Project Design Phase-II

Technology Stack (Architecture & Stack)

Date: 31 January 2025
Team ID: LTVIP2026TMIDS91486
Project Name: HematoVision – Intelligent Blood Cell Classification System
Maximum Marks: 4 Marks

Technical Architecture

HematoVision follows a Machine Learning–Driven Application Architecture where users interact with a web-based interface that communicates with a backend prediction engine integrated with a transfer learning model.

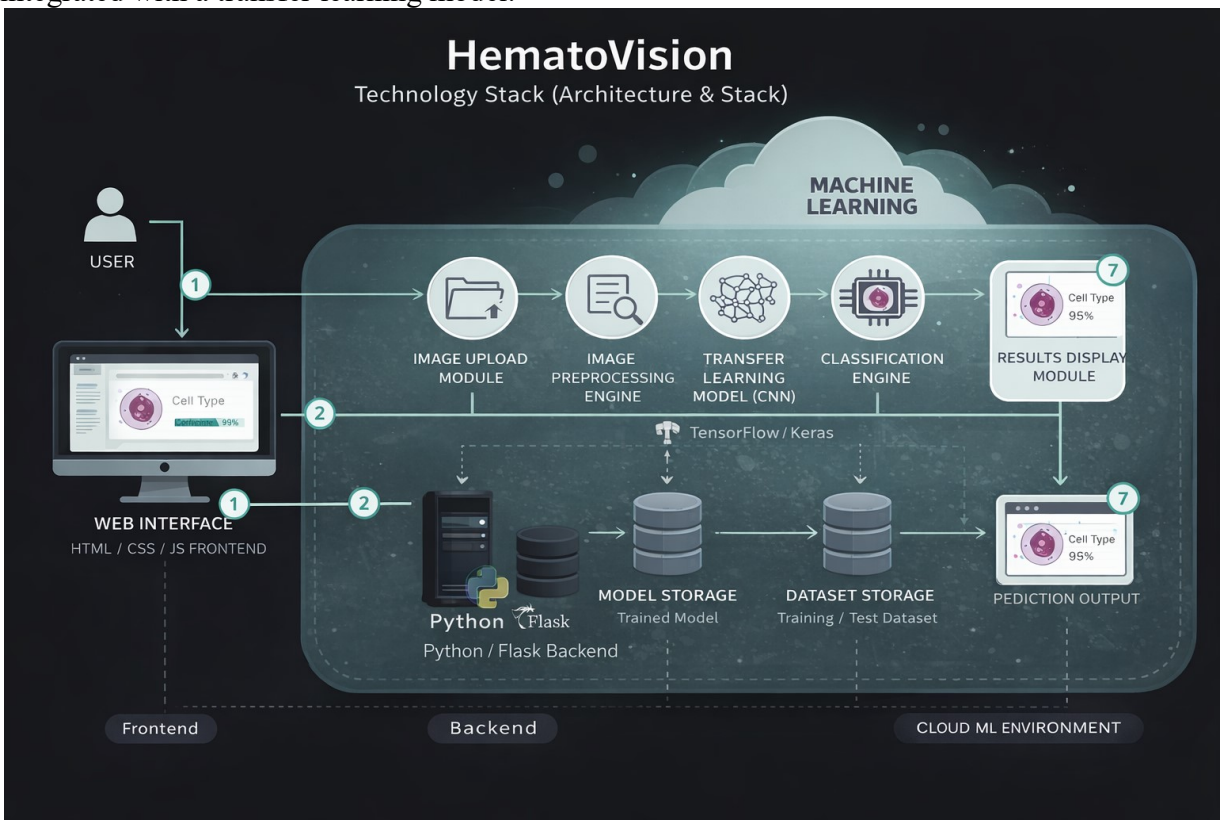

Table-1: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Web-based interface for image upload & result visualization	HTML, CSS, JavaScript
2	Application Logic-1	Handles image upload & validation	Python (Flask / FastAPI)
3	Application Logic-2	Performs image preprocessing (resize, normalization)	Python, OpenCV / NumPy
4	Application Logic-3	Executes prediction using transfer learning model	TensorFlow / Keras
5	Classification Engine	Converts extracted features into predicted labels	CNN Softmax Layer
6	Database / Data Store	Stores metadata (optional)	SQLite / Local Storage
7	File Storage	Stores uploaded images (temporary)	Local File System
8	Dataset Storage	Training & testing images	Local Dataset Directory
9	Machine Learning Model	Blood cell classification model using transfer learning	MobileNetV2 / Pretrained CNN
10	Infrastructure (Server / Deployment)	Hosts application backend & model	Local Server / Flask Server

Table-2: Application Characteristics

S.No	Characteristics	Description	Technology / Approach
1	Open-Source Frameworks	Frameworks used for development & ML	TensorFlow, Keras, Flask
2	Security Implementations	Basic validation & safe file handling	Input Validation, File Type Checking
3	Scalable Architecture	Modular ML-based layered design	UI → Backend → ML Engine
4	Availability	System accessible during runtime	Local Server Execution
5	Performance	Efficient inference using transfer learning	MobileNetV2 (Lightweight CNN)
6	Reliability	Consistent predictions from trained model	Pretrained CNN + Fine-Tuning
7	Maintainability	Easy model replacement & updates	Modular Backend Design
8	Portability	Deployable across environments	Python-based Architecture