

WBC Classifier – User Guide

1. Introduction

The WBC Classifier App automates classification of white blood cells (WBCs) from blood smear images using CNNs and transfer learning. This guide covers models, preprocessing schemes, UI features, and deployment.

2. Pipeline Overview

1. Data Upload: single images or ZIP archives 2. Preprocessing: resize, normalize, tensor conversion 3. Classification: model inference 4. Visualization & Export: saliency maps, tables, CSV download

3. GUI Overview

- Model Selection Dropdown - Normalization Dropdown - Confidence Threshold Slider - File Uploader (image/ZIP) - Performance Dashboard - Navigation Controls - Batch Summary Table - Visualization Area (original + saliency) - Export Buttons (CSV, PDF) - Accessibility Features

4. Model Information

Model	Params	Description	Normalization
Enhanced CNN	~1M	3-block CNN trained from scratch	0–1 Scaling
Enhanced CNN (v2)	~1.4M	+1 block, L2, Dropout 0.6	0–1 Scaling
MobileNetV2 (head)	~2.3M	Frozen ImageNet backbone + head	ImageNet
MobileNetV2 (fine-tuned)	~3.8M	Fine-tuned last conv block	ImageNet

5. Normalization Schemes

• 0–1 Scaling: $\text{pixel}/255 \rightarrow [0,1]$ (scratch CNNs) • ImageNet Preprocessing: $[-1,+1]$, zero-center (MobileNet) • Mean–Std Z-score: $(x-\mu)/\sigma$ per channel (custom μ/σ)

6. Batch Summary Table

Shows count & percentage per WBC class for ZIP uploads, emulating a clinical differential workflow.

7. Accessibility & Navigation

Keyboard shortcuts, ARIA labels, high-contrast maps, responsive layout.

8. Advanced Features & Tips

Custom model upload, metrics CSV for evaluation, threshold tuning, export options, debug logging.

9. Deployment & Integration

Run locally: ``streamlit run wbc_app.py`` GitHub + Git LFS for models Streamlit Cloud auto-deploy Optional Docker container

10. References

- Blumenreich MS (1990) The WBC and differential count. NBK261.
- Zhou L et al. (2022) ML in WBC diagnosis.
- Chollet F (2018) Deep Learning with Python.