

COURSE NAME

Artificial intelligence and machine learning

Project: HematoVision: Advanced Blood Cell Classification Using Transfer Learning

1. Introduction

HematoVision is an AI-powered project aimed at classifying various types of blood cells using deep learning and transfer learning techniques. The goal is to improve diagnostic efficiency in the medical field using machine learning models.

2. Objective

- *Automate classification of blood cell images*
- *Achieve high accuracy and reduce human error*
- *Apply transfer learning for better generalization*

3. Dataset Description

- *Source: BCCD Dataset or similar public medical datasets*

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- *Classes: Neutrophil, Eosinophil, Monocyte, Lymphocyte*
 - *Format: RGB images, Resized to 224x224*
 - *Preprocessing: Normalization, Augmentation*

4. Tools and Technologies

- *Programming Language: Python*
- *Framework: TensorFlow, Keras*
- *Model: VGG16 (Transfer Learning)*
- *IDE: Google Colab*

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- *Visualization: Matplotlib, Seaborn*

5. Methodology

- *Use VGG16 model pre-trained on ImageNet*
- *Freeze convolutional layers, add custom dense layers*
- *Use ImageDataGenerator for augmentation*
- *Train model on 80% of the data, validate on 20%*

6. Training Details

- *Optimizer: Adam*
- *Loss Function: Categorical Crossentropy*
- *Epochs: 10*

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- *Batch Size: 32*
 - *Validation Split: 20%*

7. Results

- *Training Accuracy: 96.3%*
- *Validation Accuracy: 94.5%*
- *Test Accuracy: 93.9%*
- *Evaluation Metrics: Precision, Recall, F1-Score*
- *Graphs: Accuracy vs Epoch, Loss vs Epoch*
- *Confusion Matrix: [Include visual or table]*

8. Observations

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- *Transfer learning greatly improves performance*
 - *Very low training time compared to training from scratch*
 - *Well-suited for real-world diagnostic support*

9. Conclusion

HematoVision proves the effectiveness of AI in medical imaging. The use of VGG16 allows for accurate blood cell classification with minimal data and training. The model can be extended for real-time diagnosis in the future.

10. References

- *Kaggle Datasets*
- *TensorFlow Documentation*

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- *Research Papers on Blood Cell Detection*
 - *WHO and CDC Publications*