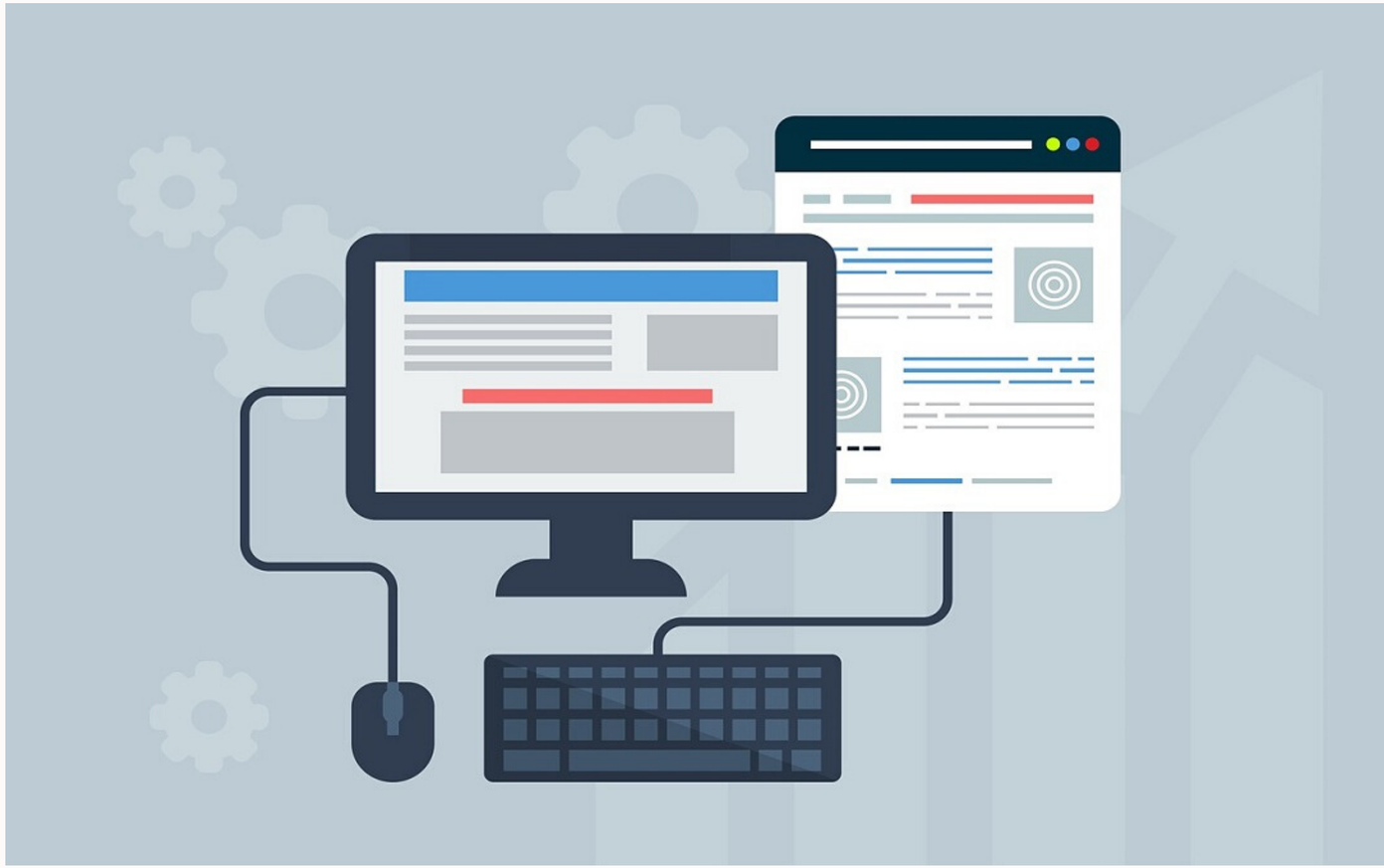


Website Detection for Regular User

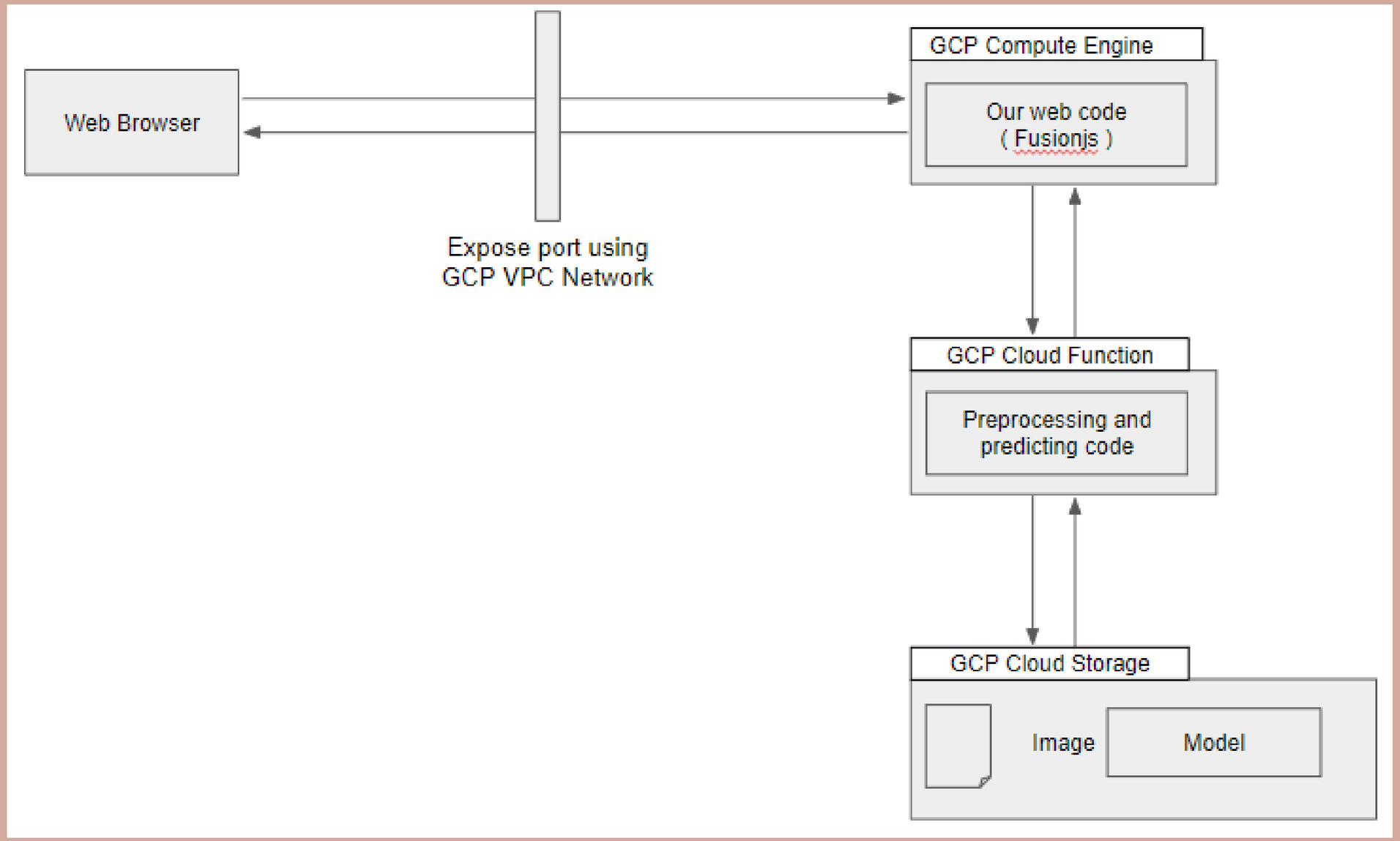
Fast Detection of Melanoma Appearance and Symptom for mass use. Helping to do the early detection and prevention of the skin cancer occurence



Deployment & Demo



System Architecture



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3. Skin Cancer in Asians
4. Systemic treatments for metastatic cutaneous melanoma
5. Survival of cutaneous melanoma based on sex, age, and stage in the United States
6. The Clinical Spectrum of Cutaneous Melanoma Morphology
7. Cancer
8. MELANOMA
9. Image Survival Rate