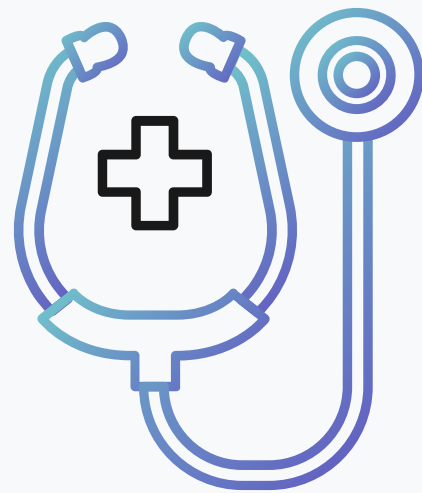


WBC on the Frontlines

Michael Pozo



Agenda

01

Business/Data
Understanding

03

Recommendations

02

Model Exploration

04

Next Steps



Business Understanding

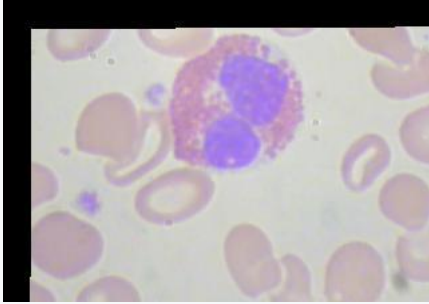
White blood cell counts are used in diagnosing many conditions such as viral infections, autoimmune diseases and certain types of cancer

Blood tests are conducted in labs where there is proper equipment to store the blood and run the test

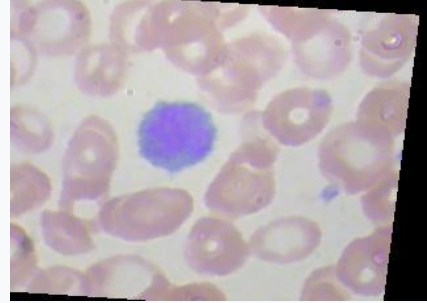
Business Problem: Doctors Without Borders would like to partner with our team for a proof of concept alternative to blood tests in assessing white blood cell counts. They need a solution that can be deployed in the field where no local labs exist.

Can You Tell the Difference?

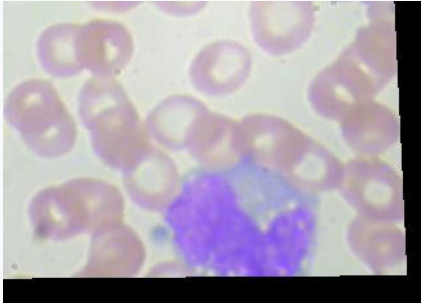
Eosinophil



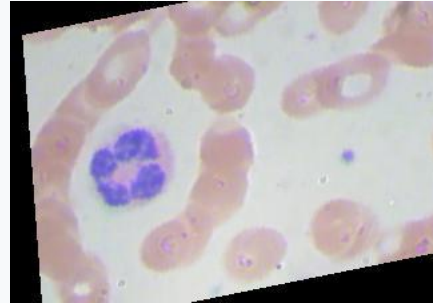
Lymphocyte



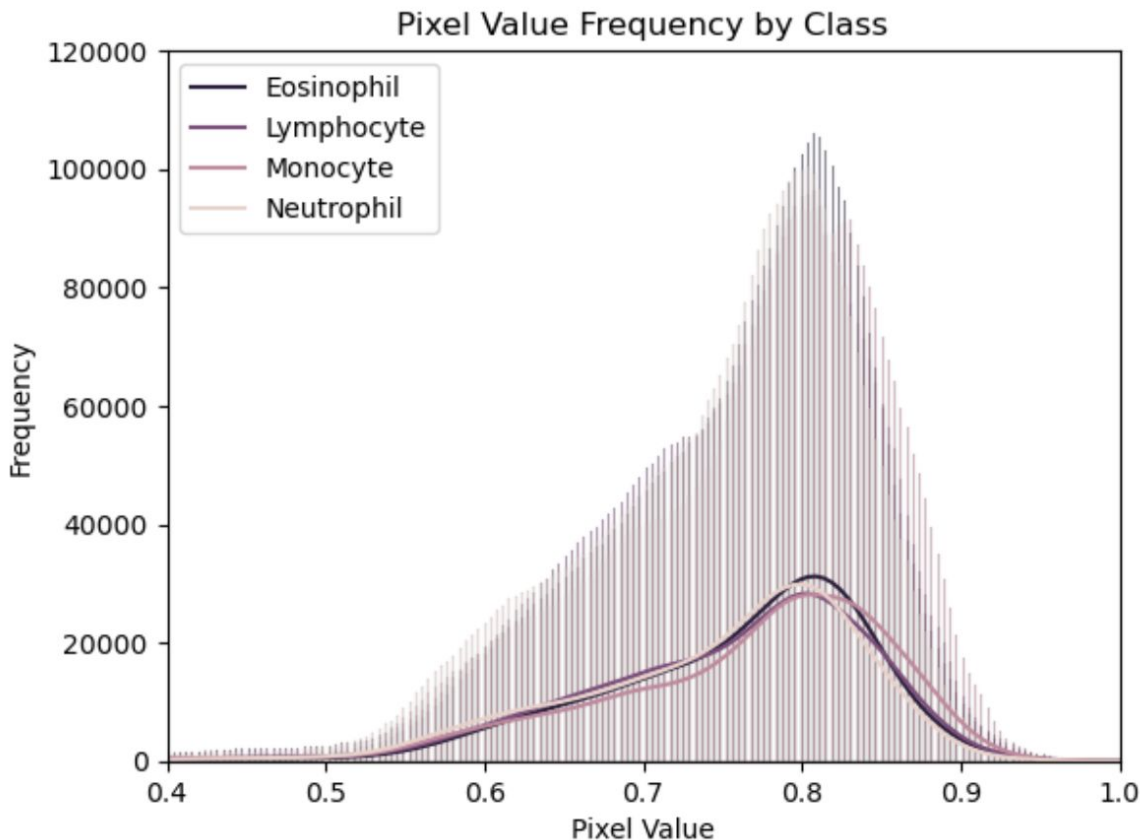
Monocyte



Neutrophil

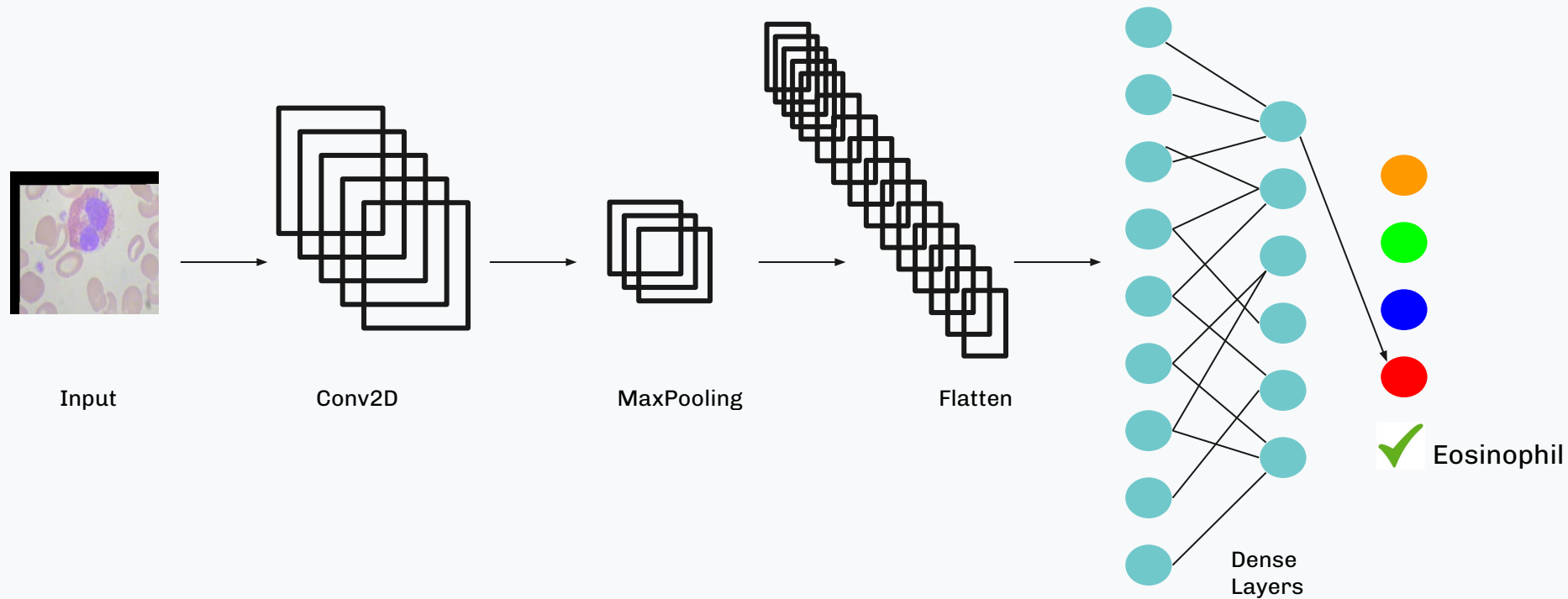


Pixel Value Distribution



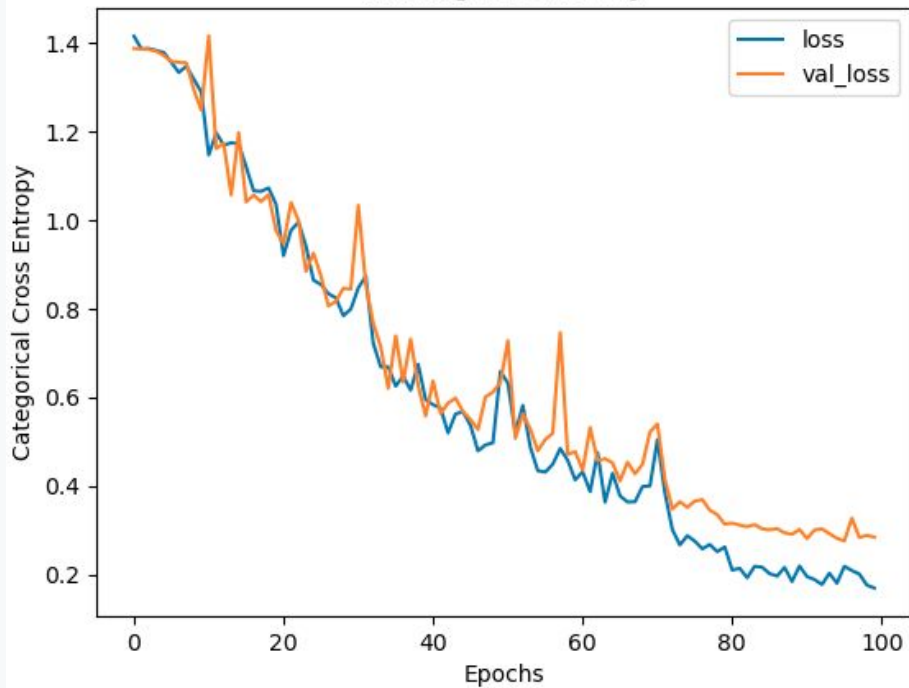
- Distribution of pixel intensity across the classes shows slight differences that the model will pick up on
 - ANOVA test confirms classes are from different distributions at 95% CL
- Monocyte distribution shifted to the darker side while Lymphocytes have a higher distribution of lighter pixel values
- Eosinophil and Neutrophil have similar distributions with a higher density around the mean.

Convolutional Neural Network

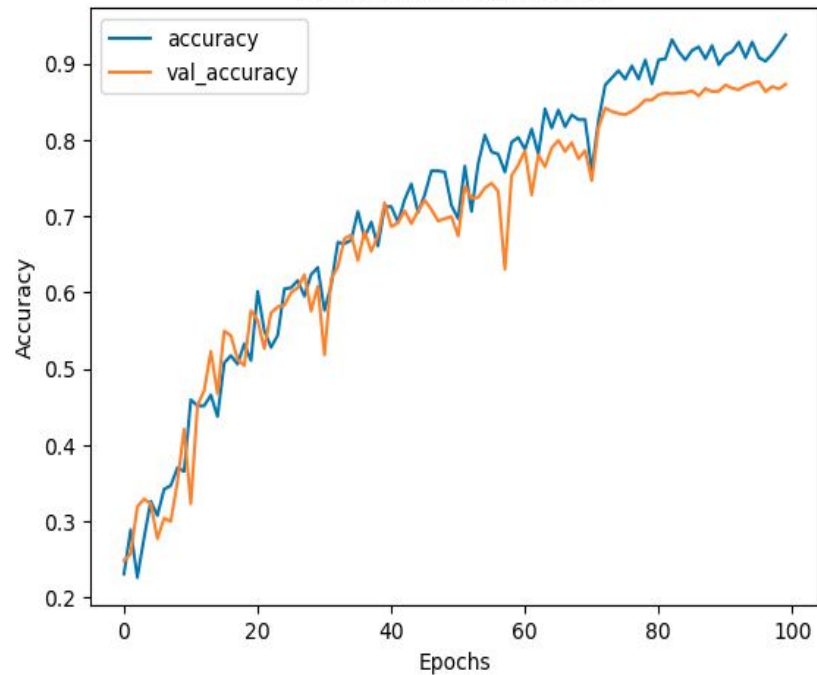


Training Performance

Training Loss History

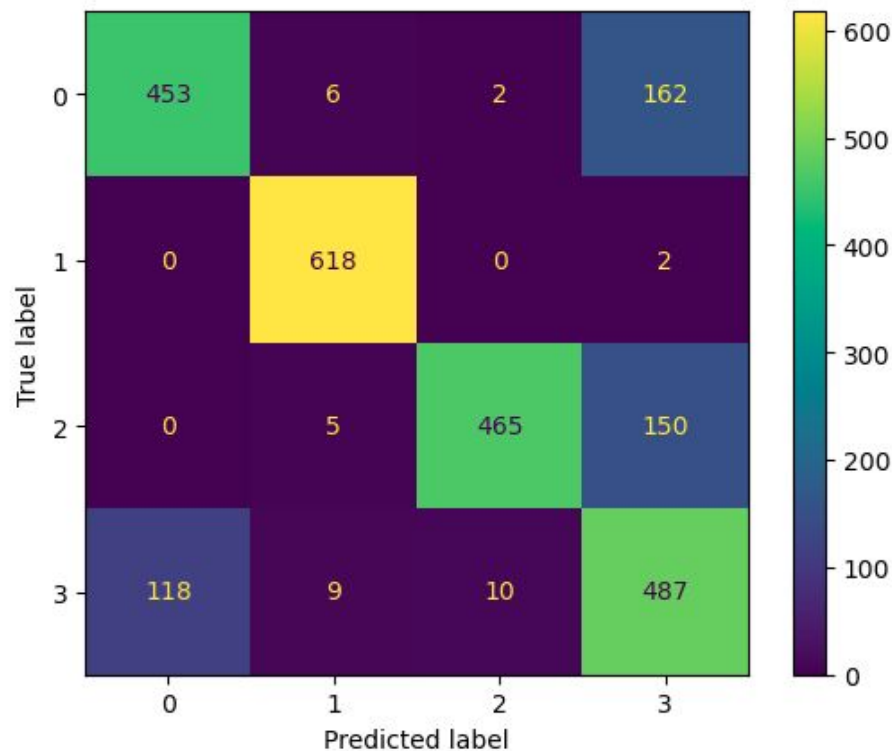


Training Accuracy History



Test Performance

- Test Accuracy: 81%
- Test Loss: 0.545
- Significant drop-off in accuracy between training and test shows the model is overfitting
- Regularization techniques produced mixed results and require further exploration
- Classes 0 (Eosinophil) and 3 (Neutrophil) were the hardest to predict as our pixel distribution suggested



Recommendation

Our recommendation is to deploy the model as a frontline tool for measuring WBC. Additional images collected can be used to further train the model and improve performance.



Next Steps

- Gather more data
- Test on separating red and white blood cells
- Expand to larger images