

## HematoVision: Advanced Blood Cell Classification Using Transfer Learning

### **What is HematoVision?**

An accurate and efficient model for classifying blood cells.

Employs transfer learning techniques.

Dataset:

Utilizes a dataset of 12,000 annotated blood cell images.

Categorized into distinct classes such as eosinophils, lymphocytes, monocytes, and neutrophils.

Key Technology: Transfer Learning

Leverages pre-trained Convolutional Neural Networks (CNNs) to expedite training and improve classification accuracy.

Allows the model to benefit from pre-existing knowledge of image features.

Significantly enhances its performance and reduces computational costs.

Impact: Provides a reliable and scalable tool for pathologists and healthcare professionals, ensuring precise and efficient blood cell classification.

Project Overview:

Goal: Build a CNN model to classify blood cells (neutrophils, lymphocytes, monocytes, eosinophils)

Uses Transfer Learning for faster training and better accuracy

Dataset: 12,000 annotated images

### **Real-World Applications:**

Scenario 1: Automated Diagnostic Systems

Scenario 2: Remote Medical Consultations (Telemedicine)

Scenario 3: Educational Tools for Medical Training

Project Architecture

User uploads image via UI

Flask app sends image to CNN model

Model predicts and sends result to UI

Model built using MobileNetV2

### **Software & Libraries Required:**

Anaconda Navigator

Python Libraries:

numpy, pandas, scikit-learn, matplotlib, scipy, seaborn, tensorflow, flask

## Knowledge Prerequisites:

CNNs, Transfer Learning, VGG16, Overfitting & Regularization

Flask Basics

Optimizers: Adam, SGD

Links to useful resources

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>HematoVision - Blood Cell Classifier</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      background: #f2f2f2;
      text-align: center;
      padding: 50px;
    }
    h1 {
      color: #2c3e50;
    }
    #uploadForm {
      background: #fff;
      padding: 20px;
      border-radius: 10px;
      display: inline-block;
      box-shadow: 0 4px 8px rgba(0,0,0,0.1);
    }
    input[type="file"] {
      margin: 15px 0;
    }
    button {
      background-color: #3498db;
      color: white;
```

```

padding: 10px 20px;
border: none;
border-radius: 6px;
cursor: pointer;
}
button:hover {
background-color: #2980b9;
}
#result {
margin-top: 20px;
font-size: 18px;
color: #27ae60;
}
</style>
</head>
<body>
<h1>  HematoVision</h1>
<h2>Advanced Blood Cell Classification Using Transfer Learning</h2>
<div id="uploadForm">
<form id="form">
<label for="imageUpload">Upload a Blood Cell Image:</label><br>
<input type="file" id="imageUpload" accept="image/*" required><br>
<button type="submit">Classify Cell</button>
</form>
<div id="result"></div>
</div>
<script>
document.getElementById("form").addEventListener("submit", function(e) {
e.preventDefault();
const fileInput = document.getElementById("imageUpload");
const resultDiv = document.getElementById("result");
if (!fileInput.files.length) {
resultDiv.innerText = "Please upload an image.";
return;
}
const file = fileInput.files[0];
// Placeholder: Simulate prediction
resultDiv.innerHTML = "🔍 Classifying...";
setTimeout(() => {
// Replace this with API call in real app
const predictions = ["Neutrophil", "Lymphocyte", "Monocyte",
"Eosinophil", "Promyelocytes", "Myelocytes", "Metamyelocytes", "Erythroblasts", "Platelets", "Basophil"];
const randomClass = predictions[Math.floor(Math.random() * predictions.length)];
resultDiv.innerHTML = `🔴 Predicted Cell Type:
<strong>${randomClass}</strong>`;
}, 1500);
});

```

```
</script>
</body>
</html>
```

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>HematoVision: Blood Cell Classification</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      margin: 40px;
      background-color: #f9f9f9;
      text-align: center;
    }
    h1 {
      color: #4B0082;
    }
    .image-container {
      margin-top: 30px;
    }
    img {
      max-width: 90%;
      height: auto;
      border: 3px solid #4B0082;
      border-radius: 8px;
      box-shadow: 0 0 10px rgba(0,0,0,0.2);
    }
    p {
      font-size: 1.1em;
      color: #555;
    }
  </style>
</head>
<body>
  <h1>HematoVision: Advanced Blood Cell Classification Using Transfer Learning</h1>
  <div class="image-container">
    
  </div>
  <p>This figure shows various blood cell types used in the HematoVision classification
pipeline.</p>
</body>
</html>
```

