Here are the **full details of the software used** in your glaucoma detection project, categorized by type and purpose:

**🔧 1. Programming Language**

**Python**

* **Version Recommended**: 3.7 or higher
* **Purpose**: Core language used for model development, data preprocessing, backend server (Flask), and scripting.

**🧠 2. Deep Learning and Machine Learning Libraries**

**PyTorch**

* **Library**: torch, torchvision
* **Purpose**:
  + Building and training neural networks
  + Loading and transforming image data
  + Performing inference (predictions)
* **Version Recommended**: ≥ 1.9.0
* **Hardware Support**: CPU and GPU (CUDA)

**Timm (PyTorch Image Models)**

* **Library**: timm
* **Purpose**: Provides pretrained models like EfficientNet, Vision Transformers, etc.
* **Used for**: Loading a pretrained efficientnet\_b0 model
* **Command to install**: pip install timm

**🌄 3. Image Processing**

**Pillow (PIL)**

* **Library**: PIL.Image
* **Purpose**: Open and convert image files (e.g., JPG, PNG) for preprocessing.
* **Command to install**: pip install pillow

**🧰 4. Dataset Handling**

**torchvision.datasets.ImageFolder**

* **Purpose**: Organizes images into classes based on folder structure (train/class1/, train/class2/, etc.).
* **Used in**: Loading training, validation, and testing datasets.

**🌐 5. Web Framework**

**Flask**

* **Library**: flask
* **Purpose**:
  + Creates the backend web server
  + Exposes routes (like /predict) for API access
  + Handles image uploads from users
* **Command to install**: pip install flask

**Flask-CORS**

* **Library**: flask\_cors
* **Purpose**: Enables Cross-Origin Resource Sharing (CORS) to allow front-end apps to communicate with the Flask API.
* **Command to install**: pip install flask-cors

**🧪 6. Development Environment**

**Recommended Tools**

* **Jupyter Notebook** or **Google Colab**: For interactive training and testing
* **Visual Studio Code** / **PyCharm**: For Python development with Flask and PyTorch

**💾 7. Others (Optional Tools)**

* **Postman**: For testing REST API endpoints
* **Browser**: To open the web interface served by Flask
* **Git**: Version control for managing code

**✅ Summary Table**

| **Category** | **Software** | **Purpose** |
| --- | --- | --- |
| Programming | Python | Core language |
| Deep Learning | PyTorch, torchvision | Model training, data loading |
| Pretrained Models | timm | EfficientNet model |
| Image Processing | Pillow (PIL) | Open and preprocess image files |
| Web Framework | Flask | Backend API server |
| Web Security | Flask-CORS | Allow API access from web frontends |
| Dev Environment | VS Code, Colab, Jupyter | Code writing, debugging, and testing |