```
import os
import torch
from diffusers import StableDiffusionPipeline

# -------------------------------
# Configuration
# -------------------------------
MODEL_ID = "runwayml/stable-diffusion-v1-5"
DEVICE = "cuda" if torch.cuda.is_available() else "cpu"
BASE_DIR = "chest_xray_dataset"
IMAGES_PER_CLASS = 10

classes = {
    "normal_lungs": "Chest X-ray of healthy lungs, normal anatomy",
    "pneumonia": "Chest X-ray showing bacterial pneumonia",
    "covid_opacities": "Chest X-ray with COVID-19 ground glass opacities",
    "lung_opacity": "Chest X-ray showing diffuse lung opacities",
    "pleural_effusion": "Chest X-ray showing pleural effusion",
    "pneumothorax": "Chest X-ray showing pneumothorax",
    "lung_nodules": "Chest X-ray showing lung nodules",
    "lung_fibrosis": "Chest X-ray showing pulmonary fibrosis",
    "cardiomegaly": "Chest X-ray showing enlarged heart",
    "medical_devices": "Chest X-ray with tubes and pacemaker",
    "imaging_artifacts": "Chest X-ray with motion blur and noise",
    "pa_view": "Chest X-ray PA view",
    "ap_view": "Chest X-ray AP view",
    "domain_shift": "Chest X-ray from different hospital scanner"
}

# -------------------------------
# Load Model
# -------------------------------
pipe = StableDiffusionPipeline.from_pretrained(
    MODEL_ID,
    torch_dtype=torch.float16 if DEVICE == "cuda" else torch.float32
)
pipe.to(DEVICE)

# -------------------------------
# Generate Dataset
# -------------------------------
os.makedirs(BASE_DIR, exist_ok=True)

for label, prompt in classes.items():
    class_dir = os.path.join(BASE_DIR, label)
    os.makedirs(class_dir, exist_ok=True)

    for i in range(IMAGES_PER_CLASS):
        print(f"Generating {label} image {i+1}")
        image = pipe(f"High resolution chest X-ray image. {prompt}").images[0]
        image.save(os.path.join(class_dir, f"{label}_{i+1}.png"))

print("✅ Dataset generation completed")
```

```
Flax classes are deprecated and will be removed in Diffusers v1.0.0. We recommend migrating to PyTorch classes or
Flax classes are deprecated and will be removed in Diffusers v1.0.0. We recommend migrating to PyTorch classes or
/usr/local/lib/python3.12/dist-packages/huggingface_hub/utils/_auth.py:94: UserWarning:
The secret `HF_TOKEN` does not exist in your Colab secrets.
To authenticate with the Hugging Face Hub, create a token in your settings tab (https://huggingface.co/settings/t
You will be able to reuse this secret in all of your notebooks.
Please note that authentication is recommended but still optional to access public models or datasets.
  warnings.warn(
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```

```
pip install torch torchvision pillow
```

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```

```
import os
import zipfile
import torch
import torch.nn as nn
from torchvision import models, transforms, datasets
from PIL import Image
import matplotlib.pyplot as plt

# --------------------------------
# STEP 1: UNZIP DATASET
# --------------------------------
ZIP_FILE = "chest_xray_dataset.zip"
EXTRACT_DIR = "chest_xray_dataset"

if not os.path.exists(EXTRACT_DIR):
    with zipfile.ZipFile(ZIP_FILE, 'r') as zip_ref:
        zip_ref.extractall(".")
    print("✅ Dataset extracted")
else:
    print("📁 Dataset already extracted")

# --------------------------------
# CONFIGURATION
# --------------------------------
DATASET_DIR = EXTRACT_DIR
NUM_CLASSES_TO_TEST = 10
IMG_SIZE = 224
DEVICE = "cuda" if torch.cuda.is_available() else "cpu"

# --------------------------------
# LOAD DATASET
# --------------------------------
dataset = datasets.ImageFolder(DATASET_DIR)
class_names = dataset.classes[:NUM_CLASSES_TO_TEST]
num_classes = len(dataset.classes)

# --------------------------------
# IMAGE TRANSFORMS
# --------------------------------
transform = transforms.Compose([
    transforms.Resize((IMG_SIZE, IMG_SIZE)),
    transforms.ToTensor(),
    transforms.Normalize(
        mean=[0.485, 0.456, 0.406],
        std=[0.229, 0.224, 0.225]
    )
])

# --------------------------------
# LOAD PRETRAINED DENSENET-121
# --------------------------------
```

```
model = models.densenet121(pretrained=True)
model.classifier = nn.Linear(model.classifier.in_features, num_classes)
model = model.to(DEVICE)
model.eval()

# -------------------------------
# TESTING + DISPLAY
# -------------------------------
correct = 0
total = 0

plt.figure(figsize=(12, 10))
plot_index = 1

print("\n🔍 Testing 10 classes (1 image per class)\n")

with torch.no_grad():
    for class_name in class_names:
        class_dir = os.path.join(DATASET_DIR, class_name)
        image_name = os.listdir(class_dir)[0]
        image_path = os.path.join(class_dir, image_name)

        image = Image.open(image_path).convert("RGB")
        input_tensor = transform(image).unsqueeze(0).to(DEVICE)

        output = model(input_tensor)
        _, predicted = torch.max(output, 1)
        predicted_class = dataset.classes[predicted.item()]

        is_correct = predicted_class == class_name
        if is_correct:
            correct += 1
        total += 1

        # ---- Console Output ----
        print(f"Class Tested : {class_name}")
        print(f"Predicted   : {predicted_class}")
        print(f"Correct     : {is_correct}\n")

        # ---- Display Image ----
        plt.subplot(4, 3, plot_index)
        plt.imshow(image, cmap="gray")
        plt.title(f"GT: {class_name}\nPred: {predicted_class}")
        plt.axis("off")
        plot_index += 1

# -------------------------------
# ACCURACY
# -------------------------------
accuracy = (correct / total) * 100
plt.tight_layout()
plt.savefig("denseNet_test_results.png", dpi=300, bbox_inches="tight")
plt.show()

print(f"✅ Overall Accuracy (10 classes, 1 image each): {accuracy:.2f}%")
```

```
📁 Dataset already extracted

🔍 Testing 10 classes (1 image per class)

Class Tested : ap_view
Predicted   : normal_lungs
Correct     : False

Class Tested : cardiomegaly
Predicted   : normal_lungs
Correct     : False

Class Tested : covid_opacities
Predicted   : lung_fibrosis
Correct     : False

Class Tested : domain_shift
Predicted   : cardiomegaly
Correct     : False

Class Tested : imaging_artifacts
Predicted   : cardiomegaly
Correct     : False

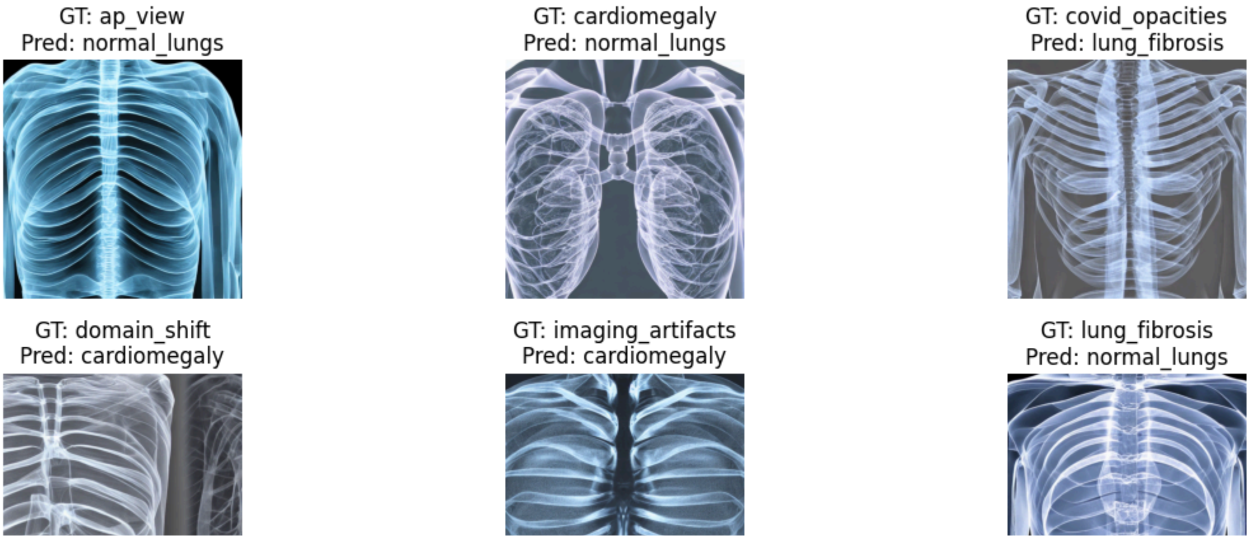
Class Tested : lung_fibrosis
Predicted   : normal_lungs
Correct     : False

Class Tested : lung_nodules
Predicted   : normal_lungs
Correct     : False

Class Tested : lung_opacity
Predicted   : pneumonia
Correct     : False

Class Tested : medical_devices
Predicted   : lung_fibrosis
Correct     : False

Class Tested : normal_lungs
Predicted   : cardiomegaly
Correct     : False
```



GT: ap_view
Pred: normal_lungs

GT: cardiomegaly
Pred: normal_lungs

GT: covid_opacities
Pred: lung_fibrosis

GT: domain_shift
Pred: cardiomegaly

GT: imaging_artifacts
Pred: cardiomegaly

GT: lung_fibrosis
Pred: normal_lungs