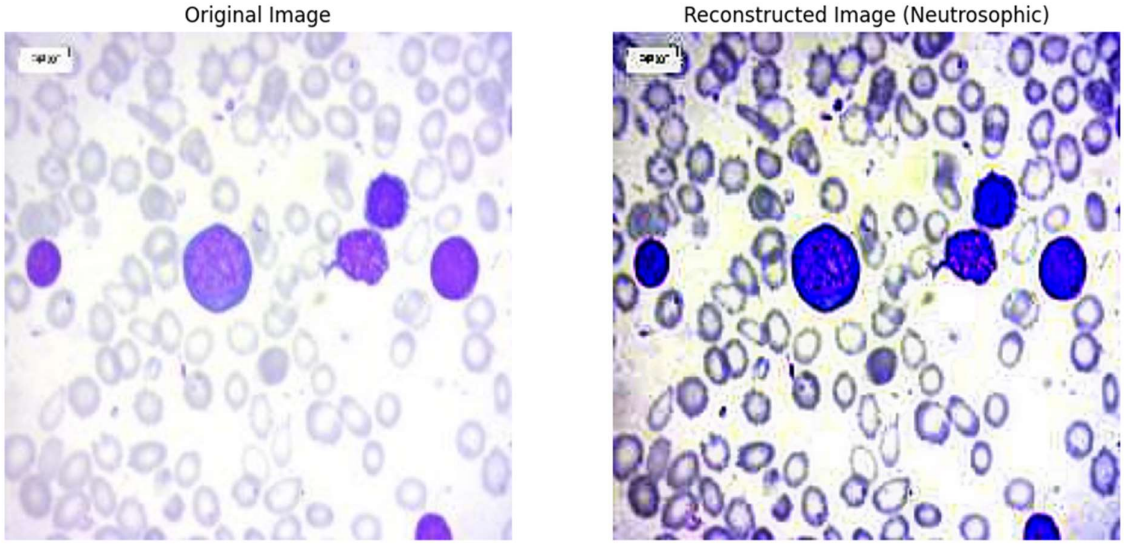
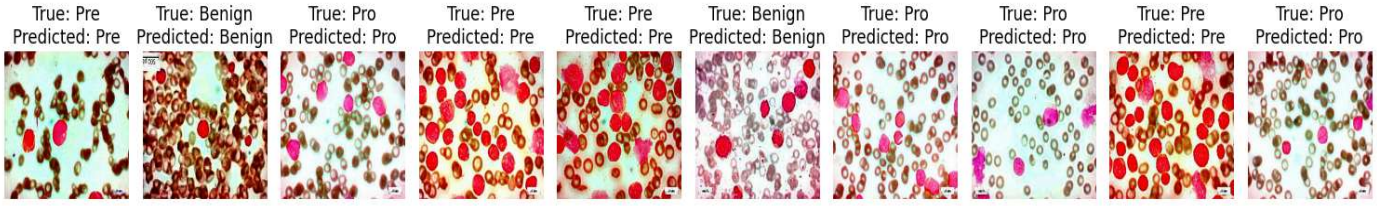
Chapter 6

Results

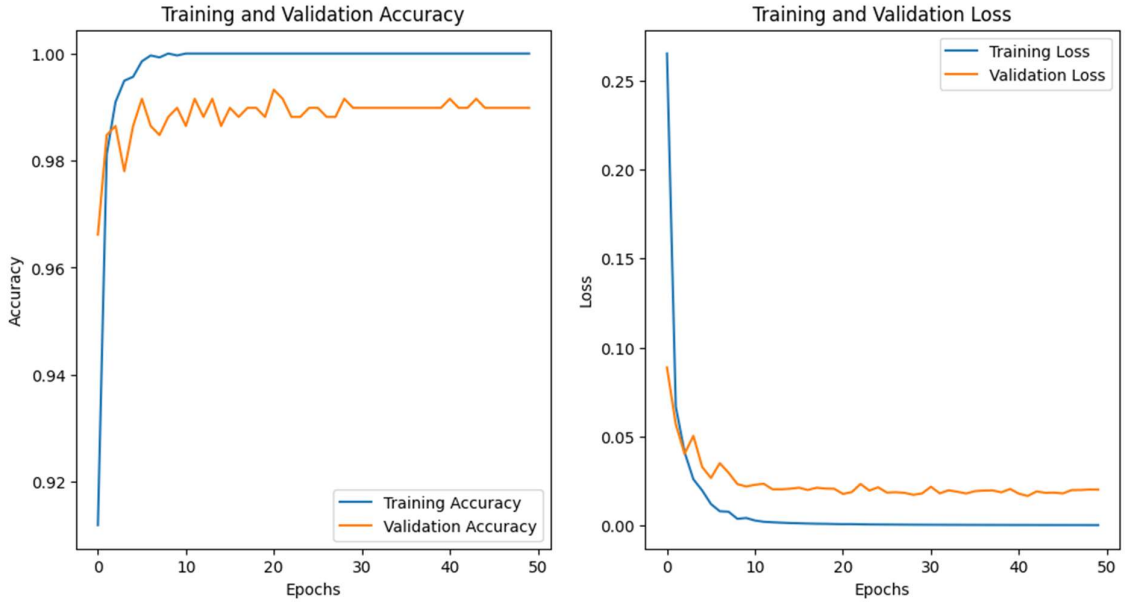
6.1 IMAGE RECONSTRUCTION AFTER ENHANCEMENTS



6.2 PREDICTION



6.3 TRAINING AND VALIDATION PERFORMANCE



6.4 TESTING PERFORMANCE

```
19/19 ━━━━━━━━━━━━━━━━━━━━ 1s 35ms/step - accuracy: 0.9907 - loss: 0.0243
Test Loss: 0.030882379040122032
Test Accuracy: 0.9864636063575745
```

6.5 PERFORMANCE METRICS

Performance metrics are essential for measuring the effectiveness of machine learning models, particularly in classification problems such as the problem employed in this research. They inform one about the performance of the model and provide feedback on areas that need improvement. In this section, we present the important performance metrics employed for measuring the accuracy and confidence of the image classification system.

1. **Accuracy:** Accuracy is the most widely used measure in classification problems, and it denotes the number of correct predictions divided by the total number of predictions. Although accuracy provides an overall sense of model performance, it is not always enough, especially in cases of imbalanced datasets.

2. **Precision:** Precision refers to how many of the positive labels predicted are correct. It is valuable when the false positive cost is high. It is particularly beneficial in tasks where the model's false positive rate must be low.

3. **Recall (Sensitivity):** Recall, or sensitivity, indicates the number of actual positive instances correctly predicted by the model. It is appropriate when false negatives must be reduced, such as in medical diagnosis or detecting fraud.

4. **F1-Score:** The F1-score is the harmonic mean between precision and recall, giving an average of the two. It is a useful measure when there is an imbalance in the class distribution since it considers both false positives and false negatives.

```
19/19 ━━━━━━━━━━━━━━━━━━━━ 7s 167ms/step
              precision    recall  f1-score   support

      Benign       0.98      0.98      0.98       133
       Early       0.98      0.98      0.98       151
         Pre       0.99      0.99      0.99       156
         Pro       1.00      0.99      1.00       151

    accuracy                           0.99       591
   macro avg       0.99      0.99      0.99       591
weighted avg       0.99      0.99      0.99       591
```