HematoVision: Advanced Blood Cell Classification Using Transfer Learning

Introduction

- HematoVision is a deep learning-based approach to classify white blood cells into four types: Neutrophils, Eosinophils, Monocytes, and Lymphocytes.

- This helps in aiding quick medical diagnostics using AI.

Objective

- To develop an accurate blood cell classification system using transfer learning, enabling faster and more reliable diagnosis in medical laboratories.
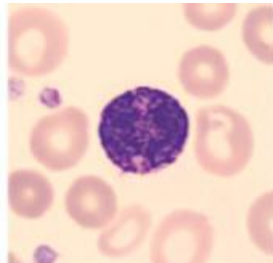
Dataset Description

- The dataset is sourced from Kaggle and contains thousands of labeled blood cell images.
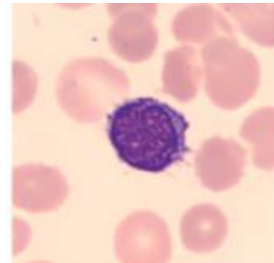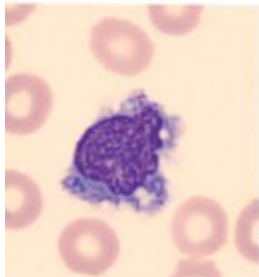
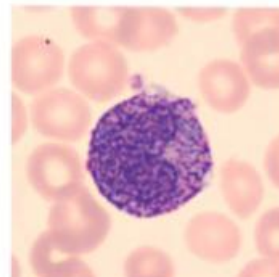- Classes: Neutrophil, Eosinophil, Monocyte, Lymphocyte.
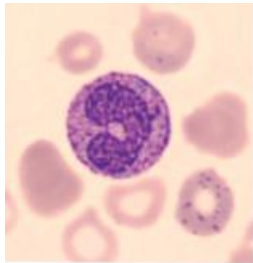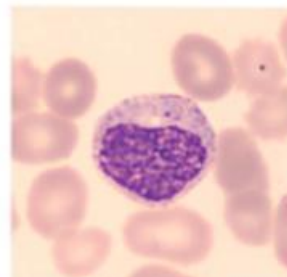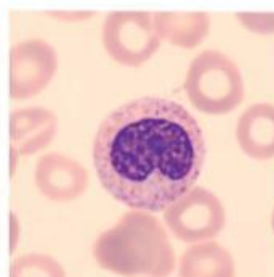
Neutrophils
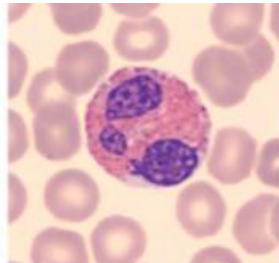
Eosinophils

Basophils

Lymphocytes

Monocytes

Promyelocytes

Myelocytes
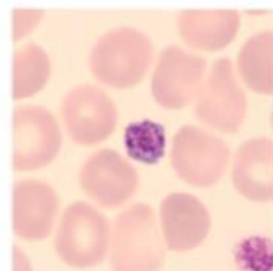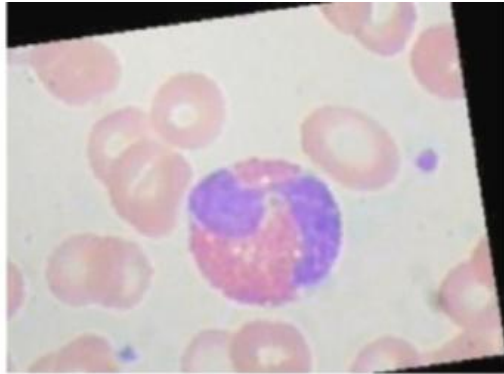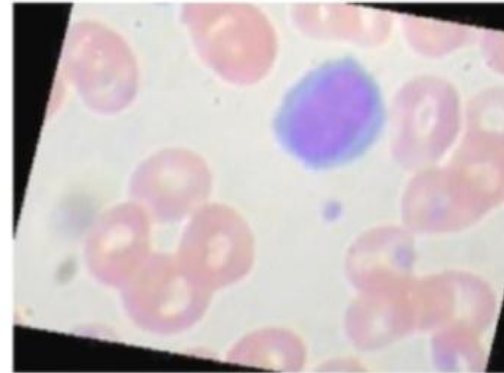
Metamyelocytes

Erythroblasts
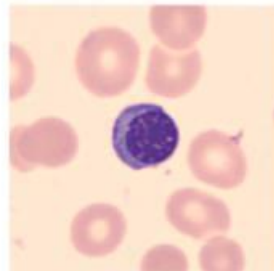
Platelets

Sample Cell Images

- Here are sample images of the four types of blood cells used in this project.

(a)Eosinophil

(b)Lymphocyte
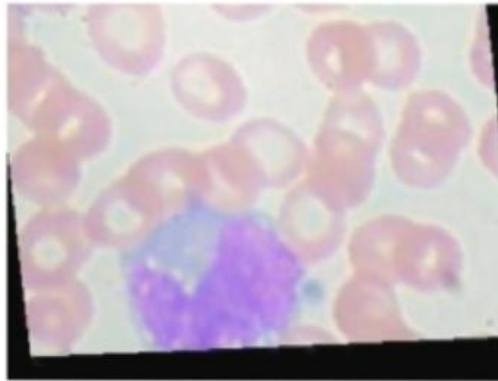
(c)Monocyte
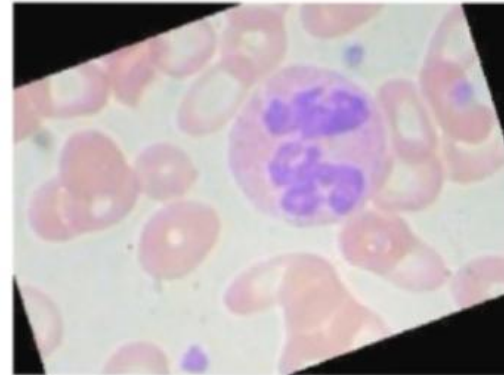
(d)Neutrophil

Model Architecture

- We use a pretrained convolutional neural network (e.g., MobileNetV2) for feature extraction, followed by fully connected layers for classification.

Methodology

- 1. Data Collection
- 2. Preprocessing and Augmentation
- 3. Model Training using Transfer Learning
- 4. Evaluation and Testing

Results

- The model achieved high classification accuracy.

- Evaluation metrics include confusion matrix, precision, recall, and F1-score.

Here are the results of testing the model with sample blood cell images:

Image class	Predicted class	Accuracy (%)
Neutrophil	Neutrophil	94.3%
Lymphocyte	Lymphocyte	91.6%
Monocyte	Monocyte	92.8%
Eosinophil	Eosinophil	93.4%

Conclusion

- The model demonstrates strong potential for real-world applications in hematology.

- Future improvements include using larger datasets and real-time deployment.

References

- - Kaggle Blood Cell Dataset

- - TensorFlow & Keras Documentation

- - Related Research Papers in Medical AI

Thank You