

Hematovision: Advanced Blood Cell Classification Using Transfer Learning

1. Introduction

- Project Title: Hematovision: Advanced Blood Cell Classification Using Transfer Learning
- Team Members: Subbu Naidu (Lead Developer), [Other Members]

2. Project Overview

- Purpose: To build an AI-powered platform that classifies blood cells using deep learning and transfer learning techniques to assist in medical diagnostics.
- Features:
 - Upload and analyze blood smear images
 - Classify different types of blood cells using CNNs
 - Provide accuracy scores and diagnostic suggestions
 - Visual interface for result display

3. Architecture

- Frontend: React.js application for user interaction and image upload.
- Backend: Python Flask/Node.js for image processing and prediction routing.
- Database: MongoDB to store user logs, results, and metadata.

4. Setup Instructions

- Prerequisites: Python 3.8+, TensorFlow, Flask, Node.js, MongoDB
- Installation:
 - Clone the repo
 - Install Python and Node dependencies

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- Configure database URI and model paths

5. Folder Structure

- Client: Contains React components and views.
- Server: Handles model prediction, routing, and database logic.

6. Running the Application

- Frontend: Run 'npm start' in /client
- Backend: Run 'python app.py' or 'npm start' in /server

7. API Documentation

- /predict (POST): Accepts image, returns predicted class and confidence.
- /history (GET): Fetch prediction history for a user.

8. Authentication

- Token-based authentication using JWT.
- Users must register/login to access full features.

9. User Interface

- Simple UI with upload button, result display, and history access.
- Screenshots included in appendix or GitHub repo.

10. Testing

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- Manual testing for frontend and backend
- Unit tests for model inference using PyTest

11. Screenshots or Demo

- Demo available at: <https://github.com/subbu-naidu>
- Screenshots in repository README

12. Known Issues

- Limited dataset may affect generalization
- Model performance varies with image quality

13. Future Enhancements

- Add support for more cell types
- Improve model robustness with larger datasets
- Integration with hospital management systems