

Erythroblast Cells: ML Models for Multiclass Classification in Single Image and Mixed Magnification.

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Project Guide: Nirmal Punjabi, IIT Bombay
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Overview

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Task Overview

- Generate composite images of sizes 1×1 , 2×2 , 3×3 , and 4×4 .
- Train the model on this set of images ensuring no data leakage.
- Evaluate on various augmentations.
- Explore image segmentation approaches.

Findings and Results

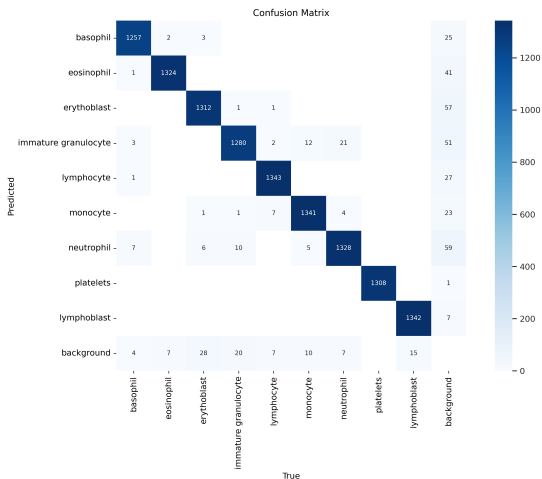


Figure: Confusion Matrix for Validation Images

Findings and Results

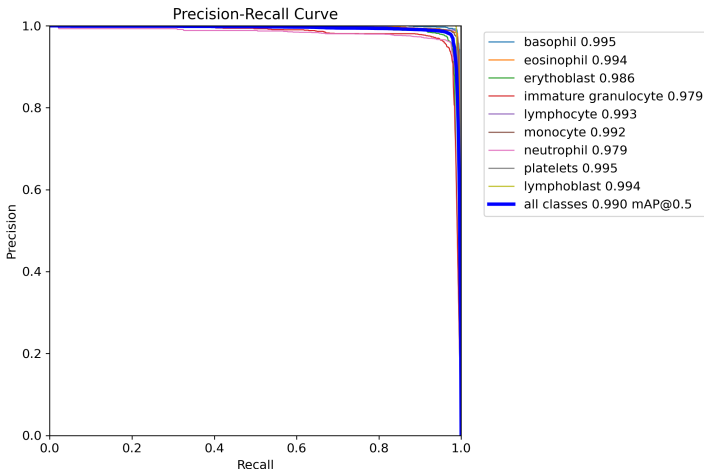


Figure: Precision-Recall Curve for Validation Images

Findings and Results

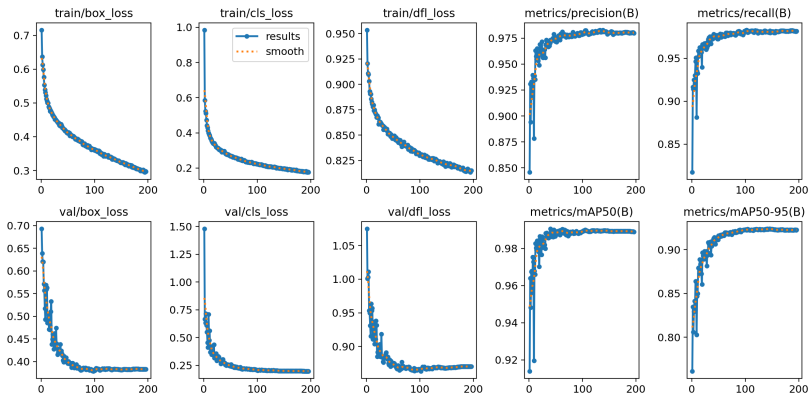


Figure: Train/Val losses

Findings and Results

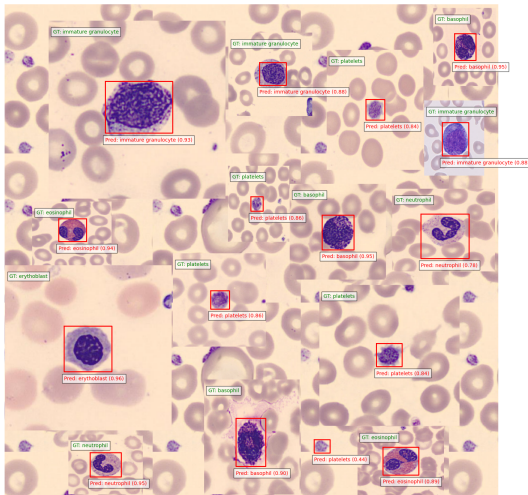


Figure: Detection on a composite image

Conclusion

- The model performs excellently on all grid sizes/composite images.
- The model is trained on yolo11m.pt.
- The dataset is first split into three parts: train (0.8), val (0.15), and test (0.05). The images are then sampled from respective sets to ensure no data leakage across the sets.
- The dataset consists of 2000 images per grid size (1600 train, 400 val), sampled with replacement.
- The composite image is created by first selecting a single-class image, removing the class in it using Adobe Firefly, creating a 1200×1200 canvas by duplicating this, and randomly pasting images with different augmentations on it.

Image Segmentation

Generating Segmentation Labels

- There are no existing segmentation labels available for the dataset.
- Various heuristic techniques are being explored to generate segmentation masks.
- Methods include edge detection, color-based segmentation, and other feature-based approaches.

Experiments

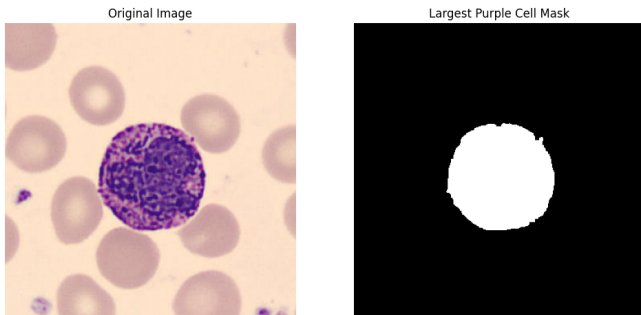


Figure: Segmentation of Basophil

Experiments

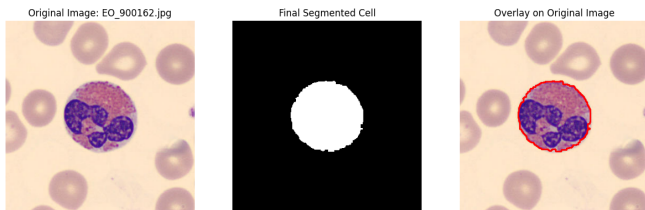


Figure: Segmentation of Eosinophil

Plan for This Week

- Segment other cell types.
- Try different segmentation techniques.
- Evaluate and refine masks.