

HematoVision: Advanced Blood Cell Classification Using Transfer Learning

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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>
```

