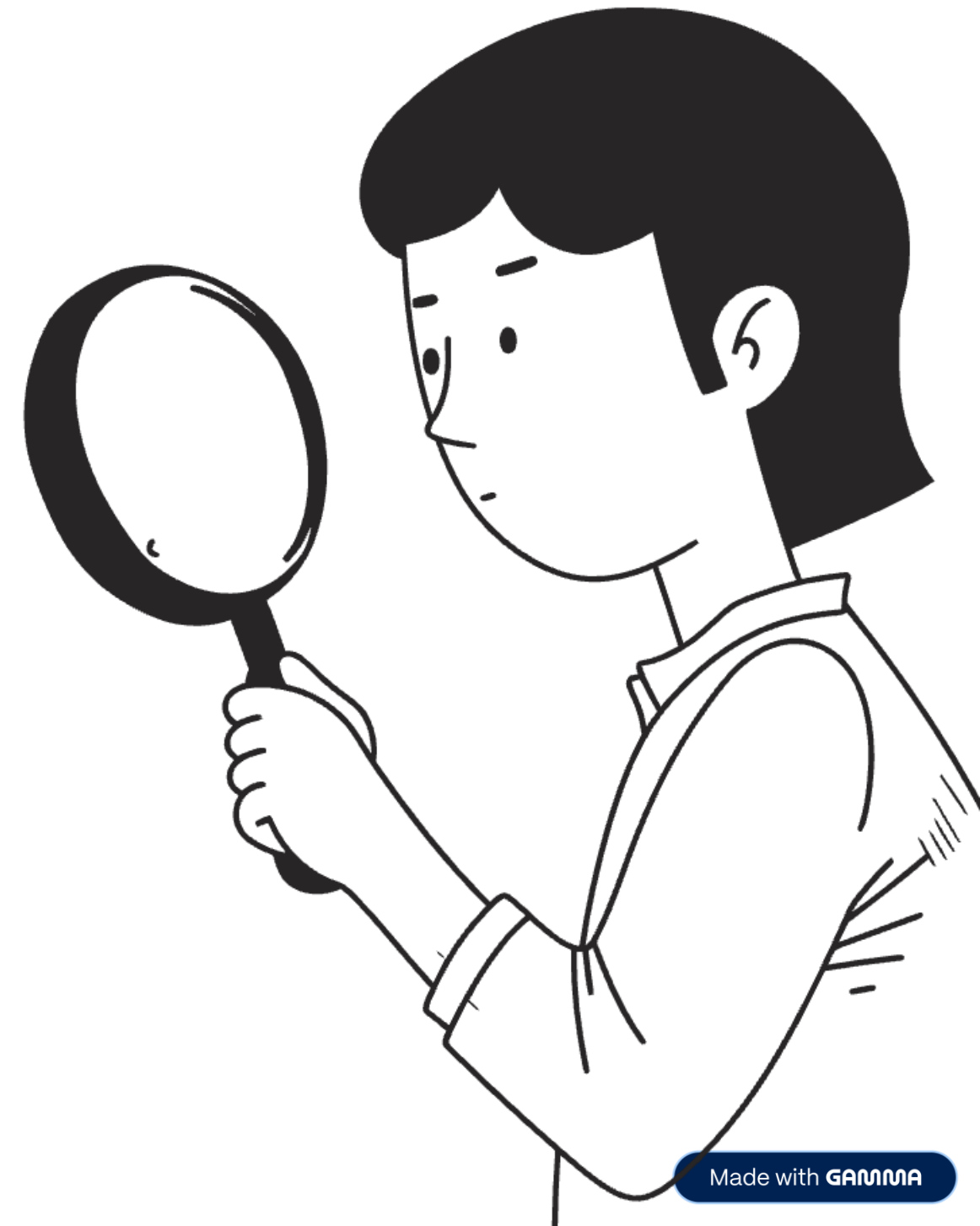# ABDOS - AI-Based Dermatological Dermatological Observation System

An advanced platform using deep learning for early skin cancer detection and patient management. By Emeka Adimora 4th year Software and engineering Student

Project Overview

Purpose

Provide accessible tools for early skin cancer detection with medical guidance. guidance.

Features

- Image-based skin lesion classification

- Risk assessment and recommendations

- User authentication and profile management

- API for frontend integration

System Architecture

Frontend

User interface built with React for uploading skin images, displaying classification results, and interacting with risk assessments and recommendations.

Backend

RESTful API developed using Node.js and Express.js, handles user authentication, profile management, and serves machine learning model inference requests securely.

Machine Learning Learning Model

Deep convolutional neural network trained on diverse skin lesion datasets to classify multiple lesion types with high accuracy and reliability.

User Authentication (Backend) (Backend)

Technologies

Node.js, Express, MongoDB, JWT for secure authentication.

Features

- User registration and login

- JWT-based secure authentication

- Password hashing and validation

- Profile retrieval and cookie sessions

Authentication API Endpoints

POST /api/auth/register	Register a new user
POST /api/auth/login	User login and token generation
POST /api/auth/logout	User logout and token invalidation
GET /api/auth/profile	Retrieve user profile information

Slide 6: Machine Learning Model

1

Model Architecture:

MobileNetV2 backbone (transfer learning)

Custom dense layers for classification

7 output classes (softmax)

2

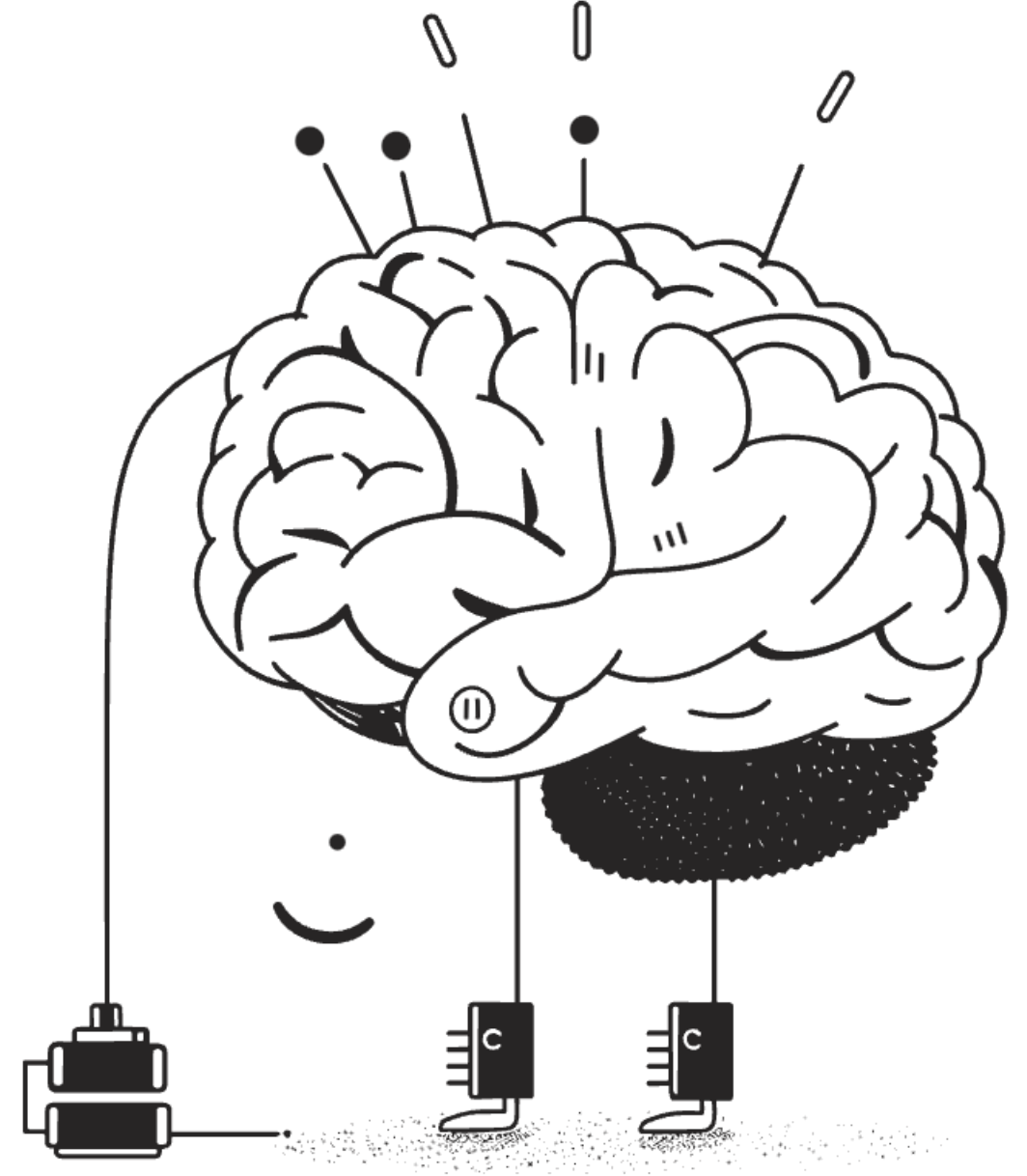**Custom Preprocessing Layer:**

Normalizes images to [-1, 1] range

3

Training Data:

Ham10000

Data augmentation for robustness

4

Model File:

Saved as .h5 file, loaded at runtime

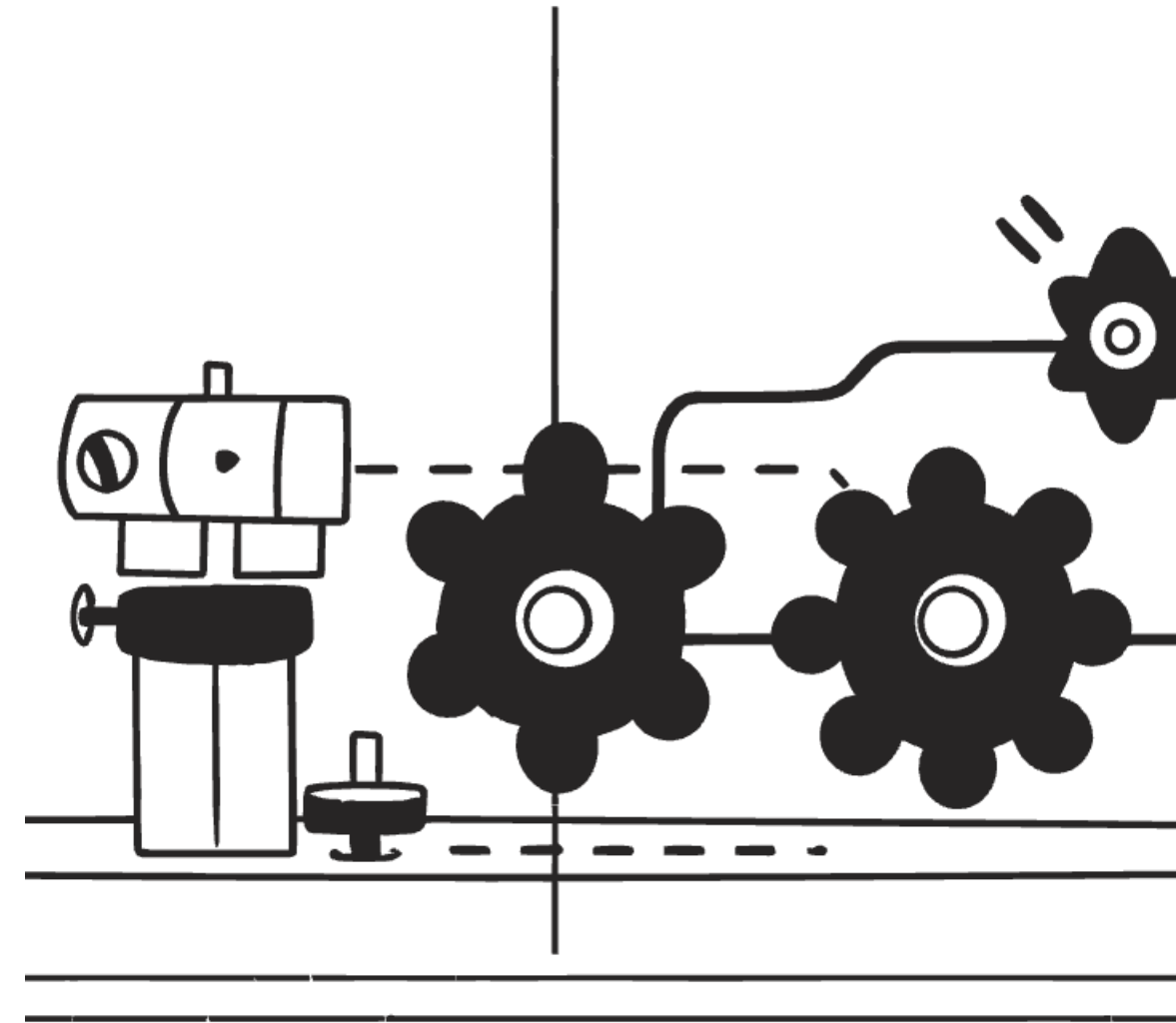# Skin Cancer Model Integration Integration

Model

Keras/TensorFlow deep learning model with MobileNetV2 backbone.
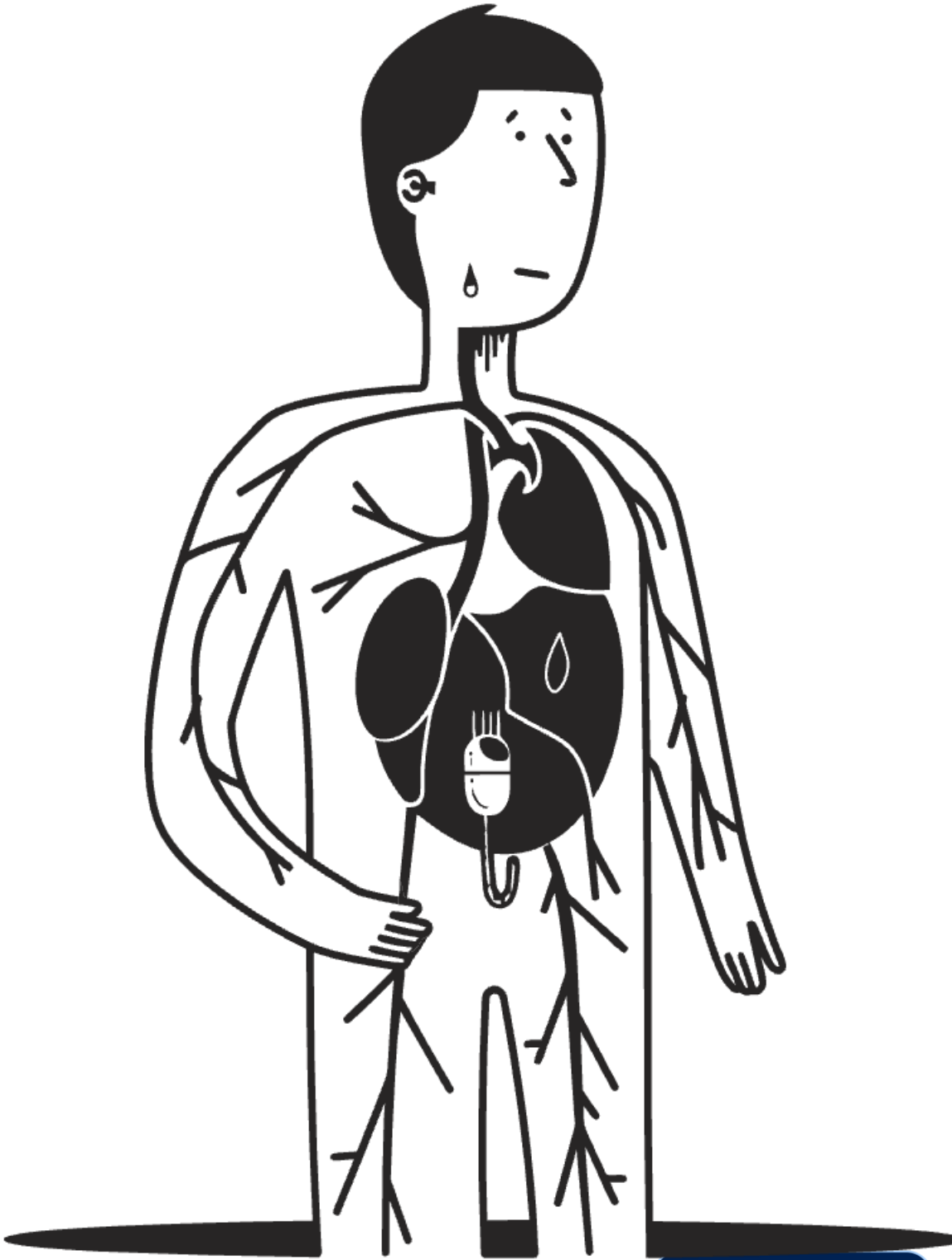
Classifies 7 types of skin lesions.

Prediction Pipeline

- Image upload and preprocessing

- Model inference

- Outputs: predicted class, confidence, risk, action

Skin Lesion Classes

Index	Code	Condition	Risk Level
0	akiec	Actinic Keratoses	Moderate
1	bcc	Basal Cell Carcinoma	High
2	bkl	Benign Keratosis	Low
3	df	Dermatofibroma	Low
4	mel	Melanoma	Very High
5	nv	Melanocytic Nevi	Low
6	vasc	Vascular Lesions	Low

Prediction Output Example

Predicted Condition

Melanoma

This is a malignant tumor of melanocytes, the cells that produce pigment. Early detection is critical for effective treatment.

Confidence

92.3%

The model is highly confident in this prediction, reflecting strong evidence from the input image features.

Risk Level

Very High

Melanoma is considered the most dangerous type of skin cancer due to its to its tendency to spread rapidly if untreated.

Description

Most serious form of skin cancer.

It often appears as a new or changing mole and requires prompt prompt diagnosis by a dermatologist.

Recommended Action

Urgent medical attention required.

Immediate consultation with a healthcare professional is advised advised to confirm diagnosis and start treatment.

Testing & Validation

Model Loading Test

Verifies model loads and predicts predicts correctly with sample input. input.

API Test

Sends images to API, checks response accuracy and latency.

Manual Testing

Uploads via frontend UI, reviews prediction results and UX.

Security & Privacy

Data Protection

User data is securely protected protected through JWT authentication and encrypted encrypted cookies.

Password Security

Passwords are securely hashed hashed and never stored in plain plain text.

Privacy

Patient images and prediction data are never stored without explicit user user consent.