SKIN CANCER DETECTION (MELANOMA CLASSIFICATION)

AUTHORS

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12-05-2024

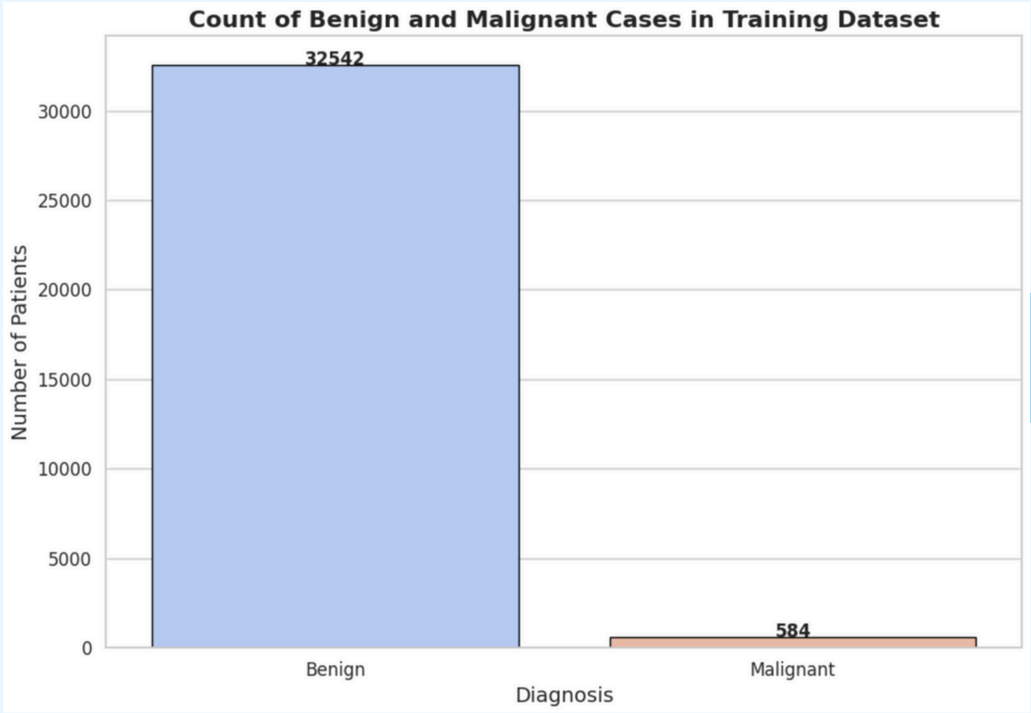
Objective

The main objective of this project is to develop a deep learning model capable of classifying dermoscopic images of skin lesions into benign or malignant categories.

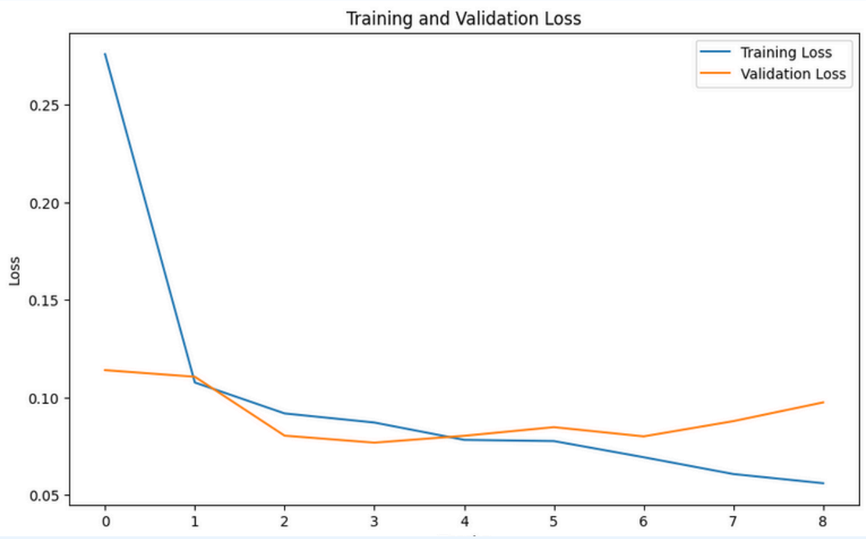
Specifically, the goals are:

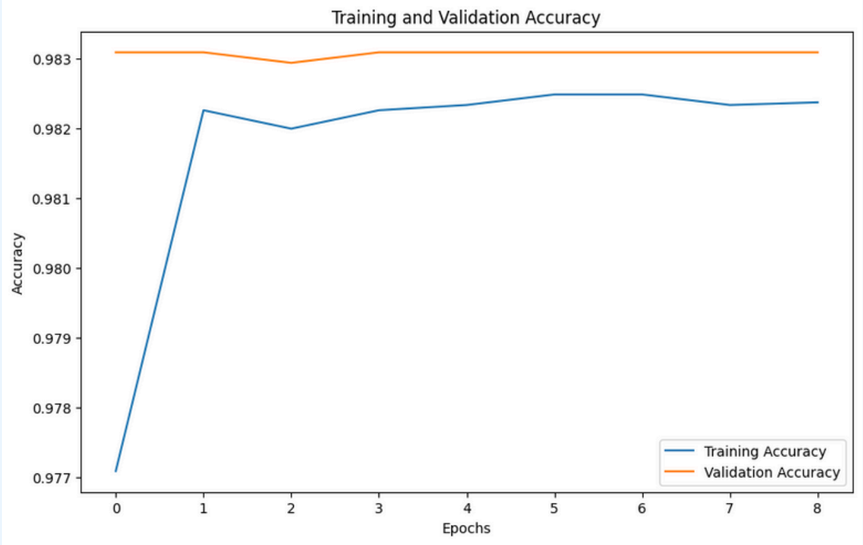
1. Dataset
2. CNN-based model
3. Evaluate model performance
4. Explore transfer learning techniques

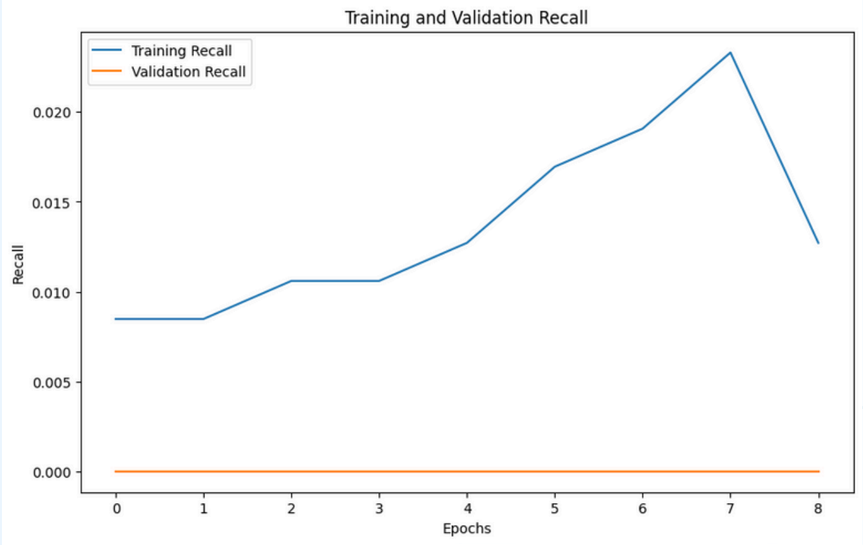
The ISIC Archive dataset



Baseline Model CNN

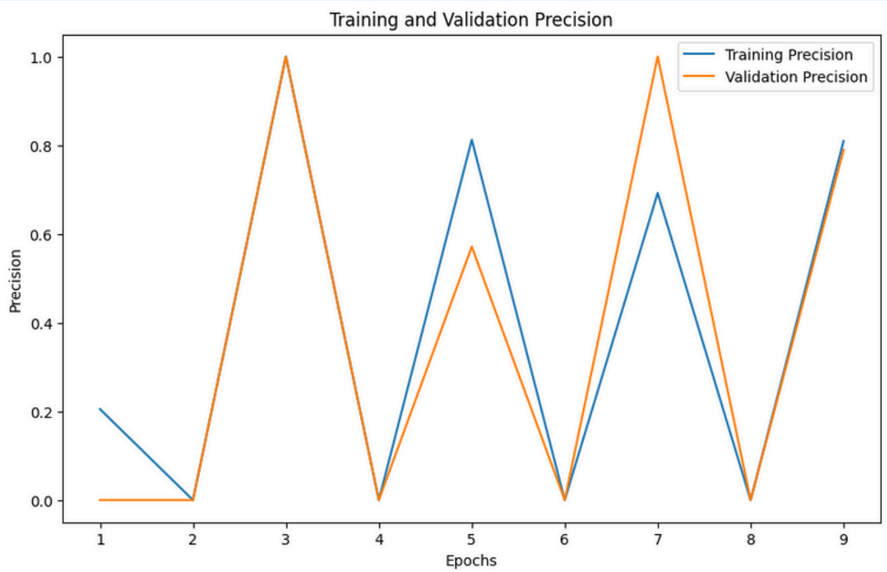


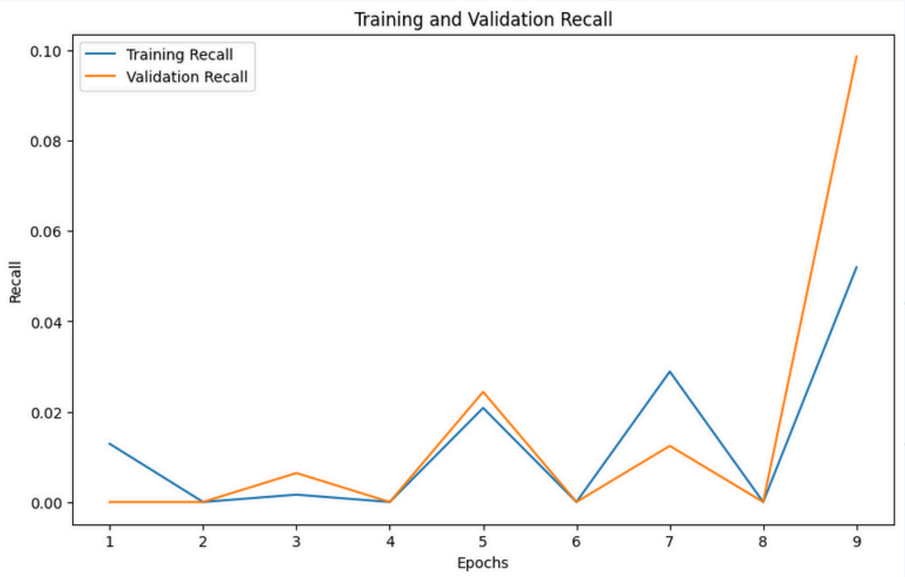




- Accuracy & Loss: The model achieved reasonable accuracy but struggled slightly with generalization, as seen in validation accuracy and loss trends.
- Precision & Recall: Performance was limited, particularly for the minority malignant class, reflecting challenges with dataset

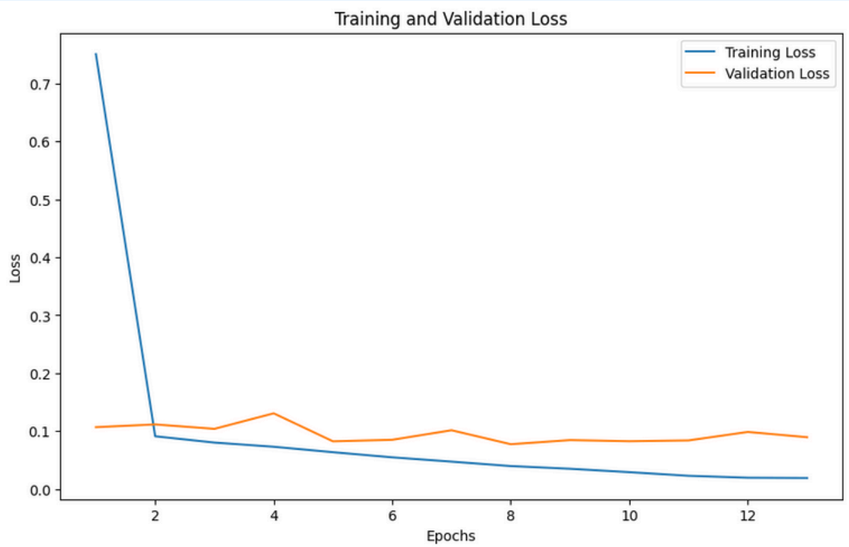
CNN After Augmentation

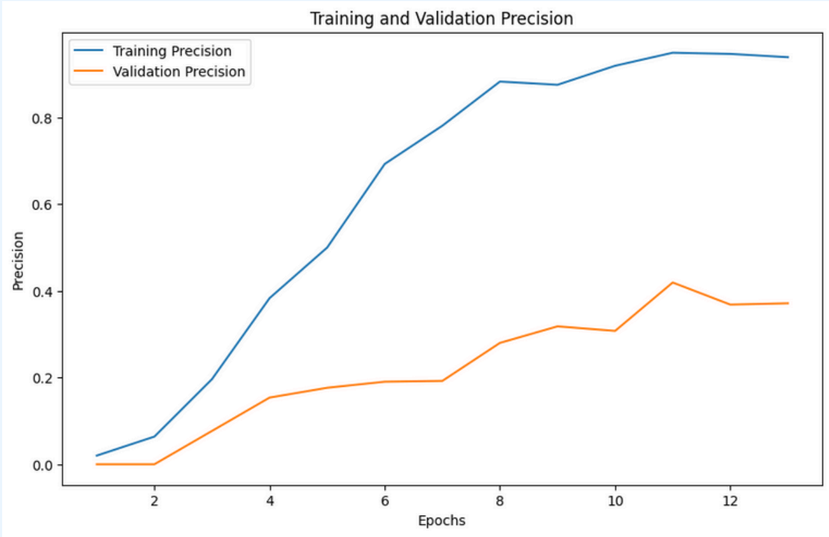


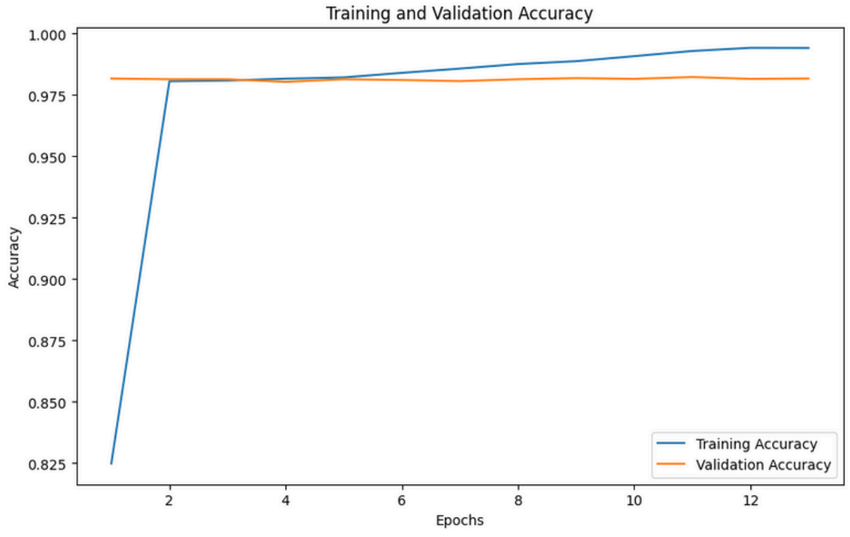


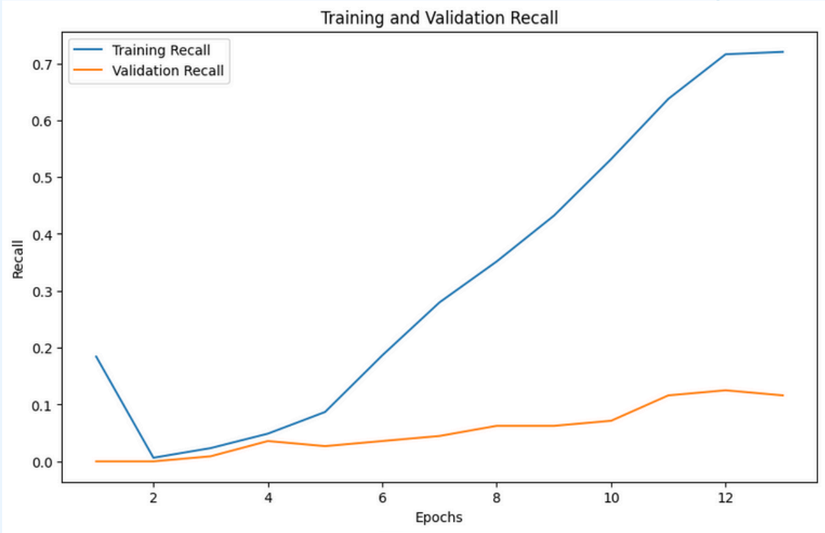
- ·Improved Accuracy & Loss
- Better Precision & Recall

EfficientNetB0 (Finetuned)





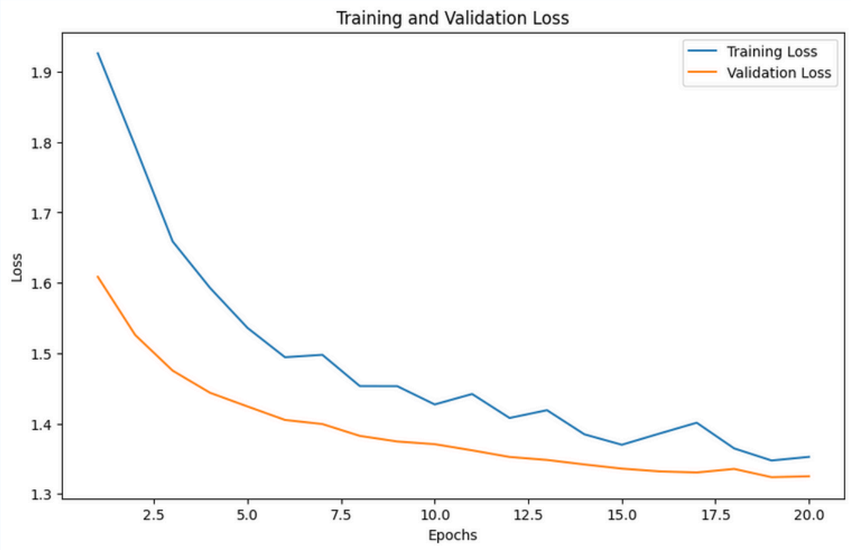


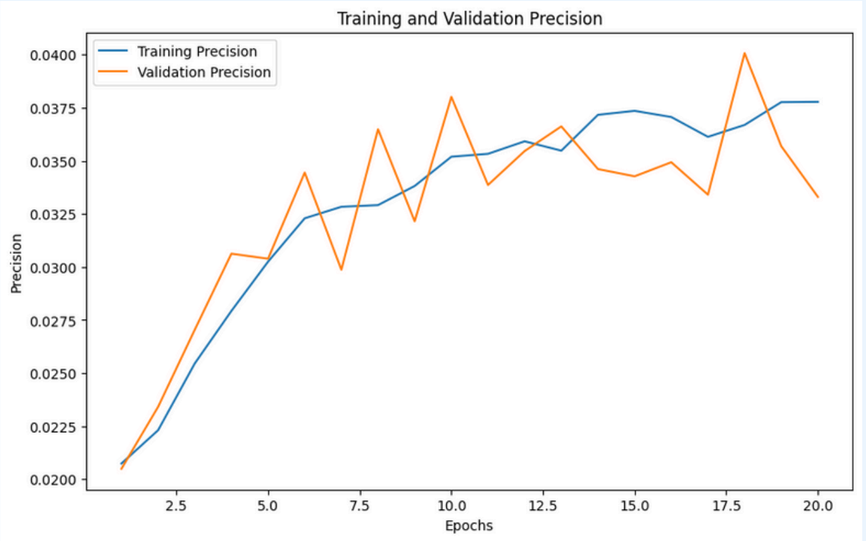


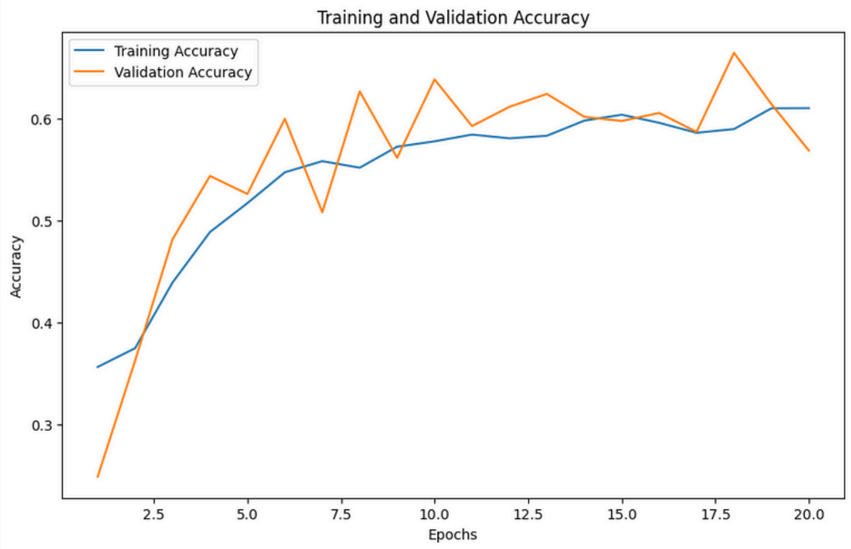
EfficientNetB0, fine-tuned for the task, significantly improved performance.

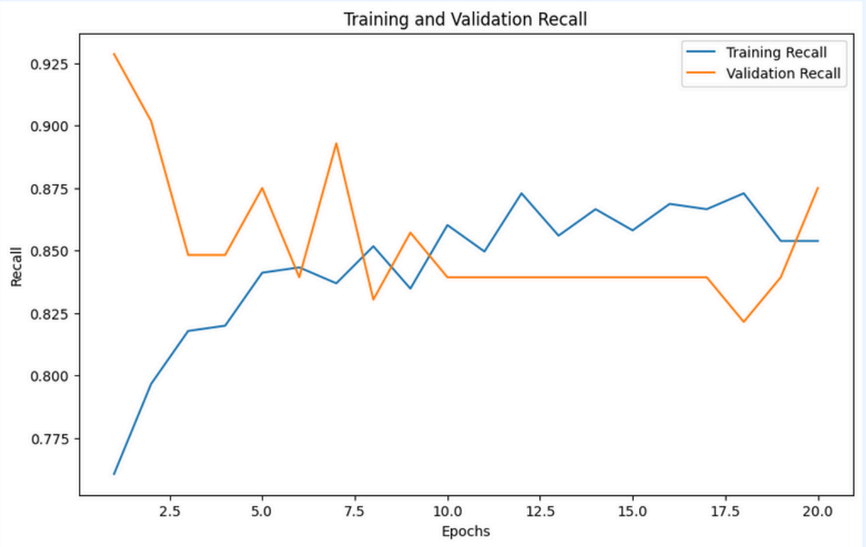
- Accuracy & Loss: Near-perfect training accuracy with high validation accuracy and low validation loss.
- Precision & Recall: Effectively addressed class imbalance, achieving high sensitivity for malignant cases.

DenseNet121(Finetuned)









DenseNet121 outperformed other models.

Accuracy & Loss: Slightly better validation accuracy than EfficientNetB0, with stable and consistent loss.

Precision & Recall: Achieved robust detection of malignant lesions, balancing sensitivity and specificity.

Conclusion

- Transfer learning models, especially DenseNet121, outperformed baseline CNN in melanoma classification, improving accuracy and generalization.
- Future work will tackle dataset imbalance using oversampling, GANs, and cost-sensitive learning.
- Advanced models like Vision Transformers and hybrid architectures will be explored for better performance.
- Focus will also be on explainability, diverse datasets, and optimizing efficiency for real-time use.

THANK YOU!