## Literature Review:

This literature review examines recent studies from the past three years that focus on skin disease classification using the Dermnet dataset and other datasets. The studies are categorized into three groups based on their dataset usage and the number of skin diseases classified. We do not find any relevant research work on Computer Vision Foundation (CVF) from year 2020 to 2024.

**Studies Using Dermnet Dataset To Classify All 23 Skin Diseases:**

| Paper Title | Published Year | Dataset Used | No of Classes | ML Model Used | Accuracy (Top-1) | Precision | Recall | F1 Score | Author |
|---|---|---|---|---|---|---|---|---|---|
| [1] | 2022-08-31 | Dermnet | 23 | DenseNet201 | 68.97% | 67.30% | 67.20% | - | Amina Aboulmira |
| [2] | 2024-06-11 | Dermnet & HAM10000 | 23 (Dermnet) & 7 (HAM10000) | Ensemble (ResNet50, DenseNet121, CNN) | 74% | - | - | - | Ananthakrishnan Balasundaram |
| [3] | 2024-08-15 | Dermnet | 23 | Custom Convolution Transformer | 73.80% | 73% | 78% | 75% | Rajat Vishwakarma |
| [4] | 2024-06-07 | Dermnet & ISIC Archive | 23 (Dermnet) & 7 (ISIC Archive) | Ensemble (Densenet-161, SE_ResNeXt-101, ResNet-152, NASNet) | 80.95% (Dermnet) | ISIC Melanoma 97.76% | ISIC Melanoma 75.22% | ISIC Melanoma 67.10% | Parthasarathi Pattnayak |
| [5] | 2024-05-29 | Dermnet | 23 | ADG+Improved EfficientNetB3 | 80.02% | - | - | 86% | Rupali Kiran Shinde |
| [6] | 2023-05-01 | Dermnet | 23 | Ensemble (VGG16, EfficientNet B3) | 69% ± 1% | - | - | - | Premanand Ghadekar |

The paper “[4] Utilizing Deep Neural Networks for Enhanced Diagnosis of Dermatological Conditions” achieved the highest accuracy (80.95%) for the Dermnet dataset among those classifying all 23 diseases.

**Studies Using Any Dataset to Classify Maximum Number of Diseases:**

| Paper Title | Published Year | Dataset Used | No of Classes | ML Model Used | Accuracy (Top-1) | Precision | Recall | F1 Score | Author |
|---|---|---|---|---|---|---|---|---|---|
| [21] | 2024-07-20 | Combined dataset from Atlas Dermatology and ISIC 2018 | 31 | DinoV2, Vision Transformers, Swin Transformers, ConvNeXt | 96.48% | 97.55% | 97.10% | 97.27% | Jayanth Mohan |
| [22] | 2023-08 | Combined dataset from Atlas Dermatology and ISIC 2018 | 31 | EfficientNet-B2 | 87.15% | - | - | - | Abdul Rafay |

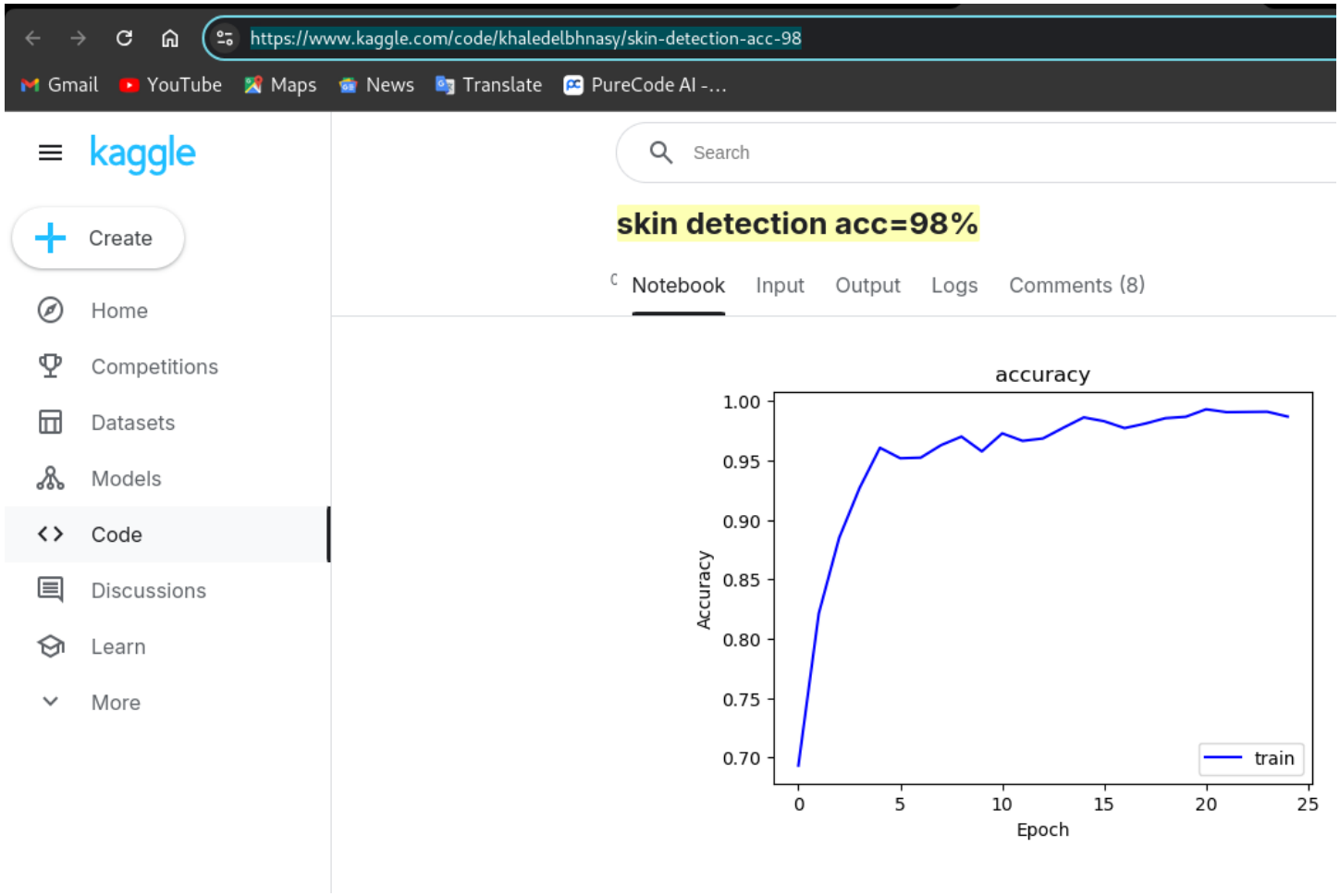
The study "[21] Enhancing Skin Disease Classification Leveraging Transformer-based Deep Learning Architectures and Explainable AI" achieved the highest accuracy (96.48%) using a combined dataset.

**Studies Using Dermnet Dataset but Classifying Fewer Than 23 Diseases:**

| Paper Title | Published Year | Dataset Used | No of Classes | ML Model Used | Accuracy (Top-1) | Precision | Recall | F1 Score | Author |
|---|---|---|---|---|---|---|---|---|---|
| [31] | 2024-05-28 | Dermnet | 5 | DenseNet | 96.80% | 97.50% | 97.20% | 98.40% | Ravi Dandu |
| [32] | 2024-05-05 | Dermnet | 5 | MobileNetV3-Large | 88% | - | 83% | 83% | Tanatorn Tanantong |
| [33] | 28 Feb 2024 | Dermnet | 5 | Xception | 92% | 91% | 92% | 91% | Mohammad Sayem Chowdhury |
| [34] | 3/2/2023 | Dermnet | 3 | AlexNet + SVM | 83% | - | - | - | Pradeep Udupa |
| [35] | 11/1/2023 | Dermnet | 5 | Xception | 97% | 97% | 97% | 97% | Rifat Sadik |

The study "[35] An in-depth analysis of Convolutional Neural Network architectures with transfer learning for skin disease diagnosis" achieved the highest accuracy (97%) in this category.

During Capstone 1 presentation, one of the panel members said that 98% accuracy is acheived till now on the dermnet dataset, yes, it is ture but this accuracy is on the training set not on the test set, author of this code does not provide the testing accuracy otherwise we will mention it too here.

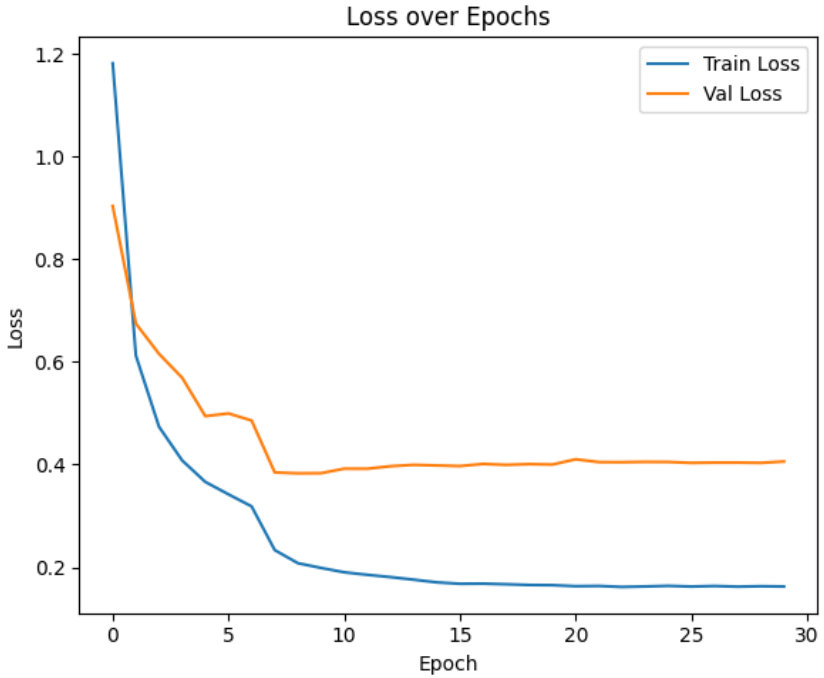


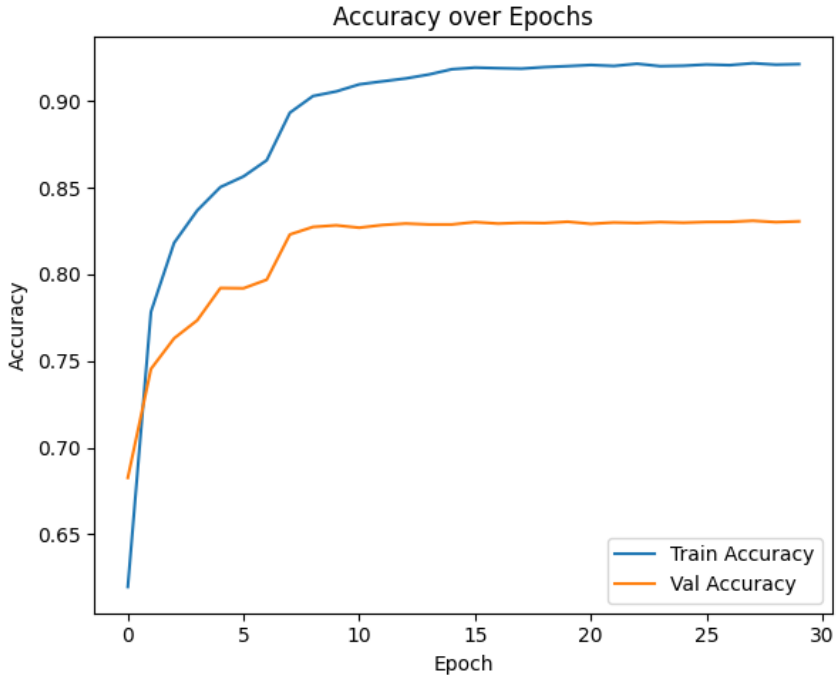
## Previous Work:

In Capstone-1 we merge the four datasets mentioned in the Dataset Roport and apply Swin Transfer on it getting the training and validation accuray of 92% and 83% respectively.

Below are the screenshots of results:

| Epoch | Train Loss | Train Accuracy | Train F1 Score | Val Loss | Val Accuracy | Val F1 Score |
|---|---|---|---|---|---|---|
| 30 | 0.162453 | 0.921433 | 0.920434 | 0.406054 | 0.830649 | 0.836478 |




Model's code along with the results is available in the form of jupyter notebook file.

**References:**


[1] Comparative Study of Multiple CNN Models for Classification of 23 Skin Diseases
[2] Genetic Algorithm Optimized Stacking Approach to Skin Disease Detection
[3] Artificial Intelligence for Image Classification of Skin Diseases with Convolution Transformer
[4] Utilizing Deep Neural Networks for Enhanced Diagnosis of Dermatological Conditions
[5] DermSegNet: smart IoT model for multi-class dermatological lesion diagnosis using adaptive segmentation and improved EfficientNetB3
[6] Ensemble Approach to Solve Multiple Skin Disease Classification Using Deep Learning
[21] Enhancing Skin Disease Classification Leveraging Transformer-based Deep Learning Architectures and Explainable AI
[22] EfficientSkinDis: An EfficientNet-based classification model for a large manually curated dataset of 31 skin diseases
[31] Convolutional Neural Networks Framework for the Early Classification and Detection of Melanoma Skin Cancer
[32] Mobile-Based Deep Learning Framework for Classifying Common Skin Diseases in Thailand
[33] Leveraging deep neural networks to uncover unprecedented levels of precision in the diagnosis of hair and scalp disorders
[34] Identification and Grouping of Skin Sickness by Means of Deep Learning
[35] An in-depth analysis of Convolutional Neural Network architectures with transfer learning for skin disease diagnosis

Dermnet: https://www.kaggle.com/datasets/shubhamgoel27/dermnet
HAM10000: https://www.kaggle.com/datasets/vrindaat/ham10000-dataset
ISIC Challenge 2018 Dataset: https://challenge.isic-archive.com/data/#2018
Atlas Dermatology: https://atlasdermatologico.com.br/browse.jsf