Skin Disease Classification Using YOLOv8

1. Dataset Overview

The dataset used in this work is a skin disease classification dataset obtained from Roboflow in folder-based image classification format.

The dataset consists of clinical skin images categorized into multiple skin condition classes. The images are divided into training, validation, and test sets.

- **Type of images:** Clinical skin images
- **Task:** Image-level classification
- **Dataset splits:** Training, Validation, Test

The dataset shows noticeable class imbalance, with certain skin conditions having fewer samples. Additionally, several classes exhibit strong visual similarity, making the classification task challenging. Variations in lighting, skin tone, and image quality further contribute to classification difficulty.

2. Model Used

The model used for this task is the YOLOv8 classification model provided by the Ultralytics framework.

- **Framework:** Ultralytics
- **Model:** YOLOv8 (Classification variant – `yolov8n-cls`)
- **Pretraining:** ImageNet
- **Input image size:** 224×224
- **Training platform:** Google Colab with GPU

The YOLOv8 nano classification model was chosen due to its lightweight architecture, fast training time, and good performance when fine-tuned using pretrained weights.

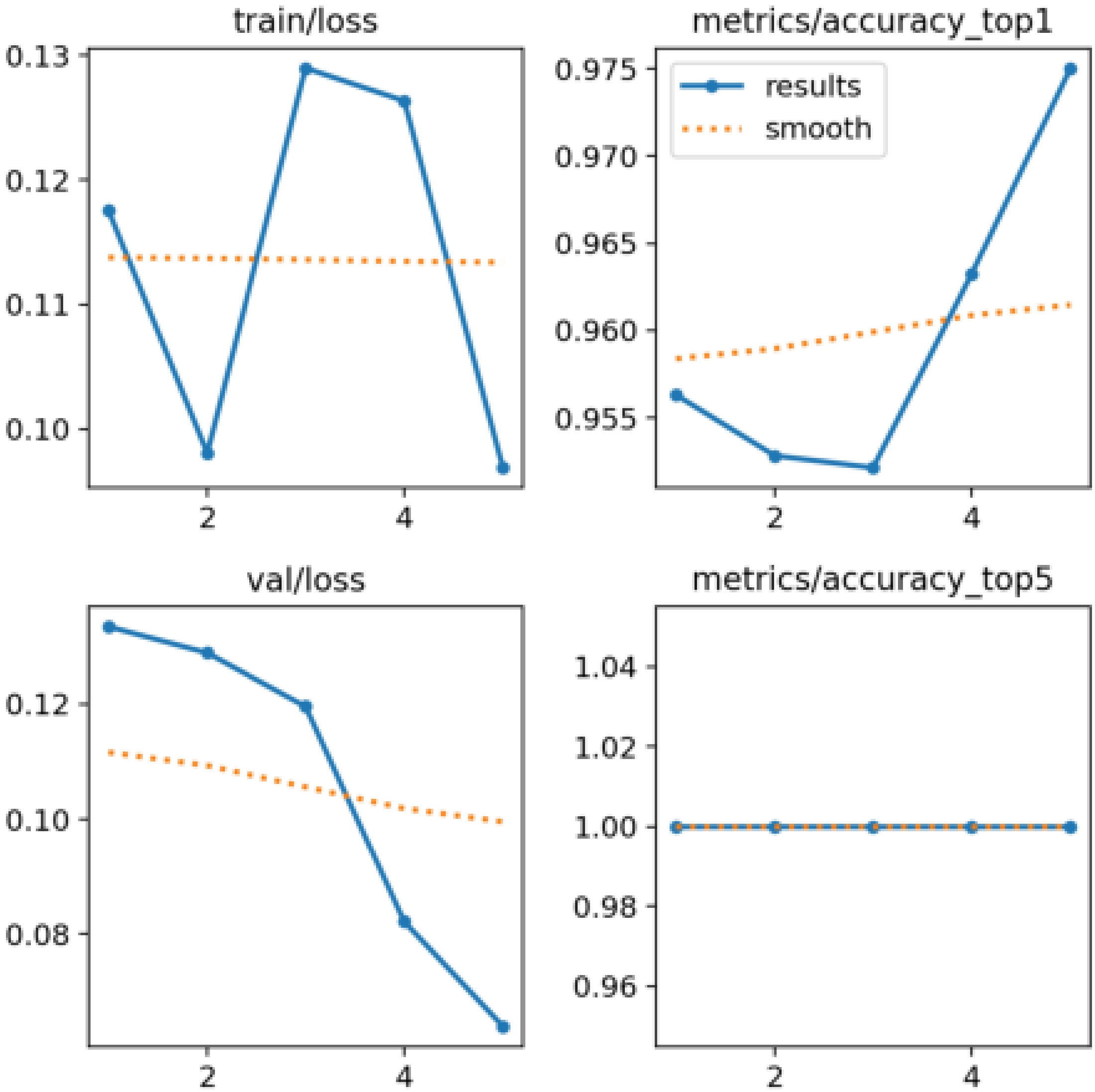

Figure 1: Overview

3. Training Results

The model was trained for 5 epochs on the training dataset.

Accuracy and Loss

The trained model achieved a **Top-1 accuracy of 97.5%** and a **Top-5 accuracy of 100%** on the validation set. Training and validation loss decreased consistently across epochs, indicating stable convergence and effective learning from the dataset.

4. Sample Predictions

Sample predictions were generated on the test dataset using the trained model.

The model correctly classified many images where visual patterns were distinct. Misclassifications were mainly observed between visually similar skin conditions. Representative prediction images from the test set are included in the report to illustrate model performance.

Figure 2: Predictions

5. Brief Observations

- ImageNet pretrained weights significantly improved training convergence.
- Class imbalance negatively affected performance on minority classes.
- The model achieved reasonable accuracy despite limited training epochs.
- Further improvements could be achieved using data augmentation and longer training.

Conclusion

This study demonstrates that YOLOv8 can be effectively applied to medical image classification tasks. Even with a lightweight model and limited training time, meaningful classification performance was achieved, highlighting the usefulness of modern pretrained convolutional neural networks in healthcare applications.