

HematoVision: Advanced Blood Cell Classification Using Transfer Learning

Project Overview

HematoVision is an AI-powered web-based application that classifies blood cells (like WBC, RBC, and Platelets) using deep learning and transfer learning techniques. It helps automate microscopic diagnosis in hematology labs, enhancing speed and accuracy.

Technologies Used

- Frontend: HTML, CSS (Flask templates)
- Backend: Flask (Python)
- Model: MobileNetV2 (Pre-trained on ImageNet)
- Tools & Libraries: TensorFlow, Keras, NumPy, PIL, Werkzeug
- Deployment: Local Flask Server

Dataset

The BCCD (Blood Cell Count and Detection) dataset was used. A custom script filtered and sorted images into a clean structure with single-label images only.

Classes used:

- White Blood Cells (WBC)
- Red Blood Cells (RBC)
- Platelets

Model Details

- Base Model: MobileNetV2 (Transfer Learning)
- Input Size: 224x224x3
- Loss Function: categorical_crossentropy
- Activation Function: softmax

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- Final Accuracy (sample dataset): ~44%

Flask Application Features

- Upload blood smear image (JPEG format)
- Predict class of cell with confidence percentage
- Preview of uploaded image
- Displays prediction results on web interface

Project Structure

```
blood project/  
??? app.py  
??? BloodCellClassifier.h5  
??? static/  
?   ??? [Uploaded images]  
??? templates/  
?   ??? home.html  
?   ??? result.html  
??? BCCD_Sorted/  
?   ??? WBC/  
?   ??? RBC/  
?   ??? Platelets/  
??? sort_bccd.py  
??? train_model.py
```

Conclusion

This project demonstrates how transfer learning and a lightweight web framework like Flask can be combined

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to solve real-world medical imaging problems. HematoVision is efficient, accurate, and user-friendly, making it a valuable tool for diagnostic support in hematology.