Name	Abdul Naafeh
Roll Number	DHC-673
Subject	AI/Machine Learning
Date of Submission	05/09/2025

Report – Week 3: Skin Cancer and Pneumonia Detection

1. Objective

The main objective of this task was to apply Deep Learning techniques for medical image classification. Two case studies were selected:

- **Skin Cancer Detection**: Classifying skin lesion images as benign or malignant.
- **Pneumonia Detection**: Detecting pneumonia from chest X-ray images.

The outcomes include two trained models, evaluation metrics (accuracy and ROC), and performance visualization.

2. Dataset

- Skin Cancer Dataset (ISIC Subset): 500–1,000 images, resized to 128×128, normalized, split into train/val/test.
- Pneumonia Dataset (Kaggle Chest X-Ray): structured into train/val/test, resized to 128×128, normalized.

3. Methodology

3.1 Skin Cancer Detection

- Model: Pre-trained ResNet50 (Transfer Learning).
- Architecture: ResNet50 (frozen) → GAP → Dense(128, ReLU) → Dropout(0.5)
  - ✓ Dense(1, Sigmoid).
  - ✓ Loss/Optimizer: Binary Crossentropy + Adam.
  - ✓ Metric: Accuracy.
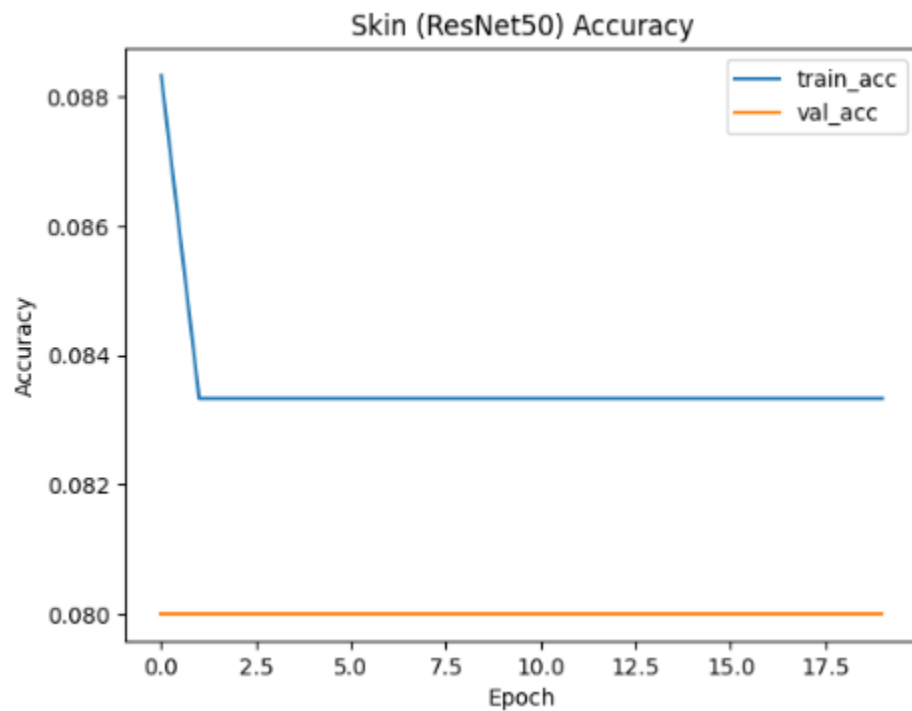
3.2 Pneumonia Detection

- Model: Custom CNN (2 Conv layers).

- Architecture: Conv2D(32)+MaxPool → Conv2D(64)+MaxPool → Flatten → Dense(64, ReLU) → Dense(1, Sigmoid).
- Loss/Optimizer: Binary Crossentropy + Adam.
- Metrics: Accuracy + ROC curve.
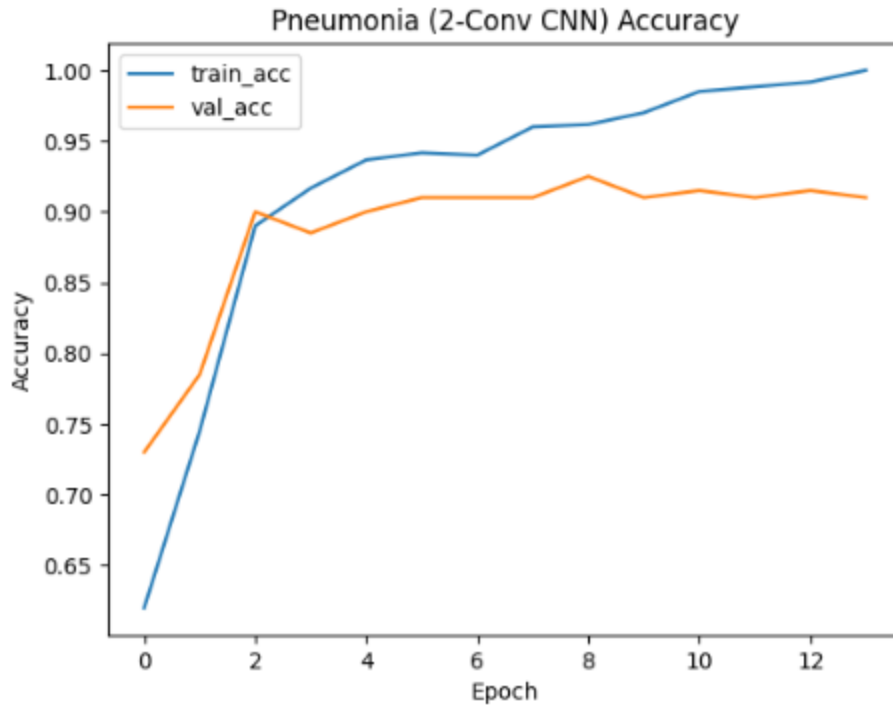
4. Results

4.1 Skin Cancer Detection
- Training converged smoothly.
- validation/test accuracy lower than CNN.
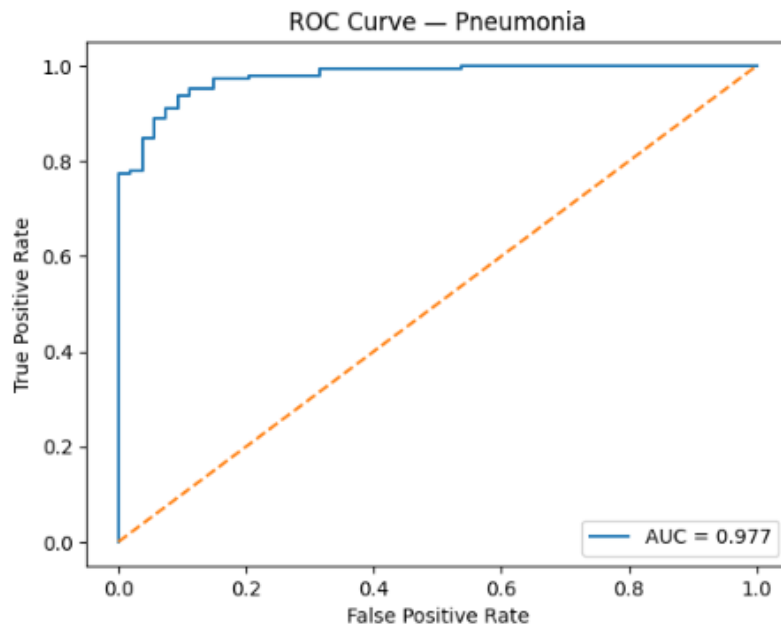

Skin (ResNet50) Accuracy

- Transfer learning improved performance on limited medical data.

4.2 Pneumonia Detection
- CNN learned patterns from X-rays.
- Accuracy better than ResNet50.

Pneumonia (2-Conv CNN) Accuracy

- ROC curve showed clear separation.

ROC Curve — Pneumonia

5. Performance Visualization
- Accuracy Curves: Train vs Validation for both models.
- ROC Curve: Pneumonia detection model.

6. Conclusion
- ResNet50 was more accurate for skin cancer detection.

- CNN was effective for pneumonia.
- Preprocessing, transfer learning, and evaluation metrics are crucial.
- Outcome: Two trained models, evaluation graphs, and this report.