Colab training notebook - Diabetic Retinopathy Classification

This notebook runs the training code from the repository on Google Colab (GPU runtime). It supports both ResNet50 and Vision Transformer (ViT) models.

Model Options:

- `resnet50`: ResNet50 backbone (baseline)
- `vit_base_patch16_224`: Vision Transformer Base (recommended for better accuracy)
- `vit_small_patch16_224`: Vision Transformer Small (faster, less memory)
- `vit_tiny_patch16_224`: Vision Transformer Tiny (fastest, least memory)

Notes:

- Make sure your dataset folder has `dr_labels.csv` and a `DR_images/` subfolder.
- You can either upload the `data/` folder to Colab session storage, or mount Google Drive and point `--data-dir` to a folder on Drive.
- If you prefer to run from a GitHub repo, upload this workspace to a public GitHub and use the git clone cell below.
- The code now includes improved data augmentation for better accuracy.

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
%cd /content
```

```
/content
```

```
mkdir /content/Diabetic-Retinopathy
```

```
# Install PyTorch with CUDA support
!pip install -q torch torchvision --extra-index-url https://download.pytorch.org/whl/cu118

# Install other requirements (includes timm for Vision Transformer)
```

```
!pip install -q -r requirements_colab.txt

print("Installation complete!")
```

```
Installation complete!
```

```
!rm -rf /content/Diabetic-Retinopathy/
!git clone https://github.com/Ojasvsakhi/Diabetic-Retinopathy.git /content/Diabetic-Retinopathy
%cd /content/Diabetic-Retinopathy


import os
DATA_DIR = '/content/drive/MyDrive/DR Dataset'
if not os.path.exists(DATA_DIR):
    print('Warning: expected DATA_DIR not found:', DATA_DIR)
else:
    print('Using DATA_DIR =', DATA_DIR)
```

```
Cloning into '/content/Diabetic-Retinopathy'...
remote: Enumerating objects: 133, done.
remote: Counting objects: 100% (133/133), done.
remote: Compressing objects: 100% (92/92), done.
remote: Total 133 (delta 75), reused 90 (delta 38), pack-reused 0 (from 0)
Receiving objects: 100% (133/133), 235.79 KiB | 11.79 MiB/s, done.
Resolving deltas: 100% (75/75), done.
/content/Diabetic-Retinopathy
Using DATA_DIR = /content/drive/MyDrive/DR Dataset
```

```
import sys, os
repo_src = os.path.join(os.getcwd(), 'src')
if os.path.exists(repo_src):
    sys.path.insert(0, repo_src)
else:
    sys.path.append('src')

from argparse import Namespace
from src.train import train

# ===== CONFIGURATION =====
# Choose your model: 'resnet50', 'vit_base_patch16_224', 'vit_small_patch16_224', 'vit_tiny_patch16_224'
MODEL_NAME = 'hybrid_cnn_lstm'  # Change this to switch models
```

```
# Training hyperparameters
EPOCHS = 20
BATCH_SIZE = 16  # Reduce to 8 if you run out of memory with ViT
IMG_SIZE = 224
LEARNING_RATE = 1e-4
NUM_WORKERS = 2

# ===== TRAINING =====
args = Namespace(
    data_dir=DATA_DIR,
    epochs=EPOCHS,
    batch_size=BATCH_SIZE,
    img_size=IMG_SIZE,
    lr=LEARNING_RATE,
    num_workers=NUM_WORKERS,
    model_name=MODEL_NAME
)

print(f"Starting training with model: {MODEL_NAME}")
print(f"Batch size: {BATCH_SIZE}, Epochs: {EPOCHS}, Learning rate: {LEARNING_RATE}")

# Training
train(args)
```

```
---------------------------------------------------------------------------
KeyboardInterrupt                         Traceback (most recent call last)
/tmp/ipython-input-1753571723.py in <cell line: 0>()
      7
      8 from argparse import Namespace
----> 9 from src.train import train
     10
     11 # ===== CONFIGURATION =====

 13 frames
/usr/lib/python3.12/collections/__init__.py in namedtuple(typename, field_names, rename, defaults, module)
    422
    423     # Variables used in the methods and docstrings
--> 424     field_names = tuple(map(_sys.intern, field_names))
    425     num_fields = len(field_names)
    426     arg_list = ', '.join(field_names)

KeyboardInterrupt:
```

```
!python -m src.train_vit_cnn --data-dir "/content/drive/MyDrive/DR Dataset" --pretrained-cnn --pretrained-vit --epochs 20 --bat
```

```
  with autocast():
Epoch 19/20 [train]: 100% 25/25 [00:43<00:00,  1.73s/it, loss=0.109]
Validation:   0% 0/7 [00:00<?, ?it/s]/content/Diabetic-Retinopathy/src/train_vit_cnn.py:100: FutureWarning: `torch.cuda.amp.a
  with autocast():
Validation: 100% 7/7 [00:10<00:00,  1.44s/it]
Epoch 19 validation -- acc: 0.7576 macro-F1: 0.7526 val_loss: 0.7290
Epoch 20/20 [train]:   0% 0/25 [00:00<?, ?it/s]/content/Diabetic-Retinopathy/src/train_vit_cnn.py:73: FutureWarning: `torch.c
  with autocast():
Epoch 20/20 [train]: 100% 25/25 [00:44<00:00,  1.78s/it, loss=0.0972]
Validation:   0% 0/7 [00:00<?, ?it/s]/content/Diabetic-Retinopathy/src/train_vit_cnn.py:100: FutureWarning: `torch.cuda.amp.a
  with autocast():
Validation: 100% 7/7 [00:09<00:00,  1.41s/it]
Epoch 20 validation -- acc: 0.7071 macro-F1: 0.6286 val_loss: 1.0677
```