🖼️ Image and Vision Datasets

- **ImageNet**: A large-scale dataset with over 14 million images categorized into more than 20,000 classes, widely used for image classification tasks.
- **Open Images V4**: Contains 9.2 million images with annotations for image classification, object detection, and visual relationship detection.
- **LAION-5B**: An open dataset comprising 5.85 billion image-text pairs, useful for training models like CLIP and Stable Diffusion.

CIFAR-10**: Consists of 60,000 32x32 color images in 10 classes, commonly used for benchmarking image classification algorithms. 🖼️ 1. ImageNet (via `torchvision`)**

Direct ImageNet access requires registration. But pretrained models and subsets (like Tiny ImageNet) are available.

```
python
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import torchvision.models as models
import torchvision.transforms as transforms
from PIL import Image
import torch

# Load a pretrained ImageNet model (e.g., ResNet50)
model = models.resnet50(pretrained=True)
model.eval()

# Transform image to ImageNet format
transform = transforms.Compose([
    transforms.Resize(256),
    transforms.CenterCrop(224),
    transforms.ToTensor(),
    transforms.Normalize(
        mean=[0.485, 0.456, 0.406],  # ImageNet means
        std=[0.229, 0.224, 0.225]    # ImageNet stds
    ),
])

# Load a sample image
img = Image.open('sample.jpg')  # Replace with your image path
img_t = transform(img).unsqueeze(0)

# Predict
with torch.no_grad():
    output = model(img_t)
    predicted = torch.argmax(output, 1)

print("Predicted class index:", predicted.item())
```

🖼️ 2. Open Images V4

Open Images is massive, and downloading the full set requires the `openimages` tool.

Instead, here's a **Python wrapper to download sample images** with labels:

```
bash
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pip install openimages
python
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from openimages.download import download

# Download 10 sample images of cats (change label as needed)
download(['Cat'], limit=10, annotations=True, image_size=600)
```

You can then use PyTorch or TensorFlow to load and process them.

🖼️ 3. LAION-5B

This dataset is **huge (≈240TB)** and usually accessed via **FAIR-compatible tools or HuggingFace Datasets**.

Example: Load a small sample from HuggingFace:

```
bash
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pip install datasets
python
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from datasets import load_dataset

# Load a small subset of LAION for text-image pair analysis
dataset = load_dataset("laion/laion400m", split="train[:1000]")
print(dataset[0])
```

You'll get image URLs and captions. You can use `requests` + `PIL` to fetch and display them:

```
python
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from PIL import Image
import requests
from io import BytesIO

sample = dataset[0]
img = Image.open(BytesIO(requests.get(sample['URL']).content))
img.show()
print("Caption:", sample['TEXT'])
```

🖼️ 4. CIFAR-10

This is included with most ML libraries:

```
python
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import torchvision
import torchvision.transforms as transforms

# Transform and load dataset
transform = transforms.Compose([transforms.ToTensor()])

trainset = torchvision.datasets.CIFAR10(root='./data', train=True,
                                        download=True, transform=transform)
trainloader = torch.utils.data.DataLoader(trainset, batch_size=4,
                                          shuffle=True)

# Get sample batch
dataiter = iter(trainloader)
images, labels = next(dataiter)

print("Batch shape:", images.shape)
```

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