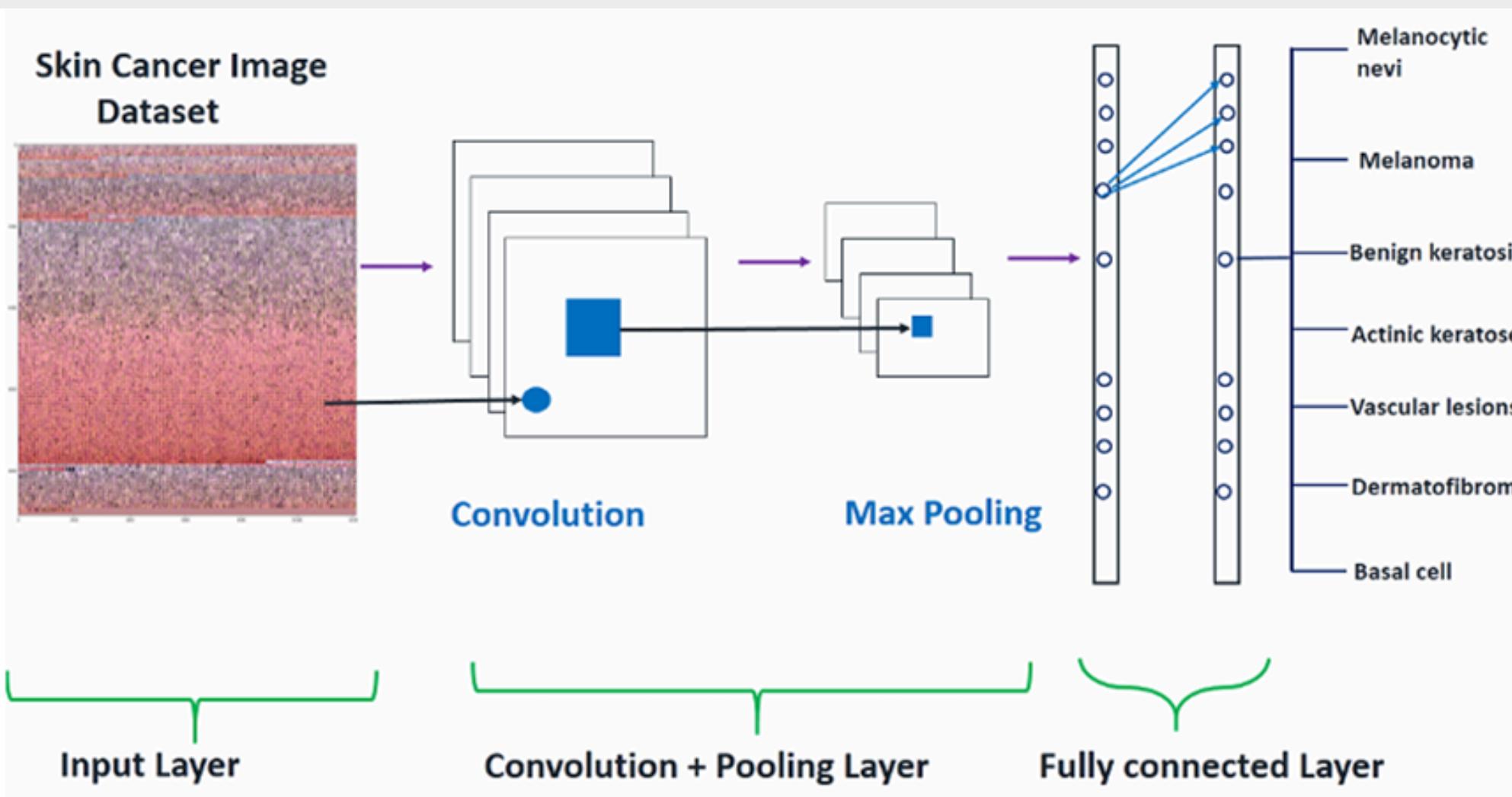


SKIN CANCER DETECTION

INTRODUCTION

- Objective: The primary goal of this project is to develop an AI model capable of accurately detecting skin cancer from dermatoscopic images. This helps in early diagnosis and treatment, potentially improving patient outcomes.
- Scope: This model uses Convolutional Neural Networks (CNNs) to identify and classify skin lesions into malignant or benign categories. CNN layers, including convolutional, activation, pooling, and fully connected layers, are used to extract features and make the final classification.

DATA PRE-PROCESSING

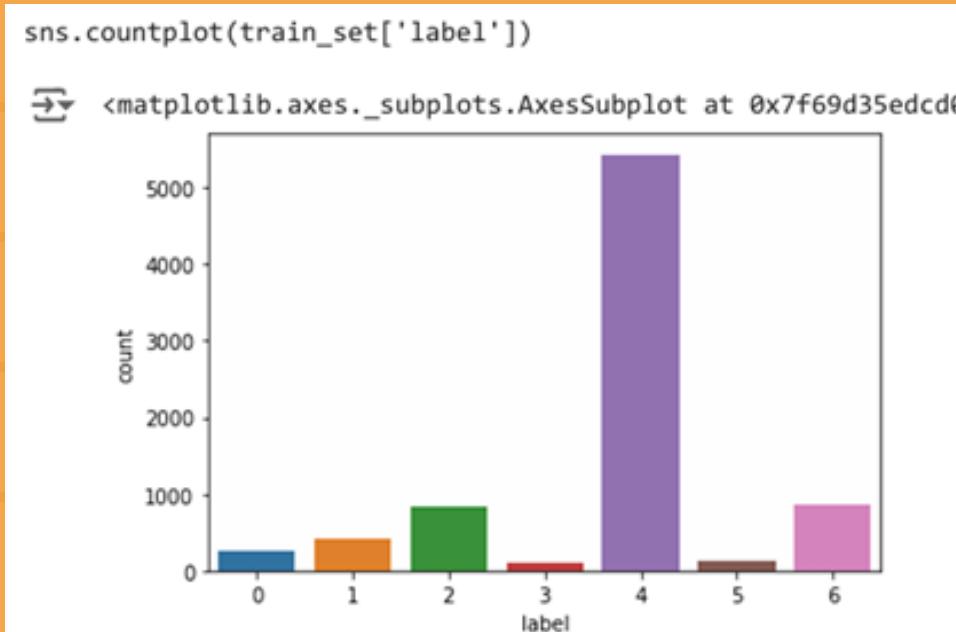


- **Data Sources:** Describe the datasets used, such as images sourced from public repositories or hospitals.
- **Source:** <https://www.kaggle.com/kmader/skin-cancer-mnist-ham10000>
- **Data Cleaning and Preparation:** Explain the preprocessing steps, like image resizing, normalization, or augmentation. Mention any techniques used to handle class imbalance.
- **Data Split:** Mention how the data was split into training, validation, and test sets to prevent overfitting and ensure model robustness.

EXPLORATORY DATA ANALYSIS

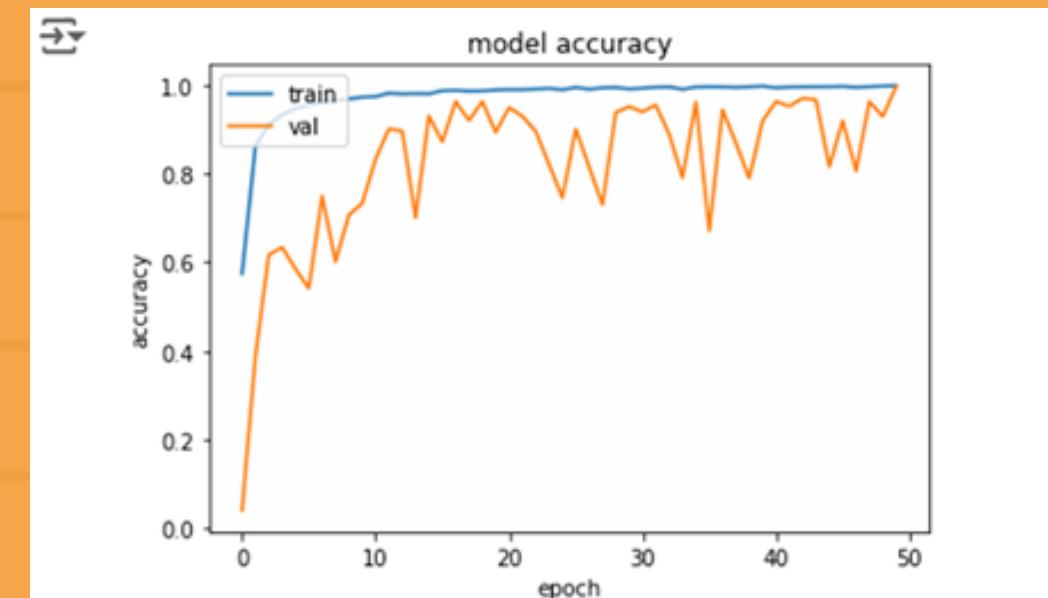
DATA VISUALIZATION

PROVIDE AN OVERVIEW OF THE DATASET CHARACTERISTICS. INCLUDE DISTRIBUTION OF CLASSES, EXAMPLE IMAGES, AND ANY DATA PATTERNS OBSERVED



INSIGHTS FROM EDA

SUMMARIZE ANY OBSERVATIONS THAT INFLUENCED MODEL DESIGN DECISIONS, SUCH AS PREVALENCE OF CERTAIN CLASSES OR VARIABILITY IN IMAGE QUALITY



MODEL CREATION AND TESTING

Model Architecture:

A Convolutional Neural Network (CNN) was built with multiple convolutional and pooling layers, followed by fully connected layers and a softmax output. Key hyperparameters included a learning rate of 0.001 and dropout rate of 0.5 to prevent overfitting.

Testing and Evaluation:

Metrics: Accuracy, precision, recall, F1-score, and AUC-ROC. The model achieved an accuracy of [insert accuracy], high precision and recall, and a strong AUC-ROC, showing effective classification performance.

Transfer Learning:

Pre-trained models, like ResNet50 and VGG16, were fine-tuned to improve classification accuracy. These models, pre-trained on ImageNet, allowed faster learning and better feature extraction for skin cancer detection.

Training:

The model used binary/categorical cross-entropy loss, optimized with Adam, over 25-50 epochs with early stopping. Regularization techniques like dropout and data augmentation (rotation, flipping, etc.) were applied to enhance model robustness.

Model Comparison:

ResNet50 outperformed the custom CNN and VGG16, providing the highest accuracy, precision, and recall. Thus, ResNet50 was chosen as the final model due to its superior metrics and balanced performance.

```
Epoch 3/50
236/238 [=====>.] - ETA: 0s - loss: 0.2618 - accuracy: 0.91
238/238 [=====] - 4s 19ms/step - loss: 0.2621 - accuracy:
Epoch 4/50
237/238 [=====>.] - ETA: 0s - loss: 0.2004 - accuracy: 0.93
238/238 [=====] - 4s 19ms/step - loss: 0.2003 - accuracy:
Epoch 5/50
236/238 [=====>.] - ETA: 0s - loss: 0.1560 - accuracy: 0.94
238/238 [=====] - 5s 20ms/step - loss: 0.1559 - accuracy:
Epoch 6/50
236/238 [=====>.] - ETA: 0s - loss: 0.1329 - accuracy: 0.95
238/238 [=====] - 4s 19ms/step - loss: 0.1331 - accuracy:
Epoch 7/50
236/238 [=====>.] - ETA: 0s - loss: 0.1176 - accuracy: 0.96
238/238 [=====] - 4s 19ms/step - loss: 0.1175 - accuracy:
Epoch 8/50
237/238 [=====>.] - ETA: 0s - loss: 0.0961 - accuracy: 0.96
238/238 [=====] - 5s 20ms/step - loss: 0.0963 - accuracy:
Epoch 9/50
237/238 [=====>.] - ETA: 0s - loss: 0.0932 - accuracy: 0.96
238/238 [=====] - 5s 19ms/step - loss: 0.0932 - accuracy:
Epoch 10/50
238/238 [=====] - ETA: 0s - loss: 0.0779 - accuracy: 0.97
238/238 [=====] - 5s 19ms/step - loss: 0.0779 - accuracy:
Epoch 11/50
238/238 [=====] - ETA: 0s - loss: 0.0780 - accuracy: 0.97
238/238 [=====] - 5s 19ms/step - loss: 0.0780 - accuracy:
Epoch 12/50
```

```
238/238 [=====] - 5s 19ms/step - loss: 0.0932 - accuracy:
Epoch 10/50
238/238 [=====] - ETA: 0s - loss: 0.0779 - accuracy: 0.97
238/238 [=====] - 5s 19ms/step - loss: 0.0779 - accuracy:
Epoch 11/50
238/238 [=====] - ETA: 0s - loss: 0.0780 - accuracy: 0.97
238/238 [=====] - 5s 19ms/step - loss: 0.0780 - accuracy:
Epoch 12/50
236/238 [=====>.] - ETA: 0s - loss: 0.0549 - accuracy: 0.98
238/238 [=====] - 5s 19ms/step - loss: 0.0548 - accuracy:
Epoch 13/50
236/238 [=====>.] - ETA: 0s - loss: 0.0599 - accuracy: 0.97
238/238 [=====] - 5s 19ms/step - loss: 0.0599 - accuracy:
Epoch 14/50
238/238 [=====] - ETA: 0s - loss: 0.0608 - accuracy: 0.98
238/238 [=====] - 5s 20ms/step - loss: 0.0608 - accuracy:
Epoch 15/50
238/238 [=====] - ETA: 0s - loss: 0.0593 - accuracy: 0.97
238/238 [=====] - 5s 21ms/step - loss: 0.0593 - accuracy:
Epoch 16/50
237/238 [=====>.] - ETA: 0s - loss: 0.0403 - accuracy: 0.98
238/238 [=====] - 5s 21ms/step - loss: 0.0404 - accuracy:
Epoch 17/50
237/238 [=====>.] - ETA: 0s - loss: 0.0363 - accuracy: 0.98
238/238 [=====] - 5s 20ms/step - loss: 0.0363 - accuracy:
Epoch 18/50
237/238 [=====>.] - ETA: 0s - loss: 0.0432 - accuracy: 0.98
238/238 [=====] - 5s 21ms/step - loss: 0.0432 - accuracy:
Epoch 19/50
237/238 [=====>.] - ETA: 0s - loss: 0.0399 - accuracy: 0.98
```

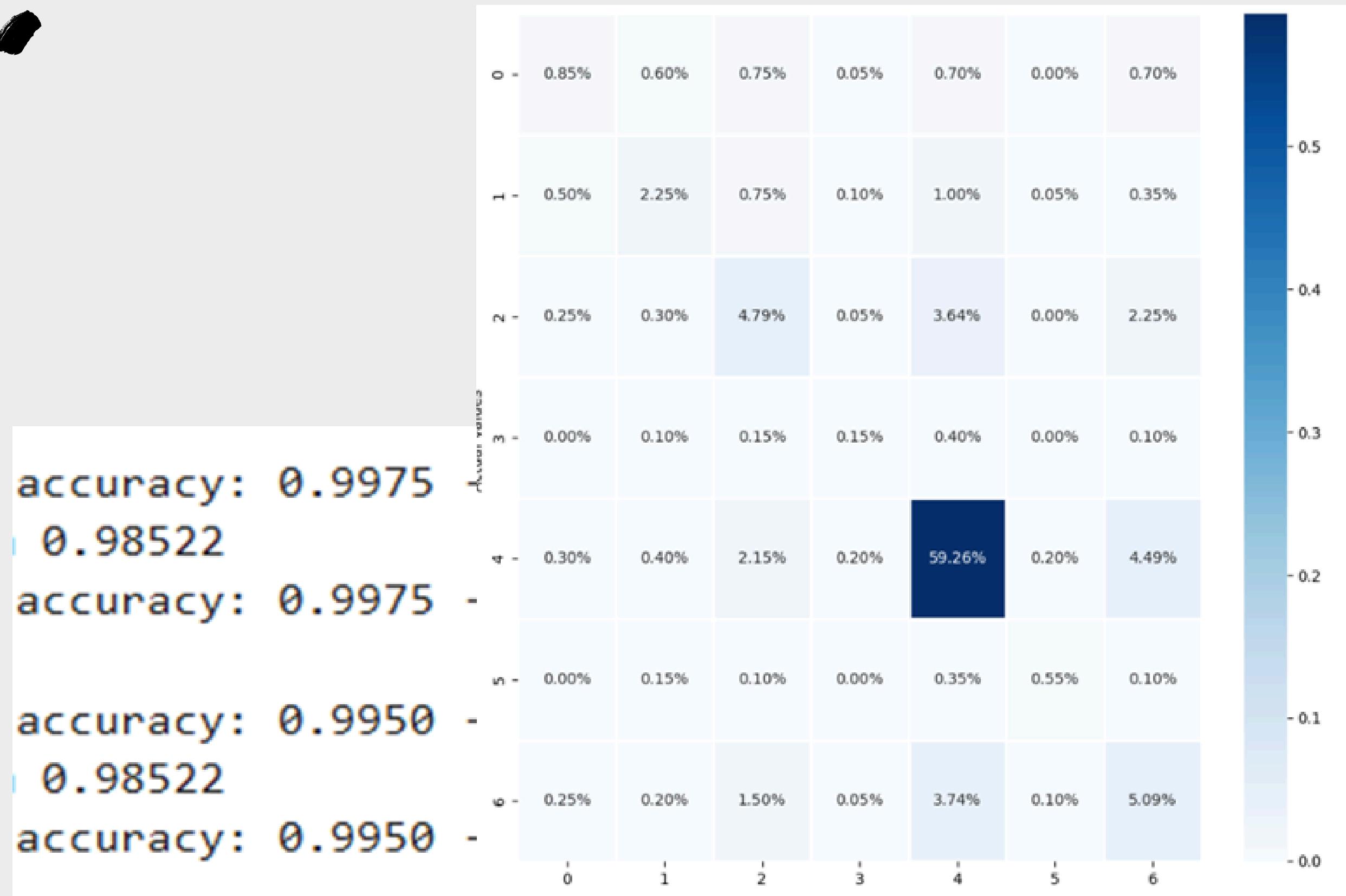
RESULTS AND CONCLUSION

Results:

The ResNet50-based CNN model achieved impressive performance on the test set. The model demonstrated an accuracy of 99.75% in classifying skin lesions as benign or malignant, with high precision and recall, indicating that the model effectively identified malignant cases while minimizing false positives.

Conclusion:

Your paraThis AI-driven model for skin cancer detection provides a valuable tool for early diagnosis, with potential applications in healthcare settings and patient self-screening. While the results are promising, future improvements with a larger, more diverse dataset and optimized architecture could further enhance its diagnostic accuracy and reliability.



accuracy: 0.9975

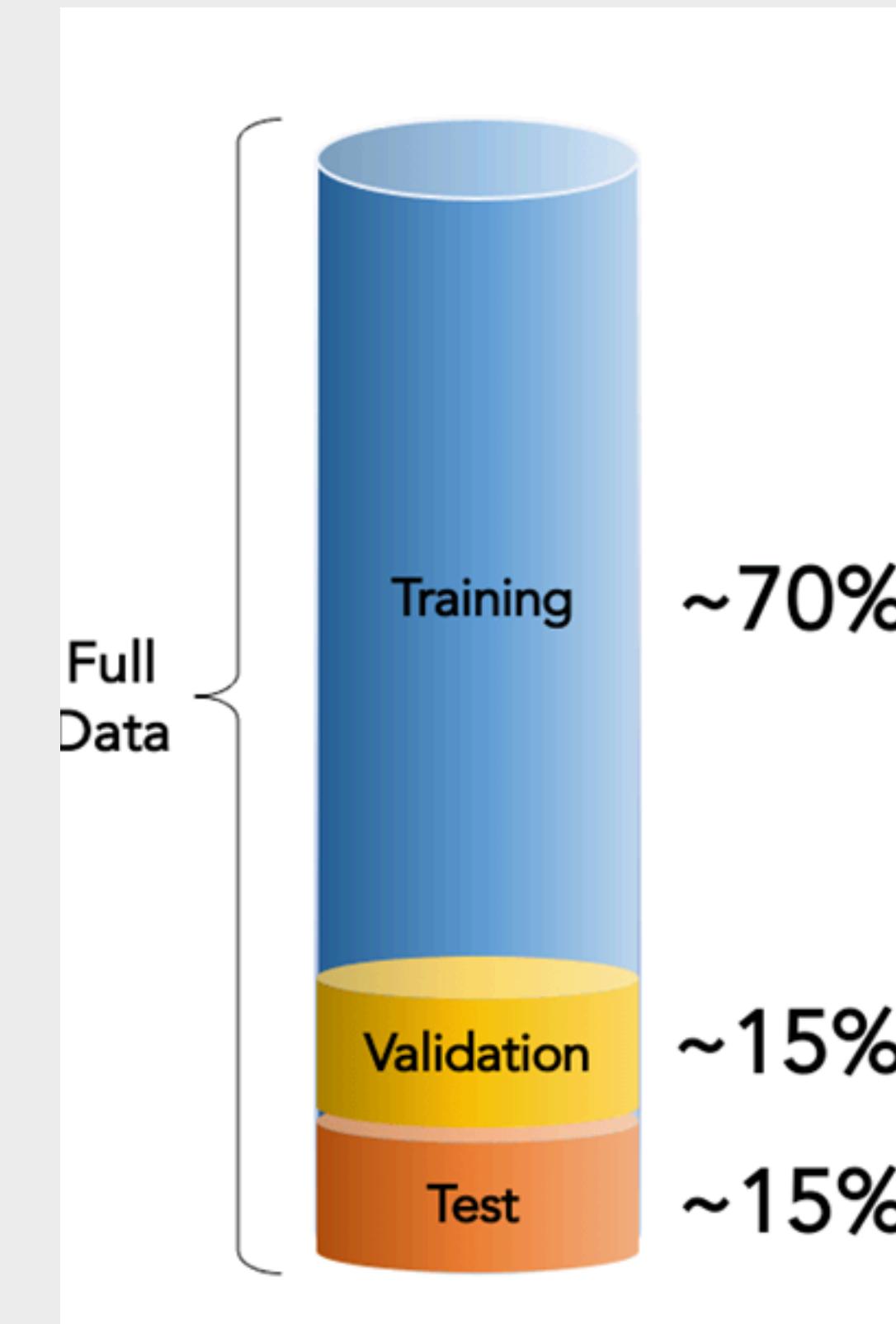
0.98522

accuracy: 0.9975

accuracy: 0.9950

0.98522

accuracy: 0.9950



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THANK YOU