

dog_app

April 12, 2020

1 Convolutional Neural Networks

1.1 Project: Write an Algorithm for a Dog Identification App

In this notebook, some template code has already been provided for you, and you will need to implement additional functionality to successfully complete this project. You will not need to modify the included code beyond what is requested. Sections that begin with '**(IMPLEMENTATION)**' in the header indicate that the following block of code will require additional functionality which you must provide. Instructions will be provided for each section, and the specifics of the implementation are marked in the code block with a 'TODO' statement. Please be sure to read the instructions carefully!

Note: Once you have completed all of the code implementations, you need to finalize your work by exporting the Jupyter Notebook as an HTML document. Before exporting the notebook to html, all of the code cells need to have been run so that reviewers can see the final implementation and output. You can then export the notebook by using the menu above and navigating to **File -> Download as -> HTML (.html)**. Include the finished document along with this notebook as your submission.

In addition to implementing code, there will be questions that you must answer which relate to the project and your implementation. Each section where you will answer a question is preceded by a '**Question X**' header. Carefully read each question and provide thorough answers in the following text boxes that begin with '**Answer:**'. Your project submission will be evaluated based on your answers to each of the questions and the implementation you provide.

Note: Code and Markdown cells can be executed using the **Shift + Enter** keyboard shortcut. Markdown cells can be edited by double-clicking the cell to enter edit mode.

The rubric contains *optional* "Stand Out Suggestions" for enhancing the project beyond the minimum requirements. If you decide to pursue the "Stand Out Suggestions", you should include the code in this Jupyter notebook.

Step 0: Import Datasets

Make sure that you've downloaded the required human and dog datasets:

Note: if you are using the Udacity workspace, you DO NOT need to re-download these - they can be found in the /data folder as noted in the cell below.

- Download the [dog dataset](#). Unzip the folder and place it in this project's home directory, at the location /dog_images.
- Download the [human dataset](#). Unzip the folder and place it in the home directory, at location /lfw.

Note: If you are using a Windows machine, you are encouraged to use [7zip](#) to extract the folder.

In the code cell below, we save the file paths for both the human (LFW) dataset and dog dataset in the numpy arrays human_files and dog_files.

```
In [1]: import numpy as np
        from glob import glob
        import os
        import torch
        import torchvision
        from torchvision import datasets
        import torchvision.transforms as transforms
        import torch.nn as nn
        import torch.nn.functional as F
        import torch.optim as optim
        import torchvision.models as models

        # load filenames for human and dog images
        human_files = np.array(glob("/data/lfw/*/"))
        dog_files = np.array(glob("/data/dog_images/*/"))

        # print number of images in each dataset
        print('There are %d total human images.' % len(human_files))
        print('There are %d total dog images.' % len(dog_files))
```

There are 13233 total human images.

There are 8351 total dog images.

```
In [2]: !pip install pytorch-model-summary
```

Collecting pytorch-model-summary

```
Downloading https://files.pythonhosted.org/packages/a0/de/f3548f3081045cfc4020fc297cc9db74839a
Requirement already satisfied: numpy in /opt/conda/lib/python3.6/site-packages (from pytorch-mod
Requirement already satisfied: torch in /opt/conda/lib/python3.6/site-packages (from pytorch-mod
Requirement already satisfied: tqdm in /opt/conda/lib/python3.6/site-packages (from pytorch-mode
Installing collected packages: pytorch-model-summary
Successfully installed pytorch-model-summary-0.1.1
```

```
In [3]: import os
        import random
        import requests
        import time
```

```

import ast
import numpy as np
from glob import glob
import cv2
from tqdm import tqdm
from PIL import Image, ImageFile

import matplotlib.pyplot as plt
%matplotlib inline

ImageFile.LOAD_TRUNCATED_IMAGES = True

# check if CUDA is available
use_cuda = torch.cuda.is_available()

```

Step 1: Detect Humans

In this section, we use OpenCV's implementation of [Haar feature-based cascade classifiers](#) to detect human faces in images.

OpenCV provides many pre-trained face detectors, stored as XML files on [github](#). We have downloaded one of these detectors and stored it in the haarcascades directory. In the next code cell, we demonstrate how to use this detector to find human faces in a sample image.

```

In [4]: import cv2
import matplotlib.pyplot as plt
%matplotlib inline

# extract pre-trained face detector
face_cascade = cv2.CascadeClassifier('haarcascades/haarcascade_frontalface_alt.xml')

# load color (BGR) image
img = cv2.imread(human_files[0])
# convert BGR image to grayscale
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

# find faces in image
faces = face_cascade.detectMultiScale(gray)

# print number of faces detected in the image
print('Number of faces detected:', len(faces))

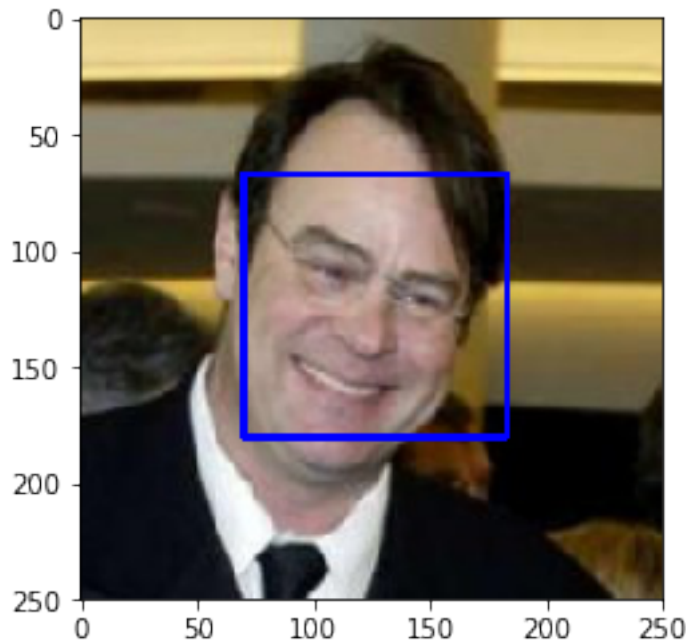
# get bounding box for each detected face
for (x,y,w,h) in faces:
    # add bounding box to color image
    cv2.rectangle(img, (x,y), (x+w,y+h), (255,0,0), 2)

# convert BGR image to RGB for plotting
cv_rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)

```

```
# display the image, along with bounding box
plt.imshow(cv_rgb)
plt.show()
```

Number of faces detected: 1



Before using any of the face detectors, it is standard procedure to convert the images to grayscale. The `detectMultiScale` function executes the classifier stored in `face_cascade` and takes the grayscale image as a parameter.

In the above code, `faces` is a numpy array of detected faces, where each row corresponds to a detected face. Each detected face is a 1D array with four entries that specifies the bounding box of the detected face. The first two entries in the array (extracted in the above code as `x` and `y`) specify the horizontal and vertical positions of the top left corner of the bounding box. The last two entries in the array (extracted here as `w` and `h`) specify the width and height of the box.

1.1.1 Write a Human Face Detector

We can use this procedure to write a function that returns `True` if a human face is detected in an image and `False` otherwise. This function, aptly named `face_detector`, takes a string-valued file path to an image as input and appears in the code block below.

```
In [5]: # returns "True" if face is detected in image stored at img_path
def face_detector(img_path):
    img = cv2.imread(img_path)
    gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
```

```

faces = face_cascade.detectMultiScale(gray)
return len(faces) > 0

```

1.1.2 (IMPLEMENTATION) Assess the Human Face Detector

Question 1: Use the code cell below to test the performance of the `face_detector` function.

- What percentage of the first 100 images in `human_files` have a detected human face?
- What percentage of the first 100 images in `dog_files` have a detected human face?

Ideally, we would like 100% of human images with a detected face and 0% of dog images with a detected face. You will see that our algorithm falls short of this goal, but still gives acceptable performance. We extract the file paths for the first 100 images from each of the datasets and store them in the numpy arrays `human_files_short` and `dog_files_short`.

Answer:

Detected human faces (LBP): 98 Detected human faces (LBP): 98%

Detected faces in dogs(LBP): 17 Detected faces in dogs(LBP): 17%

```
In [6]: # from tqdm import tqdm
```

```

human_files_short = human_files[:100]
dog_files_short = dog_files[:100]

```

```
# #-#-# Do NOT modify the code above this line. #-#-#
```

```
# ## TODO: Test the performance of the face_detector algorithm
# ## on the images in human_files_short and dog_files_short.
```

```

detected_faces_in_humans = 0
detected_faces_in_dogs = 0

```

```

for ii in range(100):
    if face_detector(human_files_short[ii]):
        detected_faces_in_humans += 1
    if face_detector(dog_files_short[ii]):
        detected_faces_in_dogs +=1

```

```

print (f"Detected human faces (LBP): {detected_faces_in_humans}\t",f"Detected human face
print (f"Detected faces in dogs(LBP): {detected_faces_in_dogs}\t",f"Detected faces in do

```

```

Detected human faces (LBP): 98
Detected faces in dogs(LBP): 17

```

```

Detected human faces (LBP): 98%
Detected faces in dogs(LBP): 17%

```

We suggest the face detector from OpenCV as a potential way to detect human images in your algorithm, but you are free to explore other approaches, especially approaches that make use of deep learning :). Please use the code cell below to design and test your own face detection algorithm. If you decide to pursue this *optional* task, report performance on `human_files_short` and `dog_files_short`.

```
In [7]: ### (Optional)
        ### TODO: Test performance of another face detection algorithm.
        ### Feel free to use as many code cells as needed.
```

Step 2: Detect Dogs

In this section, we use a [pre-trained model](#) to detect dogs in images.

1.1.3 Obtain Pre-trained VGG-16 Model

The code cell below downloads the VGG-16 model, along with weights that have been trained on [ImageNet](#), a very large, very popular dataset used for image classification and other vision tasks. ImageNet contains over 10 million URLs, each linking to an image containing an object from one of 1000 categories.

```
In [7]: import torch
        import torchvision.models as models

        # define VGG16 model
        VGG16 = models.vgg16(pretrained=True)

        # check if CUDA is available
        use_cuda = torch.cuda.is_available()

        # move model to GPU if CUDA is available
        if use_cuda:
            VGG16 = VGG16.cuda()
```

Downloading: "https://download.pytorch.org/models/vgg16-397923af.pth" to /root/.torch/models/vgg16-397923af.pth [100%|| 553433881/553433881 [00:27<00:00, 20328763.63it/s]

```
In [8]: def image_to_tensor(img_path):
        img = Image.open(img_path).convert('RGB')
        transformations = transforms.Compose([transforms.Resize(size=224),
                                              transforms.CenterCrop((224,224)),
                                              transforms.ToTensor(),
                                              transforms.Normalize(mean=[0.485, 0.456, 0.406],
                                                                    std=[0.229, 0.224, 0.225])])

        image_tensor = transformations(img)[:3,:,:].unsqueeze(0)
        return image_tensor

        # helper function for un-normalizing an image - from STYLE TRANSFER exercise
        # and converting it from a Tensor image to a NumPy image for display
        def im_convert(tensor):
            """ Display a tensor as an image. """
```

```

image = tensor.to("cpu").clone().detach()
image = image.numpy().squeeze()
image = image.transpose(1,2,0)
image = image * np.array((0.229, 0.224, 0.225)) + np.array((0.485, 0.456, 0.406))
image = image.clip(0, 1)

return image

```

Given an image, this pre-trained VGG-16 model returns a prediction (derived from the 1000 possible categories in ImageNet) for the object that is contained in the image.

1.1.4 (IMPLEMENTATION) Making Predictions with a Pre-trained Model

In the next code cell, you will write a function that accepts a path to an image (such as 'dogImages/train/001.Affenpinscher/Affenpinscher_00001.jpg') as input and returns the index corresponding to the ImageNet class that is predicted by the pre-trained VGG-16 model. The output should always be an integer between 0 and 999, inclusive.

Before writing the function, make sure that you take the time to learn how to appropriately pre-process tensors for pre-trained models in the [PyTorch documentation](#).

```

In [9]: from PIL import Image
import torchvision.transforms as transforms

def VGG16_predict(img_path):

    image_tensor = image_to_tensor(img_path)

    # move model inputs to cuda, if GPU available
    if use_cuda:
        image_tensor = image_tensor.cuda()

    # get sample outputs
    output = VGG16(image_tensor)
    # convert output probabilities to predicted class
    _, preds_tensor = torch.max(output, 1)
    pred = np.squeeze(preds_tensor.numpy()) if not use_cuda else np.squeeze(preds_tensor)
    return int(pred)

def get_human_readable_label_for_class_id(class_id):
    labels = ast.literal_eval(requests.get(LABELS_MAP_URL).text)
    # print(f"Label:{labels[class_id]}")
    return labels[class_id]

LABELS_MAP_URL = "https://gist.githubusercontent.com/yrevar/942d3a0ac09ec9e5eb3a/raw/c2c
data=sorted(glob("/data/dog_images/test/*/*"))
for i in data[100:]:

```

```

test_prediction = VGG16_predict(i)
pred_class = int(test_prediction)
print(f"\n\n NAME: {i[:-10]}", f"Predicted class id: {pred_class}")
class_description = get_human_readable_label_for_class_id(pred_class)
break
# print(f"Predicted class for image is *** {class_description.upper()} ***\n\n")
# test_prediction = VGG16_predict('/data/dog_images/train/001.Affenpinscher/Affenpinscher')
# pred_class = int(test_prediction)
# print(f"\n\n NAME: {i[:-10]}", f"Predicted class id: {pred_class}")
# class_description = get_human_readable_label_for_class_id(pred_class)

```

NAME: /data/dog_images/test/014.Basenji/Basenji Predicted class id: 253

```

In [53]: test_prediction = VGG16_predict('/data/dog_images/train/001.Affenpinscher/Affenpinscher')
pred_class = int(test_prediction)
print(f"Predicted class id: {pred_class}")
class_description = get_human_readable_label_for_class_id(pred_class)
print(class_description)

```

Predicted class id: 252

affenpinscher, monkey pinscher, monkey dog

1.1.5 (IMPLEMENTATION) Write a Dog Detector

While looking at the [dictionary](#), you will notice that the categories corresponding to dogs appear in an uninterrupted sequence and correspond to dictionary keys 151-268, inclusive, to include all categories from 'Chihuahua' to 'Mexican hairless'. Thus, in order to check to see if an image is predicted to contain a dog by the pre-trained VGG-16 model, we need only check if the pre-trained model predicts an index between 151 and 268 (inclusive).

Use these ideas to complete the dog_detector function below, which returns True if a dog is detected in an image (and False if not).

```

In [10]: ### returns "True" if a dog is detected in the image stored at img_path
def dog_detector(img_path):
    ## TODO: Complete the function.

    prediction = VGG16_predict(img_path)
    return ((prediction >= 151) & (prediction <= 268))

```

1.1.6 (IMPLEMENTATION) Assess the Dog Detector

Question 2: Use the code cell below to test the performance of your dog_detector function.

- What percentage of the images in human_files_short have a detected dog?
- What percentage of the images in dog_files_short have a detected dog?

Answer:

Percentage of the images in human_files_short that have a detected dog: 0% Percentage of the images in dog_files_short that have a detected dog: 100%

```
In [55]: ### TODO: Test the performance of the dog_detector function
         ### on the images in human_files_short and dog_files_short.
```

```
detected_dogs_in_humans = 0
detected_dogs_in_dogs = 0
```

```
for ii in range(100):
    if dog_detector(human_files_short[ii]):
        detected_dogs_in_humans += 1
        print(f"This human ({ii}) looks like a dog")
#     human_dog_image = Image.open(human_files_short[ii])
#     plt.imshow(human_dog_image)
#     plt.show()
    if dog_detector(dog_files_short[ii]):
        detected_dogs_in_dogs += 1
```

```
print (f"Percentage of the images in human_files_short that have a detected dog: {detected_dogs_in_humans}%")
print (f"Percentage of the images in dog_files_short that have a detected dog: {detected_dogs_in_dogs}%")
```

Percentage of the images in human_files_short that have a detected dog: 0%
 Percentage of the images in dog_files_short that have a detected dog: 100%

We suggest VGG-16 as a potential network to detect dog images in your algorithm, but you are free to explore other pre-trained networks (such as [Inception-v3](#), [ResNet-50](#), etc). Please use the code cell below to test other pre-trained PyTorch models. If you decide to pursue this *optional* task, report performance on human_files_short and dog_files_short.

```
In [14]: ### (Optional)
         ### TODO: Report the performance of another pre-trained network.
         ### Feel free to use as many code cells as needed.
```

Step 3: Create a CNN to Classify Dog Breeds (from Scratch)

Now that we have functions for detecting humans and dogs in images, we need a way to predict breed from images. In this step, you will create a CNN that classifies dog breeds. You must create your CNN *from scratch* (so, you can't use transfer learning *yet!*), and you must attain a test accuracy of at least 10%. In Step 4 of this notebook, you will have the opportunity to use transfer learning to create a CNN that attains greatly improved accuracy.

We mention that the task of assigning breed to dogs from images is considered exceptionally challenging. To see why, consider that *even a human* would have trouble distinguishing between a Brittany and a Welsh Springer Spaniel.

Brittany	Welsh Springer Spaniel
----------	------------------------

It is not difficult to find other dog breed pairs with minimal inter-class variation (for instance, Curly-Coated Retrievers and American Water Spaniels).

Curly-Coated Retriever	American Water Spaniel
------------------------	------------------------

Likewise, recall that labradors come in yellow, chocolate, and black. Your vision-based algorithm will have to conquer this high intra-class variation to determine how to classify all of these different shades as the same breed.

Yellow Labrador	Chocolate Labrador
-----------------	--------------------

We also mention that random chance presents an exceptionally low bar: setting aside the fact that the classes are slightly imbalanced, a random guess will provide a correct answer roughly 1 in 133 times, which corresponds to an accuracy of less than 1%.

Remember that the practice is far ahead of the theory in deep learning. Experiment with many different architectures, and trust your intuition. And, of course, have fun!

1.1.7 (IMPLEMENTATION) Specify Data Loaders for the Dog Dataset

Use the code cell below to write three separate [data loaders](#) for the training, validation, and test datasets of dog images (located at `dog_images/train`, `dog_images/valid`, and `dog_images/test`, respectively). You may find [this documentation on custom datasets](#) to be a useful resource. If you are interested in augmenting your training and/or validation data, check out the wide variety of [transforms](#)!

```
In [27]: import os
import torch
import torchvision
from torchvision import datasets
import torchvision.transforms as transforms
import torch.nn as nn
import torch.nn.functional as F
import torch.optim as optim
import torchvision.models as models

import matplotlib.pyplot as plt
%matplotlib inline

ImageFile.LOAD_TRUNCATED_IMAGES = True

# check if CUDA is available
```

```

use_cuda = torch.cuda.is_available()

### TODO: Write data loaders for training, validation, and test sets
## Specify appropriate transforms, and batch_sizes

batch_size = 8

num_workers = 1

transform = transforms.Compose([transforms.Resize(size=420),
                                transforms.CenterCrop((320,320)),
                                transforms.RandomHorizontalFlip(), # randomly flip and
                                transforms.RandomRotation(20),
                                transforms.ToTensor(),
                                transforms.Normalize(mean=[0.485, 0.456, 0.406], std=[0.225, 0.225, 0.225])])

transform2 = transforms.Compose([transforms.Resize(size=320),
                                transforms.CenterCrop((320,320)),
                                transforms.RandomRotation(10),
                                transforms.ToTensor(),
                                transforms.Normalize(mean=[0.485, 0.456, 0.406], std=[0.225, 0.225, 0.225])])

transform3 = transforms.Compose([transforms.Resize(size=320),
                                transforms.RandomHorizontalFlip(), # randomly flip and
                                transforms.Normalize(mean=[0.485, 0.456, 0.406], std=[0.225, 0.225, 0.225])])

data_dir = '/data/dog_images/'
train_dir = os.path.join(data_dir, 'train/')
valid_dir = os.path.join(data_dir, 'valid/')
test_dir = os.path.join(data_dir, 'test/')

train_data = datasets.ImageFolder(train_dir, transform=transform)
valid_data = datasets.ImageFolder(valid_dir, transform=transform2)
test_data = datasets.ImageFolder(test_dir, transform=transform3)

train_loader = torch.utils.data.DataLoader(train_data,
                                             batch_size=batch_size,
                                             num_workers=num_workers,
                                             shuffle=True)

valid_loader = torch.utils.data.DataLoader(valid_data,
                                             batch_size=batch_size,
                                             num_workers=num_workers,
                                             shuffle=False)

test_loader = torch.utils.data.DataLoader(test_data,
                                             batch_size=batch_size,
                                             num_workers=num_workers,
                                             shuffle=False)

loaders_scratch = {

```

```

        'train': train_loader,
        'valid': valid_loader,
        'test': test_loader
    }

```

Question 3: Describe your chosen procedure for preprocessing the data. - How does your code resize the images (by cropping, stretching, etc)? What size did you pick for the input tensor, and why? - Did you decide to augment the dataset? If so, how (through translations, flips, rotations, etc)? If not, why not?

Answer:

Data loaded into the training, test and validation data

Resized all image to 320 x 320 and center cropped

(320, 320, 3) images in this testing so the inputs are larger than usual dataset.

Each color channel was normalized separately, the means are [0.485, 0.456, 0.406] and the standard deviations are [0.229, 0.224, 0.225].

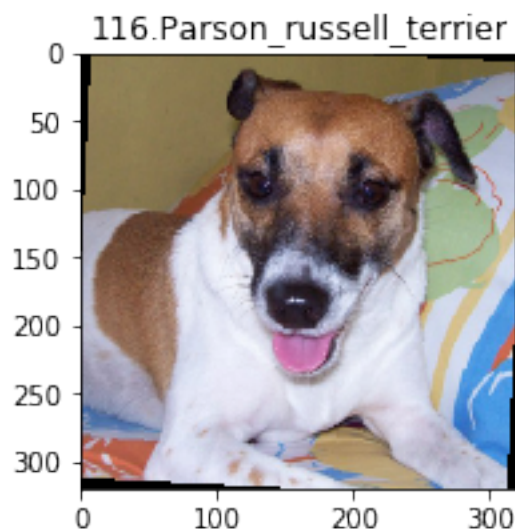
```

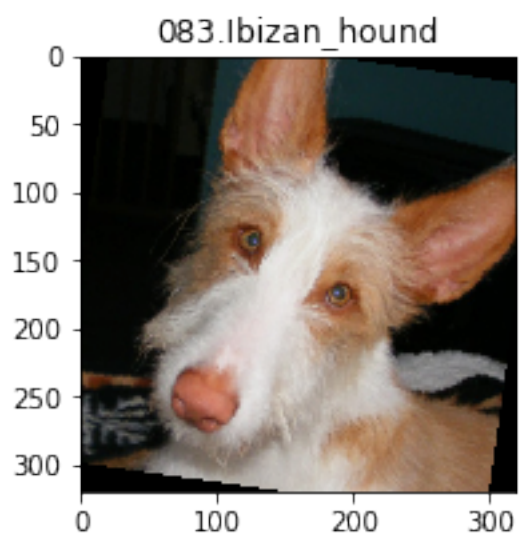
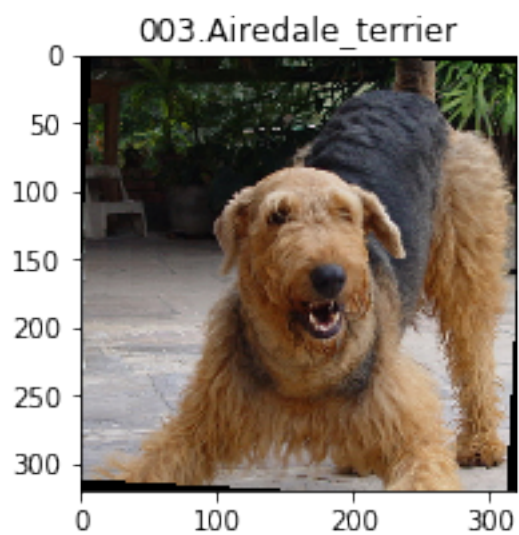
In [28]: class_names = image_datasets['train'].classes
         nb_classes = len(class_names)
         inputs, classes = next(iter(loaders_scratch['train']))

         for image, label in zip(inputs, classes):
             image = image.to("cpu").clone().detach()
             image = image.numpy().squeeze()
             image = image.transpose(1,2,0)
             image = image * np.array((0.229, 0.224, 0.225)) + np.array((0.485, 0.456, 0.406))
             image = image.clip(0, 1)

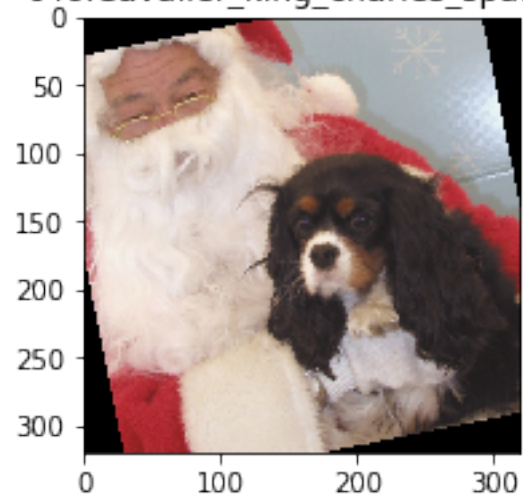
         fig = plt.figure(figsize=(12,3))
         plt.imshow(image)
         plt.title(class_names[label])

```

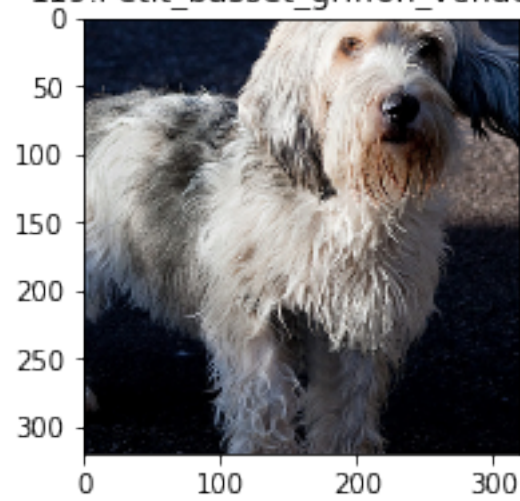




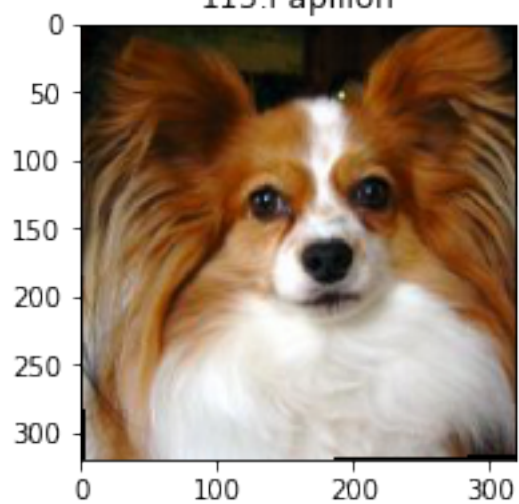
046.Cavalier_king_charles_spaniel



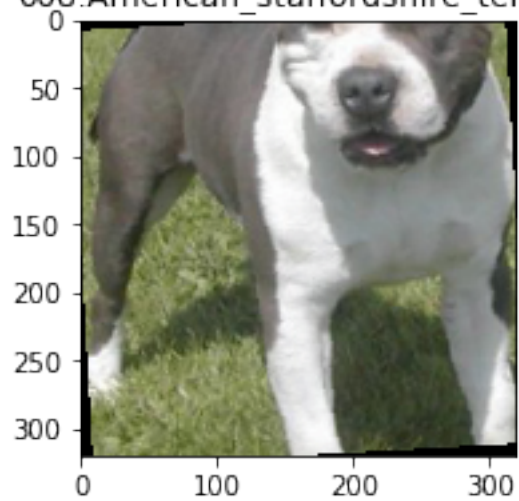
119.Petit_basset_griffon_vendéen

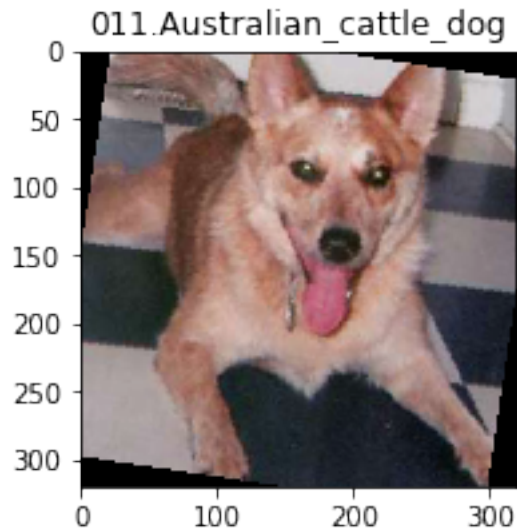


115.Papillon



008.American_staffordshire_terrier





1.1.8 (IMPLEMENTATION) Model Architecture

Create a CNN to classify dog breed. Use the template in the code cell below.

```
In [14]: import torch.nn as nn
import torch.nn.functional as F
# from pytorch_model_summary import summary

# define the CNN architecture
class Net(nn.Module):
    ### TODO: choose an architecture, and complete the class
    def __init__(self):
        super(Net, self).__init__()
        ## Define layers of a CNN
        self.conv1 = nn.Conv2d(3, 16, 3, padding=1)
        self.conv2 = nn.Conv2d(16, 32, 3, padding=1)
        self.conv3 = nn.Conv2d(32, 64, 3, padding=1)
        self.pool = nn.MaxPool2d(2, 2)
        self.fc1 = nn.Linear(64*40*40, 500)
        self.fc2 = nn.Linear(500, 133)
        self.dropout = nn.Dropout(0.33)
        self.batch_norm = nn.BatchNorm1d(num_features=500)

    def forward(self, x):
        x = self.pool(F.relu(self.conv1(x)))
        x = self.dropout(x)

        x = self.pool(F.relu(self.conv2(x)))
```



```

        x = self.dropout(x)

        x = self.pool(F.relu(self.conv3(x)))
        x = self.dropout(x)

        x = x.view(x.size(0), -1)

        x = F.relu(self.batch_norm(self.fc1(x)))
        x = self.dropout(x)
        x = self.fc2(x)

        return x

### You so NOT have to modify the code below this line. ###

# instantiate the CNN
model_scratch = Net()
print(model_scratch)

# print(summary(Net(), torch.zeros((320, 320, 3)), show_input=True))

# move tensors to GPU if CUDA is available
if use_cuda:
    model_scratch.cuda()

Net(
  (conv1): Conv2d(3, 16, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv2): Conv2d(16, 32, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv3): Conv2d(32, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (pool): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1, ceil_mode=False)
  (fc1): Linear(in_features=102400, out_features=500, bias=True)
  (fc2): Linear(in_features=500, out_features=133, bias=True)
  (dropout): Dropout(p=0.33)
  (batch_norm): BatchNorm1d(500, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
)

```

Question 4: Outline the steps you took to get to your final CNN architecture and your reasoning at each step.

Answer:

First layer has input shape of (320, 320, 3) and last layer should output 133 classes.

Convolutional layers (stack of filtered images) and Maxpooling layers(reduce the x-y size of an input, keeping only the most active pixels from the previous layer) as well as the usual Linear + Dropout layers to avoid overfitting and produce a 133-dim output.

MaxPooling2D seems to be a common choice to downsample in these type of classification problems and that is why I chose it.

To filter to jump 1 pixel at a time.

nn.Conv2d(in_channels, out_channels, kernel_size, stride=1, padding=0)

Then, to construct this convolutional layer, I would use the following line of code: `self.conv2 = nn.Conv2d(3, 32, 3, padding=1)`

Pool layer that takes in a `kernel_size` and a `stride` after every convolution layer. This will down-sample the input's x-y dimensions, by a factor of 2:

```
self.pool = nn.MaxPool2d(2,2)
```

I am adding a fully connected Linear Layer to produce a 133-dim output. As well as a Dropout layer to avoid overfitting.

Forward pass would give:

```
torch.Size([16, 3, 320, 320]) torch.Size([16, 16, 160, 160]) torch.Size([16, 32, 80, 80]) torch.Size([16, 64, 40, 40]) torch.Size([16, 50176]) torch.Size([16, 500]) torch.Size([16, 133])
```

1.1.9 (IMPLEMENTATION) Specify Loss Function and Optimizer

Use the next code cell to specify a [loss function](#) and [optimizer](#). Save the chosen loss function as `criterion_scratch`, and the optimizer as `optimizer_scratch` below.

```
In [15]: import torch.optim as optim

        ### TODO: select loss function
        criterion_scratch = nn.CrossEntropyLoss()

        ### TODO: select optimizer
        optimizer_scratch = optim.SGD(model_scratch.parameters(), lr = 0.05)
```

1.1.10 (IMPLEMENTATION) Train and Validate the Model

Train and validate your model in the code cell below. [Save the final model parameters](#) at filepath `'model_scratch.pt'`.

```
In [23]: def train(n_epochs, loaders, model, optimizer, criterion, use_cuda, save_path):
        """returns trained model"""
        # initialize tracker for minimum validation loss
        valid_loss_min = np.Inf

        for epoch in range(1, n_epochs+1):
            # initialize variables to monitor training and validation loss
            train_loss = 0.0
            valid_loss = 0.0

            #####
            # train the model #
            #####
            model.train()

            for batch_idx, (data, target) in enumerate(loaders['train']):
                # move to GPU
```

```

#         print(batch_idx)
if use_cuda:
    data, target = data.cuda(), target.cuda()

# initialize weights to zero
optimizer.zero_grad()

output = model(data)

# calculate loss
loss = criterion(output, target)

# back prop
loss.backward()

# grad
optimizer.step()

train_loss = train_loss + ((1 / (batch_idx + 1)) * (loss.data - train_loss))

## find the loss and update the model parameters accordingly
## record the average training loss, using something like
# train_loss = train_loss + ((1 / (batch_idx + 1)) * (loss.data - train_loss))

#####
# validate the model #
#####
model.eval()
for batch_idx, (data, target) in enumerate(loaders['valid']):
    # move to GPU
    if use_cuda:
        data, target = data.cuda(), target.cuda()
    ## update the average validation loss

    output = model(data)
    loss = criterion(output, target)
    valid_loss = valid_loss + ((1 / (batch_idx + 1)) * (loss.data - valid_loss))

    print('Batch_id: {} \tTraining Loss: {:.6f} \tValidation Loss: {:.6f}'.format(
        batch_idx, train_loss, valid_loss ))

# print training/validation statistics
print('\n Epoch: {} \tTraining Loss: {:.6f} \tValidation Loss: {:.6f}\n'.format(
    epoch,
    train_loss,

```

```

        valid_loss
    ))

    ## TODO: save the model if validation loss has decreased

    # return trained model
    return model

# train the model
model_scratch = train(20, loaders_scratch, model_scratch, optimizer_scratch,
                      criterion_scratch, use_cuda, 'model_scratch.pt')

```

Batch_id: 0	Training Loss: 4.680951	Validation Loss: 5.161191
Batch_id: 1	Training Loss: 4.680951	Validation Loss: 4.929408
Batch_id: 2	Training Loss: 4.680951	Validation Loss: 4.715879
Batch_id: 3	Training Loss: 4.680951	Validation Loss: 4.612629
Batch_id: 4	Training Loss: 4.680951	Validation Loss: 4.662212
Batch_id: 5	Training Loss: 4.680951	Validation Loss: 4.585559
Batch_id: 6	Training Loss: 4.680951	Validation Loss: 4.522384
Batch_id: 7	Training Loss: 4.680951	Validation Loss: 4.571192
Batch_id: 8	Training Loss: 4.680951	Validation Loss: 4.545742
Batch_id: 9	Training Loss: 4.680951	Validation Loss: 4.588528
Batch_id: 10	Training Loss: 4.680951	Validation Loss: 4.636975
Batch_id: 11	Training Loss: 4.680951	Validation Loss: 4.654819
Batch_id: 12	Training Loss: 4.680951	Validation Loss: 4.636422
Batch_id: 13	Training Loss: 4.680951	Validation Loss: 4.654023
Batch_id: 14	Training Loss: 4.680951	Validation Loss: 4.629862
Batch_id: 15	Training Loss: 4.680951	Validation Loss: 4.635892
Batch_id: 16	Training Loss: 4.680951	Validation Loss: 4.637594
Batch_id: 17	Training Loss: 4.680951	Validation Loss: 4.644904
Batch_id: 18	Training Loss: 4.680951	Validation Loss: 4.639925
Batch_id: 19	Training Loss: 4.680951	Validation Loss: 4.638913
Batch_id: 20	Training Loss: 4.680951	Validation Loss: 4.627434
Batch_id: 21	Training Loss: 4.680951	Validation Loss: 4.644301
Batch_id: 22	Training Loss: 4.680951	Validation Loss: 4.626540
Batch_id: 23	Training Loss: 4.680951	Validation Loss: 4.649744
Batch_id: 24	Training Loss: 4.680951	Validation Loss: 4.646548
Batch_id: 25	Training Loss: 4.680951	Validation Loss: 4.630435
Batch_id: 26	Training Loss: 4.680951	Validation Loss: 4.629078
Batch_id: 27	Training Loss: 4.680951	Validation Loss: 4.631172
Batch_id: 28	Training Loss: 4.680951	Validation Loss: 4.629868
Batch_id: 29	Training Loss: 4.680951	Validation Loss: 4.629021
Batch_id: 30	Training Loss: 4.680951	Validation Loss: 4.629328
Batch_id: 31	Training Loss: 4.680951	Validation Loss: 4.632673
Batch_id: 32	Training Loss: 4.680951	Validation Loss: 4.638931
Batch_id: 33	Training Loss: 4.680951	Validation Loss: 4.643406
Batch_id: 34	Training Loss: 4.680951	Validation Loss: 4.652924

Batch_id: 35	Training Loss: 4.680951	Validation Loss: 4.655213
Batch_id: 36	Training Loss: 4.680951	Validation Loss: 4.668110
Batch_id: 37	Training Loss: 4.680951	Validation Loss: 4.662428
Batch_id: 38	Training Loss: 4.680951	Validation Loss: 4.657326
Batch_id: 39	Training Loss: 4.680951	Validation Loss: 4.656281
Batch_id: 40	Training Loss: 4.680951	Validation Loss: 4.653348
Batch_id: 41	Training Loss: 4.680951	Validation Loss: 4.655692
Batch_id: 42	Training Loss: 4.680951	Validation Loss: 4.652507
Batch_id: 43	Training Loss: 4.680951	Validation Loss: 4.646934
Batch_id: 44	Training Loss: 4.680951	Validation Loss: 4.648279
Batch_id: 45	Training Loss: 4.680951	Validation Loss: 4.647685
Batch_id: 46	Training Loss: 4.680951	Validation Loss: 4.652258
Batch_id: 47	Training Loss: 4.680951	Validation Loss: 4.645349
Batch_id: 48	Training Loss: 4.680951	Validation Loss: 4.652037
Batch_id: 49	Training Loss: 4.680951	Validation Loss: 4.651268
Batch_id: 50	Training Loss: 4.680951	Validation Loss: 4.658869
Batch_id: 51	Training Loss: 4.680951	Validation Loss: 4.665141
Batch_id: 52	Training Loss: 4.680951	Validation Loss: 4.666535
Batch_id: 53	Training Loss: 4.680951	Validation Loss: 4.676461
Batch_id: 54	Training Loss: 4.680951	Validation Loss: 4.671870
Batch_id: 55	Training Loss: 4.680951	Validation Loss: 4.673610
Batch_id: 56	Training Loss: 4.680951	Validation Loss: 4.679042
Batch_id: 57	Training Loss: 4.680951	Validation Loss: 4.682248
Batch_id: 58	Training Loss: 4.680951	Validation Loss: 4.678649
Batch_id: 59	Training Loss: 4.680951	Validation Loss: 4.681543
Batch_id: 60	Training Loss: 4.680951	Validation Loss: 4.681692
Batch_id: 61	Training Loss: 4.680951	Validation Loss: 4.671434
Batch_id: 62	Training Loss: 4.680951	Validation Loss: 4.673685
Batch_id: 63	Training Loss: 4.680951	Validation Loss: 4.671007
Batch_id: 64	Training Loss: 4.680951	Validation Loss: 4.668185
Batch_id: 65	Training Loss: 4.680951	Validation Loss: 4.669726
Batch_id: 66	Training Loss: 4.680951	Validation Loss: 4.666387
Batch_id: 67	Training Loss: 4.680951	Validation Loss: 4.666205
Batch_id: 68	Training Loss: 4.680951	Validation Loss: 4.663677
Batch_id: 69	Training Loss: 4.680951	Validation Loss: 4.654888
Batch_id: 70	Training Loss: 4.680951	Validation Loss: 4.657689
Batch_id: 71	Training Loss: 4.680951	Validation Loss: 4.652065
Batch_id: 72	Training Loss: 4.680951	Validation Loss: 4.648762
Batch_id: 73	Training Loss: 4.680951	Validation Loss: 4.651489
Batch_id: 74	Training Loss: 4.680951	Validation Loss: 4.650220
Batch_id: 75	Training Loss: 4.680951	Validation Loss: 4.653626
Batch_id: 76	Training Loss: 4.680951	Validation Loss: 4.657176
Batch_id: 77	Training Loss: 4.680951	Validation Loss: 4.658342
Batch_id: 78	Training Loss: 4.680951	Validation Loss: 4.660710
Batch_id: 79	Training Loss: 4.680951	Validation Loss: 4.655934
Batch_id: 80	Training Loss: 4.680951	Validation Loss: 4.660422
Batch_id: 81	Training Loss: 4.680951	Validation Loss: 4.661537
Batch_id: 82	Training Loss: 4.680951	Validation Loss: 4.653109

Batch_id: 83	Training Loss: 4.680951	Validation Loss: 4.654483
Batch_id: 84	Training Loss: 4.680951	Validation Loss: 4.657984
Batch_id: 85	Training Loss: 4.680951	Validation Loss: 4.662751
Batch_id: 86	Training Loss: 4.680951	Validation Loss: 4.664867
Batch_id: 87	Training Loss: 4.680951	Validation Loss: 4.666874
Batch_id: 88	Training Loss: 4.680951	Validation Loss: 4.678568
Batch_id: 89	Training Loss: 4.680951	Validation Loss: 4.680971
Batch_id: 90	Training Loss: 4.680951	Validation Loss: 4.684111
Batch_id: 91	Training Loss: 4.680951	Validation Loss: 4.689065
Batch_id: 92	Training Loss: 4.680951	Validation Loss: 4.687928
Batch_id: 93	Training Loss: 4.680951	Validation Loss: 4.681825
Batch_id: 94	Training Loss: 4.680951	Validation Loss: 4.684454
Batch_id: 95	Training Loss: 4.680951	Validation Loss: 4.680903
Batch_id: 96	Training Loss: 4.680951	Validation Loss: 4.680807
Batch_id: 97	Training Loss: 4.680951	Validation Loss: 4.680335
Batch_id: 98	Training Loss: 4.680951	Validation Loss: 4.683579
Batch_id: 99	Training Loss: 4.680951	Validation Loss: 4.689420
Batch_id: 100	Training Loss: 4.680951	Validation Loss: 4.683884
Batch_id: 101	Training Loss: 4.680951	Validation Loss: 4.685870
Batch_id: 102	Training Loss: 4.680951	Validation Loss: 4.687132
Batch_id: 103	Training Loss: 4.680951	Validation Loss: 4.687150
Batch_id: 104	Training Loss: 4.680951	Validation Loss: 4.683083

Epoch: 1	Training Loss: 4.680951	Validation Loss: 4.683083
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 4.392548	Validation Loss: 4.555003
Batch_id: 1	Training Loss: 4.392548	Validation Loss: 4.514245
Batch_id: 2	Training Loss: 4.392548	Validation Loss: 4.447278
Batch_id: 3	Training Loss: 4.392548	Validation Loss: 4.479567
Batch_id: 4	Training Loss: 4.392548	Validation Loss: 4.372390
Batch_id: 5	Training Loss: 4.392548	Validation Loss: 4.378815
Batch_id: 6	Training Loss: 4.392548	Validation Loss: 4.299386
Batch_id: 7	Training Loss: 4.392548	Validation Loss: 4.333761
Batch_id: 8	Training Loss: 4.392548	Validation Loss: 4.357083
Batch_id: 9	Training Loss: 4.392548	Validation Loss: 4.368766
Batch_id: 10	Training Loss: 4.392548	Validation Loss: 4.398238
Batch_id: 11	Training Loss: 4.392548	Validation Loss: 4.372696
Batch_id: 12	Training Loss: 4.392548	Validation Loss: 4.417424
Batch_id: 13	Training Loss: 4.392548	Validation Loss: 4.418332
Batch_id: 14	Training Loss: 4.392548	Validation Loss: 4.387540
Batch_id: 15	Training Loss: 4.392548	Validation Loss: 4.387510
Batch_id: 16	Training Loss: 4.392548	Validation Loss: 4.384509
Batch_id: 17	Training Loss: 4.392548	Validation Loss: 4.390769
Batch_id: 18	Training Loss: 4.392548	Validation Loss: 4.379967
Batch_id: 19	Training Loss: 4.392548	Validation Loss: 4.369565
Batch_id: 20	Training Loss: 4.392548	Validation Loss: 4.377067
Batch_id: 21	Training Loss: 4.392548	Validation Loss: 4.367585
Batch_id: 22	Training Loss: 4.392548	Validation Loss: 4.376149

Batch_id: 23	Training Loss: 4.392548	Validation Loss: 4.356503
Batch_id: 24	Training Loss: 4.392548	Validation Loss: 4.362492
Batch_id: 25	Training Loss: 4.392548	Validation Loss: 4.377316
Batch_id: 26	Training Loss: 4.392548	Validation Loss: 4.375546
Batch_id: 27	Training Loss: 4.392548	Validation Loss: 4.386596
Batch_id: 28	Training Loss: 4.392548	Validation Loss: 4.384465
Batch_id: 29	Training Loss: 4.392548	Validation Loss: 4.390693
Batch_id: 30	Training Loss: 4.392548	Validation Loss: 4.395631
Batch_id: 31	Training Loss: 4.392548	Validation Loss: 4.395613
Batch_id: 32	Training Loss: 4.392548	Validation Loss: 4.384550
Batch_id: 33	Training Loss: 4.392548	Validation Loss: 4.390594
Batch_id: 34	Training Loss: 4.392548	Validation Loss: 4.391298
Batch_id: 35	Training Loss: 4.392548	Validation Loss: 4.410906
Batch_id: 36	Training Loss: 4.392548	Validation Loss: 4.409313
Batch_id: 37	Training Loss: 4.392548	Validation Loss: 4.415236
Batch_id: 38	Training Loss: 4.392548	Validation Loss: 4.411012
Batch_id: 39	Training Loss: 4.392548	Validation Loss: 4.405564
Batch_id: 40	Training Loss: 4.392548	Validation Loss: 4.403988
Batch_id: 41	Training Loss: 4.392548	Validation Loss: 4.404136
Batch_id: 42	Training Loss: 4.392548	Validation Loss: 4.400597
Batch_id: 43	Training Loss: 4.392548	Validation Loss: 4.385391
Batch_id: 44	Training Loss: 4.392548	Validation Loss: 4.390835
Batch_id: 45	Training Loss: 4.392548	Validation Loss: 4.387983
Batch_id: 46	Training Loss: 4.392548	Validation Loss: 4.386995
Batch_id: 47	Training Loss: 4.392548	Validation Loss: 4.385954
Batch_id: 48	Training Loss: 4.392548	Validation Loss: 4.385973
Batch_id: 49	Training Loss: 4.392548	Validation Loss: 4.387504
Batch_id: 50	Training Loss: 4.392548	Validation Loss: 4.379690
Batch_id: 51	Training Loss: 4.392548	Validation Loss: 4.372826
Batch_id: 52	Training Loss: 4.392548	Validation Loss: 4.377862
Batch_id: 53	Training Loss: 4.392548	Validation Loss: 4.381651
Batch_id: 54	Training Loss: 4.392548	Validation Loss: 4.385441
Batch_id: 55	Training Loss: 4.392548	Validation Loss: 4.384113
Batch_id: 56	Training Loss: 4.392548	Validation Loss: 4.389564
Batch_id: 57	Training Loss: 4.392548	Validation Loss: 4.389056
Batch_id: 58	Training Loss: 4.392548	Validation Loss: 4.387043
Batch_id: 59	Training Loss: 4.392548	Validation Loss: 4.379472
Batch_id: 60	Training Loss: 4.392548	Validation Loss: 4.373859
Batch_id: 61	Training Loss: 4.392548	Validation Loss: 4.366715
Batch_id: 62	Training Loss: 4.392548	Validation Loss: 4.372585
Batch_id: 63	Training Loss: 4.392548	Validation Loss: 4.373044
Batch_id: 64	Training Loss: 4.392548	Validation Loss: 4.368922
Batch_id: 65	Training Loss: 4.392548	Validation Loss: 4.378427
Batch_id: 66	Training Loss: 4.392548	Validation Loss: 4.377655
Batch_id: 67	Training Loss: 4.392548	Validation Loss: 4.380088
Batch_id: 68	Training Loss: 4.392548	Validation Loss: 4.379158
Batch_id: 69	Training Loss: 4.392548	Validation Loss: 4.375001
Batch_id: 70	Training Loss: 4.392548	Validation Loss: 4.379842

Batch_id: 71	Training Loss: 4.392548	Validation Loss: 4.386403
Batch_id: 72	Training Loss: 4.392548	Validation Loss: 4.388537
Batch_id: 73	Training Loss: 4.392548	Validation Loss: 4.396791
Batch_id: 74	Training Loss: 4.392548	Validation Loss: 4.396886
Batch_id: 75	Training Loss: 4.392548	Validation Loss: 4.392645
Batch_id: 76	Training Loss: 4.392548	Validation Loss: 4.392509
Batch_id: 77	Training Loss: 4.392548	Validation Loss: 4.390170
Batch_id: 78	Training Loss: 4.392548	Validation Loss: 4.385945
Batch_id: 79	Training Loss: 4.392548	Validation Loss: 4.386765
Batch_id: 80	Training Loss: 4.392548	Validation Loss: 4.387639
Batch_id: 81	Training Loss: 4.392548	Validation Loss: 4.384395
Batch_id: 82	Training Loss: 4.392548	Validation Loss: 4.381776
Batch_id: 83	Training Loss: 4.392548	Validation Loss: 4.389406
Batch_id: 84	Training Loss: 4.392548	Validation Loss: 4.386306
Batch_id: 85	Training Loss: 4.392548	Validation Loss: 4.385996
Batch_id: 86	Training Loss: 4.392548	Validation Loss: 4.383003
Batch_id: 87	Training Loss: 4.392548	Validation Loss: 4.382741
Batch_id: 88	Training Loss: 4.392548	Validation Loss: 4.383080
Batch_id: 89	Training Loss: 4.392548	Validation Loss: 4.384225
Batch_id: 90	Training Loss: 4.392548	Validation Loss: 4.385349
Batch_id: 91	Training Loss: 4.392548	Validation Loss: 4.380229
Batch_id: 92	Training Loss: 4.392548	Validation Loss: 4.385816
Batch_id: 93	Training Loss: 4.392548	Validation Loss: 4.387285
Batch_id: 94	Training Loss: 4.392548	Validation Loss: 4.394662
Batch_id: 95	Training Loss: 4.392548	Validation Loss: 4.392968
Batch_id: 96	Training Loss: 4.392548	Validation Loss: 4.394557
Batch_id: 97	Training Loss: 4.392548	Validation Loss: 4.399884
Batch_id: 98	Training Loss: 4.392548	Validation Loss: 4.401861
Batch_id: 99	Training Loss: 4.392548	Validation Loss: 4.398332
Batch_id: 100	Training Loss: 4.392548	Validation Loss: 4.397727
Batch_id: 101	Training Loss: 4.392548	Validation Loss: 4.397415
Batch_id: 102	Training Loss: 4.392548	Validation Loss: 4.396971
Batch_id: 103	Training Loss: 4.392548	Validation Loss: 4.399033
Batch_id: 104	Training Loss: 4.392548	Validation Loss: 4.402671

Epoch: 2	Training Loss: 4.392548	Validation Loss: 4.402671
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 4.255557	Validation Loss: 4.076869
Batch_id: 1	Training Loss: 4.255557	Validation Loss: 4.070625
Batch_id: 2	Training Loss: 4.255557	Validation Loss: 4.108051
Batch_id: 3	Training Loss: 4.255557	Validation Loss: 4.249818
Batch_id: 4	Training Loss: 4.255557	Validation Loss: 4.211902
Batch_id: 5	Training Loss: 4.255557	Validation Loss: 4.293436
Batch_id: 6	Training Loss: 4.255557	Validation Loss: 4.367618
Batch_id: 7	Training Loss: 4.255557	Validation Loss: 4.320796
Batch_id: 8	Training Loss: 4.255557	Validation Loss: 4.361652
Batch_id: 9	Training Loss: 4.255557	Validation Loss: 4.271477
Batch_id: 10	Training Loss: 4.255557	Validation Loss: 4.272223

Batch_id: 11	Training Loss: 4.255557	Validation Loss: 4.272372
Batch_id: 12	Training Loss: 4.255557	Validation Loss: 4.255890
Batch_id: 13	Training Loss: 4.255557	Validation Loss: 4.234610
Batch_id: 14	Training Loss: 4.255557	Validation Loss: 4.235674
Batch_id: 15	Training Loss: 4.255557	Validation Loss: 4.231986
Batch_id: 16	Training Loss: 4.255557	Validation Loss: 4.233094
Batch_id: 17	Training Loss: 4.255557	Validation Loss: 4.250428
Batch_id: 18	Training Loss: 4.255557	Validation Loss: 4.250570
Batch_id: 19	Training Loss: 4.255557	Validation Loss: 4.240198
Batch_id: 20	Training Loss: 4.255557	Validation Loss: 4.261846
Batch_id: 21	Training Loss: 4.255557	Validation Loss: 4.280807
Batch_id: 22	Training Loss: 4.255557	Validation Loss: 4.303801
Batch_id: 23	Training Loss: 4.255557	Validation Loss: 4.323055
Batch_id: 24	Training Loss: 4.255557	Validation Loss: 4.347241
Batch_id: 25	Training Loss: 4.255557	Validation Loss: 4.340236
Batch_id: 26	Training Loss: 4.255557	Validation Loss: 4.346514
Batch_id: 27	Training Loss: 4.255557	Validation Loss: 4.355267
Batch_id: 28	Training Loss: 4.255557	Validation Loss: 4.362504
Batch_id: 29	Training Loss: 4.255557	Validation Loss: 4.350208
Batch_id: 30	Training Loss: 4.255557	Validation Loss: 4.343867
Batch_id: 31	Training Loss: 4.255557	Validation Loss: 4.329678
Batch_id: 32	Training Loss: 4.255557	Validation Loss: 4.330564
Batch_id: 33	Training Loss: 4.255557	Validation Loss: 4.323762
Batch_id: 34	Training Loss: 4.255557	Validation Loss: 4.330734
Batch_id: 35	Training Loss: 4.255557	Validation Loss: 4.331944
Batch_id: 36	Training Loss: 4.255557	Validation Loss: 4.330405
Batch_id: 37	Training Loss: 4.255557	Validation Loss: 4.324808
Batch_id: 38	Training Loss: 4.255557	Validation Loss: 4.324366
Batch_id: 39	Training Loss: 4.255557	Validation Loss: 4.326974
Batch_id: 40	Training Loss: 4.255557	Validation Loss: 4.322791
Batch_id: 41	Training Loss: 4.255557	Validation Loss: 4.332456
Batch_id: 42	Training Loss: 4.255557	Validation Loss: 4.328578
Batch_id: 43	Training Loss: 4.255557	Validation Loss: 4.342359
Batch_id: 44	Training Loss: 4.255557	Validation Loss: 4.352419
Batch_id: 45	Training Loss: 4.255557	Validation Loss: 4.351822
Batch_id: 46	Training Loss: 4.255557	Validation Loss: 4.344071
Batch_id: 47	Training Loss: 4.255557	Validation Loss: 4.335950
Batch_id: 48	Training Loss: 4.255557	Validation Loss: 4.337675
Batch_id: 49	Training Loss: 4.255557	Validation Loss: 4.347442
Batch_id: 50	Training Loss: 4.255557	Validation Loss: 4.353661
Batch_id: 51	Training Loss: 4.255557	Validation Loss: 4.341331
Batch_id: 52	Training Loss: 4.255557	Validation Loss: 4.347883
Batch_id: 53	Training Loss: 4.255557	Validation Loss: 4.361423
Batch_id: 54	Training Loss: 4.255557	Validation Loss: 4.357625
Batch_id: 55	Training Loss: 4.255557	Validation Loss: 4.362514
Batch_id: 56	Training Loss: 4.255557	Validation Loss: 4.366958
Batch_id: 57	Training Loss: 4.255557	Validation Loss: 4.362409
Batch_id: 58	Training Loss: 4.255557	Validation Loss: 4.359272

Batch_id: 59	Training Loss: 4.255557	Validation Loss: 4.359583
Batch_id: 60	Training Loss: 4.255557	Validation Loss: 4.370035
Batch_id: 61	Training Loss: 4.255557	Validation Loss: 4.364906
Batch_id: 62	Training Loss: 4.255557	Validation Loss: 4.362618
Batch_id: 63	Training Loss: 4.255557	Validation Loss: 4.364744
Batch_id: 64	Training Loss: 4.255557	Validation Loss: 4.357322
Batch_id: 65	Training Loss: 4.255557	Validation Loss: 4.357584
Batch_id: 66	Training Loss: 4.255557	Validation Loss: 4.356965
Batch_id: 67	Training Loss: 4.255557	Validation Loss: 4.360140
Batch_id: 68	Training Loss: 4.255557	Validation Loss: 4.361804
Batch_id: 69	Training Loss: 4.255557	Validation Loss: 4.368242
Batch_id: 70	Training Loss: 4.255557	Validation Loss: 4.369137
Batch_id: 71	Training Loss: 4.255557	Validation Loss: 4.364751
Batch_id: 72	Training Loss: 4.255557	Validation Loss: 4.362062
Batch_id: 73	Training Loss: 4.255557	Validation Loss: 4.358122
Batch_id: 74	Training Loss: 4.255557	Validation Loss: 4.357786
Batch_id: 75	Training Loss: 4.255557	Validation Loss: 4.357576
Batch_id: 76	Training Loss: 4.255557	Validation Loss: 4.366765
Batch_id: 77	Training Loss: 4.255557	Validation Loss: 4.364105
Batch_id: 78	Training Loss: 4.255557	Validation Loss: 4.353189
Batch_id: 79	Training Loss: 4.255557	Validation Loss: 4.344141
Batch_id: 80	Training Loss: 4.255557	Validation Loss: 4.336846
Batch_id: 81	Training Loss: 4.255557	Validation Loss: 4.336381
Batch_id: 82	Training Loss: 4.255557	Validation Loss: 4.337780
Batch_id: 83	Training Loss: 4.255557	Validation Loss: 4.341359
Batch_id: 84	Training Loss: 4.255557	Validation Loss: 4.342154
Batch_id: 85	Training Loss: 4.255557	Validation Loss: 4.337097
Batch_id: 86	Training Loss: 4.255557	Validation Loss: 4.330720
Batch_id: 87	Training Loss: 4.255557	Validation Loss: 4.332675
Batch_id: 88	Training Loss: 4.255557	Validation Loss: 4.332718
Batch_id: 89	Training Loss: 4.255557	Validation Loss: 4.334452
Batch_id: 90	Training Loss: 4.255557	Validation Loss: 4.334152
Batch_id: 91	Training Loss: 4.255557	Validation Loss: 4.336922
Batch_id: 92	Training Loss: 4.255557	Validation Loss: 4.336457
Batch_id: 93	Training Loss: 4.255557	Validation Loss: 4.336372
Batch_id: 94	Training Loss: 4.255557	Validation Loss: 4.329808
Batch_id: 95	Training Loss: 4.255557	Validation Loss: 4.335600
Batch_id: 96	Training Loss: 4.255557	Validation Loss: 4.332067
Batch_id: 97	Training Loss: 4.255557	Validation Loss: 4.331280
Batch_id: 98	Training Loss: 4.255557	Validation Loss: 4.325810
Batch_id: 99	Training Loss: 4.255557	Validation Loss: 4.330661
Batch_id: 100	Training Loss: 4.255557	Validation Loss: 4.324572
Batch_id: 101	Training Loss: 4.255557	Validation Loss: 4.325822
Batch_id: 102	Training Loss: 4.255557	Validation Loss: 4.328692
Batch_id: 103	Training Loss: 4.255557	Validation Loss: 4.325730
Batch_id: 104	Training Loss: 4.255557	Validation Loss: 4.336518

Epoch: 3

Training Loss: 4.255557

Validation Loss: 4.336518

Batch_id: 0	Training Loss: 4.143457	Validation Loss: 4.246143
Batch_id: 1	Training Loss: 4.143457	Validation Loss: 4.108292
Batch_id: 2	Training Loss: 4.143457	Validation Loss: 4.035645
Batch_id: 3	Training Loss: 4.143457	Validation Loss: 3.993431
Batch_id: 4	Training Loss: 4.143457	Validation Loss: 3.975453
Batch_id: 5	Training Loss: 4.143457	Validation Loss: 4.022533
Batch_id: 6	Training Loss: 4.143457	Validation Loss: 4.086437
Batch_id: 7	Training Loss: 4.143457	Validation Loss: 4.025936
Batch_id: 8	Training Loss: 4.143457	Validation Loss: 4.051577
Batch_id: 9	Training Loss: 4.143457	Validation Loss: 4.037553
Batch_id: 10	Training Loss: 4.143457	Validation Loss: 4.043664
Batch_id: 11	Training Loss: 4.143457	Validation Loss: 4.063632
Batch_id: 12	Training Loss: 4.143457	Validation Loss: 4.120856
Batch_id: 13	Training Loss: 4.143457	Validation Loss: 4.154277
Batch_id: 14	Training Loss: 4.143457	Validation Loss: 4.128032
Batch_id: 15	Training Loss: 4.143457	Validation Loss: 4.134571
Batch_id: 16	Training Loss: 4.143457	Validation Loss: 4.144220
Batch_id: 17	Training Loss: 4.143457	Validation Loss: 4.155756
Batch_id: 18	Training Loss: 4.143457	Validation Loss: 4.140859
Batch_id: 19	Training Loss: 4.143457	Validation Loss: 4.124305
Batch_id: 20	Training Loss: 4.143457	Validation Loss: 4.169208
Batch_id: 21	Training Loss: 4.143457	Validation Loss: 4.145921
Batch_id: 22	Training Loss: 4.143457	Validation Loss: 4.148583
Batch_id: 23	Training Loss: 4.143457	Validation Loss: 4.150240
Batch_id: 24	Training Loss: 4.143457	Validation Loss: 4.160508
Batch_id: 25	Training Loss: 4.143457	Validation Loss: 4.161357
Batch_id: 26	Training Loss: 4.143457	Validation Loss: 4.174565
Batch_id: 27	Training Loss: 4.143457	Validation Loss: 4.189879
Batch_id: 28	Training Loss: 4.143457	Validation Loss: 4.197352
Batch_id: 29	Training Loss: 4.143457	Validation Loss: 4.198203
Batch_id: 30	Training Loss: 4.143457	Validation Loss: 4.203823
Batch_id: 31	Training Loss: 4.143457	Validation Loss: 4.206733
Batch_id: 32	Training Loss: 4.143457	Validation Loss: 4.208587
Batch_id: 33	Training Loss: 4.143457	Validation Loss: 4.200715
Batch_id: 34	Training Loss: 4.143457	Validation Loss: 4.196193
Batch_id: 35	Training Loss: 4.143457	Validation Loss: 4.199301
Batch_id: 36	Training Loss: 4.143457	Validation Loss: 4.208934
Batch_id: 37	Training Loss: 4.143457	Validation Loss: 4.205715
Batch_id: 38	Training Loss: 4.143457	Validation Loss: 4.194252
Batch_id: 39	Training Loss: 4.143457	Validation Loss: 4.204207
Batch_id: 40	Training Loss: 4.143457	Validation Loss: 4.199943
Batch_id: 41	Training Loss: 4.143457	Validation Loss: 4.205847
Batch_id: 42	Training Loss: 4.143457	Validation Loss: 4.214839
Batch_id: 43	Training Loss: 4.143457	Validation Loss: 4.216619
Batch_id: 44	Training Loss: 4.143457	Validation Loss: 4.204860
Batch_id: 45	Training Loss: 4.143457	Validation Loss: 4.220674
Batch_id: 46	Training Loss: 4.143457	Validation Loss: 4.237053

Batch_id: 47	Training Loss: 4.143457	Validation Loss: 4.239012
Batch_id: 48	Training Loss: 4.143457	Validation Loss: 4.243806
Batch_id: 49	Training Loss: 4.143457	Validation Loss: 4.263405
Batch_id: 50	Training Loss: 4.143457	Validation Loss: 4.264517
Batch_id: 51	Training Loss: 4.143457	Validation Loss: 4.264231
Batch_id: 52	Training Loss: 4.143457	Validation Loss: 4.251757
Batch_id: 53	Training Loss: 4.143457	Validation Loss: 4.249770
Batch_id: 54	Training Loss: 4.143457	Validation Loss: 4.257988
Batch_id: 55	Training Loss: 4.143457	Validation Loss: 4.267796
Batch_id: 56	Training Loss: 4.143457	Validation Loss: 4.260827
Batch_id: 57	Training Loss: 4.143457	Validation Loss: 4.267645
Batch_id: 58	Training Loss: 4.143457	Validation Loss: 4.258928
Batch_id: 59	Training Loss: 4.143457	Validation Loss: 4.261038
Batch_id: 60	Training Loss: 4.143457	Validation Loss: 4.257978
Batch_id: 61	Training Loss: 4.143457	Validation Loss: 4.250607
Batch_id: 62	Training Loss: 4.143457	Validation Loss: 4.258005
Batch_id: 63	Training Loss: 4.143457	Validation Loss: 4.260335
Batch_id: 64	Training Loss: 4.143457	Validation Loss: 4.258437
Batch_id: 65	Training Loss: 4.143457	Validation Loss: 4.258547
Batch_id: 66	Training Loss: 4.143457	Validation Loss: 4.256670
Batch_id: 67	Training Loss: 4.143457	Validation Loss: 4.249829
Batch_id: 68	Training Loss: 4.143457	Validation Loss: 4.245963
Batch_id: 69	Training Loss: 4.143457	Validation Loss: 4.248300
Batch_id: 70	Training Loss: 4.143457	Validation Loss: 4.255718
Batch_id: 71	Training Loss: 4.143457	Validation Loss: 4.249338
Batch_id: 72	Training Loss: 4.143457	Validation Loss: 4.248018
Batch_id: 73	Training Loss: 4.143457	Validation Loss: 4.246987
Batch_id: 74	Training Loss: 4.143457	Validation Loss: 4.249097
Batch_id: 75	Training Loss: 4.143457	Validation Loss: 4.254449
Batch_id: 76	Training Loss: 4.143457	Validation Loss: 4.261955
Batch_id: 77	Training Loss: 4.143457	Validation Loss: 4.257733
Batch_id: 78	Training Loss: 4.143457	Validation Loss: 4.255469
Batch_id: 79	Training Loss: 4.143457	Validation Loss: 4.255324
Batch_id: 80	Training Loss: 4.143457	Validation Loss: 4.255580
Batch_id: 81	Training Loss: 4.143457	Validation Loss: 4.254629
Batch_id: 82	Training Loss: 4.143457	Validation Loss: 4.253386
Batch_id: 83	Training Loss: 4.143457	Validation Loss: 4.256534
Batch_id: 84	Training Loss: 4.143457	Validation Loss: 4.259542
Batch_id: 85	Training Loss: 4.143457	Validation Loss: 4.257810
Batch_id: 86	Training Loss: 4.143457	Validation Loss: 4.259547
Batch_id: 87	Training Loss: 4.143457	Validation Loss: 4.255602
Batch_id: 88	Training Loss: 4.143457	Validation Loss: 4.260664
Batch_id: 89	Training Loss: 4.143457	Validation Loss: 4.268143
Batch_id: 90	Training Loss: 4.143457	Validation Loss: 4.266214
Batch_id: 91	Training Loss: 4.143457	Validation Loss: 4.268656
Batch_id: 92	Training Loss: 4.143457	Validation Loss: 4.269530
Batch_id: 93	Training Loss: 4.143457	Validation Loss: 4.274345
Batch_id: 94	Training Loss: 4.143457	Validation Loss: 4.280976

Batch_id: 95	Training Loss: 4.143457	Validation Loss: 4.279413
Batch_id: 96	Training Loss: 4.143457	Validation Loss: 4.283503
Batch_id: 97	Training Loss: 4.143457	Validation Loss: 4.280837
Batch_id: 98	Training Loss: 4.143457	Validation Loss: 4.289926
Batch_id: 99	Training Loss: 4.143457	Validation Loss: 4.281359
Batch_id: 100	Training Loss: 4.143457	Validation Loss: 4.284991
Batch_id: 101	Training Loss: 4.143457	Validation Loss: 4.287207
Batch_id: 102	Training Loss: 4.143457	Validation Loss: 4.290423
Batch_id: 103	Training Loss: 4.143457	Validation Loss: 4.285936
Batch_id: 104	Training Loss: 4.143457	Validation Loss: 4.283281

Epoch: 4	Training Loss: 4.143457	Validation Loss: 4.283281
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 4.066541	Validation Loss: 4.255335
Batch_id: 1	Training Loss: 4.066541	Validation Loss: 4.424554
Batch_id: 2	Training Loss: 4.066541	Validation Loss: 4.580284
Batch_id: 3	Training Loss: 4.066541	Validation Loss: 4.416777
Batch_id: 4	Training Loss: 4.066541	Validation Loss: 4.320832
Batch_id: 5	Training Loss: 4.066541	Validation Loss: 4.302053
Batch_id: 6	Training Loss: 4.066541	Validation Loss: 4.263667
Batch_id: 7	Training Loss: 4.066541	Validation Loss: 4.195283
Batch_id: 8	Training Loss: 4.066541	Validation Loss: 4.165835
Batch_id: 9	Training Loss: 4.066541	Validation Loss: 4.244574
Batch_id: 10	Training Loss: 4.066541	Validation Loss: 4.184932
Batch_id: 11	Training Loss: 4.066541	Validation Loss: 4.176712
Batch_id: 12	Training Loss: 4.066541	Validation Loss: 4.183807
Batch_id: 13	Training Loss: 4.066541	Validation Loss: 4.145492
Batch_id: 14	Training Loss: 4.066541	Validation Loss: 4.119472
Batch_id: 15	Training Loss: 4.066541	Validation Loss: 4.102457
Batch_id: 16	Training Loss: 4.066541	Validation Loss: 4.094893
Batch_id: 17	Training Loss: 4.066541	Validation Loss: 4.087739
Batch_id: 18	Training Loss: 4.066541	Validation Loss: 4.116748
Batch_id: 19	Training Loss: 4.066541	Validation Loss: 4.093045
Batch_id: 20	Training Loss: 4.066541	Validation Loss: 4.120451
Batch_id: 21	Training Loss: 4.066541	Validation Loss: 4.095192
Batch_id: 22	Training Loss: 4.066541	Validation Loss: 4.097806
Batch_id: 23	Training Loss: 4.066541	Validation Loss: 4.113314
Batch_id: 24	Training Loss: 4.066541	Validation Loss: 4.117056
Batch_id: 25	Training Loss: 4.066541	Validation Loss: 4.115597
Batch_id: 26	Training Loss: 4.066541	Validation Loss: 4.121593
Batch_id: 27	Training Loss: 4.066541	Validation Loss: 4.142116
Batch_id: 28	Training Loss: 4.066541	Validation Loss: 4.120876
Batch_id: 29	Training Loss: 4.066541	Validation Loss: 4.116514
Batch_id: 30	Training Loss: 4.066541	Validation Loss: 4.120981
Batch_id: 31	Training Loss: 4.066541	Validation Loss: 4.126913
Batch_id: 32	Training Loss: 4.066541	Validation Loss: 4.112672
Batch_id: 33	Training Loss: 4.066541	Validation Loss: 4.119584
Batch_id: 34	Training Loss: 4.066541	Validation Loss: 4.113781

Batch_id: 35	Training Loss: 4.066541	Validation Loss: 4.102816
Batch_id: 36	Training Loss: 4.066541	Validation Loss: 4.103856
Batch_id: 37	Training Loss: 4.066541	Validation Loss: 4.108080
Batch_id: 38	Training Loss: 4.066541	Validation Loss: 4.114768
Batch_id: 39	Training Loss: 4.066541	Validation Loss: 4.108012
Batch_id: 40	Training Loss: 4.066541	Validation Loss: 4.126786
Batch_id: 41	Training Loss: 4.066541	Validation Loss: 4.123885
Batch_id: 42	Training Loss: 4.066541	Validation Loss: 4.133487
Batch_id: 43	Training Loss: 4.066541	Validation Loss: 4.152049
Batch_id: 44	Training Loss: 4.066541	Validation Loss: 4.149262
Batch_id: 45	Training Loss: 4.066541	Validation Loss: 4.169390
Batch_id: 46	Training Loss: 4.066541	Validation Loss: 4.150153
Batch_id: 47	Training Loss: 4.066541	Validation Loss: 4.144367
Batch_id: 48	Training Loss: 4.066541	Validation Loss: 4.154896
Batch_id: 49	Training Loss: 4.066541	Validation Loss: 4.156060
Batch_id: 50	Training Loss: 4.066541	Validation Loss: 4.159999
Batch_id: 51	Training Loss: 4.066541	Validation Loss: 4.161818
Batch_id: 52	Training Loss: 4.066541	Validation Loss: 4.166213
Batch_id: 53	Training Loss: 4.066541	Validation Loss: 4.169617
Batch_id: 54	Training Loss: 4.066541	Validation Loss: 4.175842
Batch_id: 55	Training Loss: 4.066541	Validation Loss: 4.173944
Batch_id: 56	Training Loss: 4.066541	Validation Loss: 4.174882
Batch_id: 57	Training Loss: 4.066541	Validation Loss: 4.176100
Batch_id: 58	Training Loss: 4.066541	Validation Loss: 4.173605
Batch_id: 59	Training Loss: 4.066541	Validation Loss: 4.169407
Batch_id: 60	Training Loss: 4.066541	Validation Loss: 4.177436
Batch_id: 61	Training Loss: 4.066541	Validation Loss: 4.176438
Batch_id: 62	Training Loss: 4.066541	Validation Loss: 4.168778
Batch_id: 63	Training Loss: 4.066541	Validation Loss: 4.168083
Batch_id: 64	Training Loss: 4.066541	Validation Loss: 4.179257
Batch_id: 65	Training Loss: 4.066541	Validation Loss: 4.184615
Batch_id: 66	Training Loss: 4.066541	Validation Loss: 4.187177
Batch_id: 67	Training Loss: 4.066541	Validation Loss: 4.183864
Batch_id: 68	Training Loss: 4.066541	Validation Loss: 4.188149
Batch_id: 69	Training Loss: 4.066541	Validation Loss: 4.189975
Batch_id: 70	Training Loss: 4.066541	Validation Loss: 4.197993
Batch_id: 71	Training Loss: 4.066541	Validation Loss: 4.207582
Batch_id: 72	Training Loss: 4.066541	Validation Loss: 4.209102
Batch_id: 73	Training Loss: 4.066541	Validation Loss: 4.201189
Batch_id: 74	Training Loss: 4.066541	Validation Loss: 4.193202
Batch_id: 75	Training Loss: 4.066541	Validation Loss: 4.192254
Batch_id: 76	Training Loss: 4.066541	Validation Loss: 4.198703
Batch_id: 77	Training Loss: 4.066541	Validation Loss: 4.196989
Batch_id: 78	Training Loss: 4.066541	Validation Loss: 4.199963
Batch_id: 79	Training Loss: 4.066541	Validation Loss: 4.203760
Batch_id: 80	Training Loss: 4.066541	Validation Loss: 4.206359
Batch_id: 81	Training Loss: 4.066541	Validation Loss: 4.212158
Batch_id: 82	Training Loss: 4.066541	Validation Loss: 4.213606

Batch_id: 83	Training Loss: 4.066541	Validation Loss: 4.219547
Batch_id: 84	Training Loss: 4.066541	Validation Loss: 4.231997
Batch_id: 85	Training Loss: 4.066541	Validation Loss: 4.235829
Batch_id: 86	Training Loss: 4.066541	Validation Loss: 4.239880
Batch_id: 87	Training Loss: 4.066541	Validation Loss: 4.238745
Batch_id: 88	Training Loss: 4.066541	Validation Loss: 4.232317
Batch_id: 89	Training Loss: 4.066541	Validation Loss: 4.223485
Batch_id: 90	Training Loss: 4.066541	Validation Loss: 4.232084
Batch_id: 91	Training Loss: 4.066541	Validation Loss: 4.227400
Batch_id: 92	Training Loss: 4.066541	Validation Loss: 4.223454
Batch_id: 93	Training Loss: 4.066541	Validation Loss: 4.222244
Batch_id: 94	Training Loss: 4.066541	Validation Loss: 4.216017
Batch_id: 95	Training Loss: 4.066541	Validation Loss: 4.213346
Batch_id: 96	Training Loss: 4.066541	Validation Loss: 4.218645
Batch_id: 97	Training Loss: 4.066541	Validation Loss: 4.221657
Batch_id: 98	Training Loss: 4.066541	Validation Loss: 4.218199
Batch_id: 99	Training Loss: 4.066541	Validation Loss: 4.218678
Batch_id: 100	Training Loss: 4.066541	Validation Loss: 4.223069
Batch_id: 101	Training Loss: 4.066541	Validation Loss: 4.226783
Batch_id: 102	Training Loss: 4.066541	Validation Loss: 4.216966
Batch_id: 103	Training Loss: 4.066541	Validation Loss: 4.220957
Batch_id: 104	Training Loss: 4.066541	Validation Loss: 4.228559

Epoch: 5	Training Loss: 4.066541	Validation Loss: 4.228559
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.974709	Validation Loss: 4.214949
Batch_id: 1	Training Loss: 3.974709	Validation Loss: 4.456476
Batch_id: 2	Training Loss: 3.974709	Validation Loss: 4.258027
Batch_id: 3	Training Loss: 3.974709	Validation Loss: 4.287745
Batch_id: 4	Training Loss: 3.974709	Validation Loss: 4.266571
Batch_id: 5	Training Loss: 3.974709	Validation Loss: 4.295401
Batch_id: 6	Training Loss: 3.974709	Validation Loss: 4.236977
Batch_id: 7	Training Loss: 3.974709	Validation Loss: 4.235283
Batch_id: 8	Training Loss: 3.974709	Validation Loss: 4.239180
Batch_id: 9	Training Loss: 3.974709	Validation Loss: 4.241656
Batch_id: 10	Training Loss: 3.974709	Validation Loss: 4.170815
Batch_id: 11	Training Loss: 3.974709	Validation Loss: 4.174884
Batch_id: 12	Training Loss: 3.974709	Validation Loss: 4.158082
Batch_id: 13	Training Loss: 3.974709	Validation Loss: 4.186791
Batch_id: 14	Training Loss: 3.974709	Validation Loss: 4.165723
Batch_id: 15	Training Loss: 3.974709	Validation Loss: 4.216218
Batch_id: 16	Training Loss: 3.974709	Validation Loss: 4.202102
Batch_id: 17	Training Loss: 3.974709	Validation Loss: 4.205210
Batch_id: 18	Training Loss: 3.974709	Validation Loss: 4.223320
Batch_id: 19	Training Loss: 3.974709	Validation Loss: 4.235085
Batch_id: 20	Training Loss: 3.974709	Validation Loss: 4.261017
Batch_id: 21	Training Loss: 3.974709	Validation Loss: 4.257142
Batch_id: 22	Training Loss: 3.974709	Validation Loss: 4.268784

Batch_id: 23	Training Loss: 3.974709	Validation Loss: 4.258996
Batch_id: 24	Training Loss: 3.974709	Validation Loss: 4.278253
Batch_id: 25	Training Loss: 3.974709	Validation Loss: 4.271370
Batch_id: 26	Training Loss: 3.974709	Validation Loss: 4.241994
Batch_id: 27	Training Loss: 3.974709	Validation Loss: 4.232287
Batch_id: 28	Training Loss: 3.974709	Validation Loss: 4.242829
Batch_id: 29	Training Loss: 3.974709	Validation Loss: 4.242812
Batch_id: 30	Training Loss: 3.974709	Validation Loss: 4.232158
Batch_id: 31	Training Loss: 3.974709	Validation Loss: 4.247489
Batch_id: 32	Training Loss: 3.974709	Validation Loss: 4.243151
Batch_id: 33	Training Loss: 3.974709	Validation Loss: 4.239368
Batch_id: 34	Training Loss: 3.974709	Validation Loss: 4.233531
Batch_id: 35	Training Loss: 3.974709	Validation Loss: 4.226834
Batch_id: 36	Training Loss: 3.974709	Validation Loss: 4.242568
Batch_id: 37	Training Loss: 3.974709	Validation Loss: 4.225745
Batch_id: 38	Training Loss: 3.974709	Validation Loss: 4.230393
Batch_id: 39	Training Loss: 3.974709	Validation Loss: 4.237504
Batch_id: 40	Training Loss: 3.974709	Validation Loss: 4.254883
Batch_id: 41	Training Loss: 3.974709	Validation Loss: 4.255750
Batch_id: 42	Training Loss: 3.974709	Validation Loss: 4.245901
Batch_id: 43	Training Loss: 3.974709	Validation Loss: 4.244617
Batch_id: 44	Training Loss: 3.974709	Validation Loss: 4.252206
Batch_id: 45	Training Loss: 3.974709	Validation Loss: 4.255782
Batch_id: 46	Training Loss: 3.974709	Validation Loss: 4.260704
Batch_id: 47	Training Loss: 3.974709	Validation Loss: 4.254948
Batch_id: 48	Training Loss: 3.974709	Validation Loss: 4.252069
Batch_id: 49	Training Loss: 3.974709	Validation Loss: 4.254850
Batch_id: 50	Training Loss: 3.974709	Validation Loss: 4.245988
Batch_id: 51	Training Loss: 3.974709	Validation Loss: 4.238309
Batch_id: 52	Training Loss: 3.974709	Validation Loss: 4.246024
Batch_id: 53	Training Loss: 3.974709	Validation Loss: 4.249223
Batch_id: 54	Training Loss: 3.974709	Validation Loss: 4.253865
Batch_id: 55	Training Loss: 3.974709	Validation Loss: 4.273011
Batch_id: 56	Training Loss: 3.974709	Validation Loss: 4.278427
Batch_id: 57	Training Loss: 3.974709	Validation Loss: 4.273151
Batch_id: 58	Training Loss: 3.974709	Validation Loss: 4.269007
Batch_id: 59	Training Loss: 3.974709	Validation Loss: 4.267089
Batch_id: 60	Training Loss: 3.974709	Validation Loss: 4.278605
Batch_id: 61	Training Loss: 3.974709	Validation Loss: 4.277997
Batch_id: 62	Training Loss: 3.974709	Validation Loss: 4.277350
Batch_id: 63	Training Loss: 3.974709	Validation Loss: 4.272960
Batch_id: 64	Training Loss: 3.974709	Validation Loss: 4.261984
Batch_id: 65	Training Loss: 3.974709	Validation Loss: 4.265143
Batch_id: 66	Training Loss: 3.974709	Validation Loss: 4.259193
Batch_id: 67	Training Loss: 3.974709	Validation Loss: 4.251918
Batch_id: 68	Training Loss: 3.974709	Validation Loss: 4.256034
Batch_id: 69	Training Loss: 3.974709	Validation Loss: 4.254025
Batch_id: 70	Training Loss: 3.974709	Validation Loss: 4.262389

Batch_id: 71	Training Loss: 3.974709	Validation Loss: 4.264392
Batch_id: 72	Training Loss: 3.974709	Validation Loss: 4.267260
Batch_id: 73	Training Loss: 3.974709	Validation Loss: 4.262388
Batch_id: 74	Training Loss: 3.974709	Validation Loss: 4.257518
Batch_id: 75	Training Loss: 3.974709	Validation Loss: 4.253032
Batch_id: 76	Training Loss: 3.974709	Validation Loss: 4.255911
Batch_id: 77	Training Loss: 3.974709	Validation Loss: 4.253885
Batch_id: 78	Training Loss: 3.974709	Validation Loss: 4.257185
Batch_id: 79	Training Loss: 3.974709	Validation Loss: 4.247857
Batch_id: 80	Training Loss: 3.974709	Validation Loss: 4.254415
Batch_id: 81	Training Loss: 3.974709	Validation Loss: 4.254984
Batch_id: 82	Training Loss: 3.974709	Validation Loss: 4.252270
Batch_id: 83	Training Loss: 3.974709	Validation Loss: 4.244801
Batch_id: 84	Training Loss: 3.974709	Validation Loss: 4.252901
Batch_id: 85	Training Loss: 3.974709	Validation Loss: 4.254738
Batch_id: 86	Training Loss: 3.974709	Validation Loss: 4.256616
Batch_id: 87	Training Loss: 3.974709	Validation Loss: 4.253427
Batch_id: 88	Training Loss: 3.974709	Validation Loss: 4.255244
Batch_id: 89	Training Loss: 3.974709	Validation Loss: 4.245219
Batch_id: 90	Training Loss: 3.974709	Validation Loss: 4.256190
Batch_id: 91	Training Loss: 3.974709	Validation Loss: 4.259719
Batch_id: 92	Training Loss: 3.974709	Validation Loss: 4.260678
Batch_id: 93	Training Loss: 3.974709	Validation Loss: 4.264225
Batch_id: 94	Training Loss: 3.974709	Validation Loss: 4.271447
Batch_id: 95	Training Loss: 3.974709	Validation Loss: 4.270685
Batch_id: 96	Training Loss: 3.974709	Validation Loss: 4.279198
Batch_id: 97	Training Loss: 3.974709	Validation Loss: 4.278722
Batch_id: 98	Training Loss: 3.974709	Validation Loss: 4.277547
Batch_id: 99	Training Loss: 3.974709	Validation Loss: 4.283622
Batch_id: 100	Training Loss: 3.974709	Validation Loss: 4.292677
Batch_id: 101	Training Loss: 3.974709	Validation Loss: 4.290539
Batch_id: 102	Training Loss: 3.974709	Validation Loss: 4.289577
Batch_id: 103	Training Loss: 3.974709	Validation Loss: 4.296767
Batch_id: 104	Training Loss: 3.974709	Validation Loss: 4.293106

Epoch: 6	Training Loss: 3.974709	Validation Loss: 4.293106
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.876474	Validation Loss: 4.045046
Batch_id: 1	Training Loss: 3.876474	Validation Loss: 4.090010
Batch_id: 2	Training Loss: 3.876474	Validation Loss: 3.958364
Batch_id: 3	Training Loss: 3.876474	Validation Loss: 4.154308
Batch_id: 4	Training Loss: 3.876474	Validation Loss: 4.327350
Batch_id: 5	Training Loss: 3.876474	Validation Loss: 4.374978
Batch_id: 6	Training Loss: 3.876474	Validation Loss: 4.345129
Batch_id: 7	Training Loss: 3.876474	Validation Loss: 4.317557
Batch_id: 8	Training Loss: 3.876474	Validation Loss: 4.340131
Batch_id: 9	Training Loss: 3.876474	Validation Loss: 4.301774
Batch_id: 10	Training Loss: 3.876474	Validation Loss: 4.306932

Batch_id: 11	Training Loss: 3.876474	Validation Loss: 4.332822
Batch_id: 12	Training Loss: 3.876474	Validation Loss: 4.347690
Batch_id: 13	Training Loss: 3.876474	Validation Loss: 4.315925
Batch_id: 14	Training Loss: 3.876474	Validation Loss: 4.311259
Batch_id: 15	Training Loss: 3.876474	Validation Loss: 4.276381
Batch_id: 16	Training Loss: 3.876474	Validation Loss: 4.263807
Batch_id: 17	Training Loss: 3.876474	Validation Loss: 4.250345
Batch_id: 18	Training Loss: 3.876474	Validation Loss: 4.234351
Batch_id: 19	Training Loss: 3.876474	Validation Loss: 4.232901
Batch_id: 20	Training Loss: 3.876474	Validation Loss: 4.217187
Batch_id: 21	Training Loss: 3.876474	Validation Loss: 4.218109
Batch_id: 22	Training Loss: 3.876474	Validation Loss: 4.202729
Batch_id: 23	Training Loss: 3.876474	Validation Loss: 4.181621
Batch_id: 24	Training Loss: 3.876474	Validation Loss: 4.177549
Batch_id: 25	Training Loss: 3.876474	Validation Loss: 4.194326
Batch_id: 26	Training Loss: 3.876474	Validation Loss: 4.218323
Batch_id: 27	Training Loss: 3.876474	Validation Loss: 4.217424
Batch_id: 28	Training Loss: 3.876474	Validation Loss: 4.218902
Batch_id: 29	Training Loss: 3.876474	Validation Loss: 4.213107
Batch_id: 30	Training Loss: 3.876474	Validation Loss: 4.176904
Batch_id: 31	Training Loss: 3.876474	Validation Loss: 4.176145
Batch_id: 32	Training Loss: 3.876474	Validation Loss: 4.161934
Batch_id: 33	Training Loss: 3.876474	Validation Loss: 4.176226
Batch_id: 34	Training Loss: 3.876474	Validation Loss: 4.168521
Batch_id: 35	Training Loss: 3.876474	Validation Loss: 4.181257
Batch_id: 36	Training Loss: 3.876474	Validation Loss: 4.184592
Batch_id: 37	Training Loss: 3.876474	Validation Loss: 4.177230
Batch_id: 38	Training Loss: 3.876474	Validation Loss: 4.165500
Batch_id: 39	Training Loss: 3.876474	Validation Loss: 4.151262
Batch_id: 40	Training Loss: 3.876474	Validation Loss: 4.156590
Batch_id: 41	Training Loss: 3.876474	Validation Loss: 4.151567
Batch_id: 42	Training Loss: 3.876474	Validation Loss: 4.163651
Batch_id: 43	Training Loss: 3.876474	Validation Loss: 4.139672
Batch_id: 44	Training Loss: 3.876474	Validation Loss: 4.154736
Batch_id: 45	Training Loss: 3.876474	Validation Loss: 4.153503
Batch_id: 46	Training Loss: 3.876474	Validation Loss: 4.155235
Batch_id: 47	Training Loss: 3.876474	Validation Loss: 4.168986
Batch_id: 48	Training Loss: 3.876474	Validation Loss: 4.165986
Batch_id: 49	Training Loss: 3.876474	Validation Loss: 4.161154
Batch_id: 50	Training Loss: 3.876474	Validation Loss: 4.162027
Batch_id: 51	Training Loss: 3.876474	Validation Loss: 4.155260
Batch_id: 52	Training Loss: 3.876474	Validation Loss: 4.149803
Batch_id: 53	Training Loss: 3.876474	Validation Loss: 4.146578
Batch_id: 54	Training Loss: 3.876474	Validation Loss: 4.137532
Batch_id: 55	Training Loss: 3.876474	Validation Loss: 4.134062
Batch_id: 56	Training Loss: 3.876474	Validation Loss: 4.132511
Batch_id: 57	Training Loss: 3.876474	Validation Loss: 4.134309
Batch_id: 58	Training Loss: 3.876474	Validation Loss: 4.132327

Batch_id: 59	Training Loss: 3.876474	Validation Loss: 4.133214
Batch_id: 60	Training Loss: 3.876474	Validation Loss: 4.144566
Batch_id: 61	Training Loss: 3.876474	Validation Loss: 4.138968
Batch_id: 62	Training Loss: 3.876474	Validation Loss: 4.138648
Batch_id: 63	Training Loss: 3.876474	Validation Loss: 4.141996
Batch_id: 64	Training Loss: 3.876474	Validation Loss: 4.142433
Batch_id: 65	Training Loss: 3.876474	Validation Loss: 4.149715
Batch_id: 66	Training Loss: 3.876474	Validation Loss: 4.153890
Batch_id: 67	Training Loss: 3.876474	Validation Loss: 4.162448
Batch_id: 68	Training Loss: 3.876474	Validation Loss: 4.175371
Batch_id: 69	Training Loss: 3.876474	Validation Loss: 4.172973
Batch_id: 70	Training Loss: 3.876474	Validation Loss: 4.181015
Batch_id: 71	Training Loss: 3.876474	Validation Loss: 4.188559
Batch_id: 72	Training Loss: 3.876474	Validation Loss: 4.191466
Batch_id: 73	Training Loss: 3.876474	Validation Loss: 4.198505
Batch_id: 74	Training Loss: 3.876474	Validation Loss: 4.196633
Batch_id: 75	Training Loss: 3.876474	Validation Loss: 4.197044
Batch_id: 76	Training Loss: 3.876474	Validation Loss: 4.207193
Batch_id: 77	Training Loss: 3.876474	Validation Loss: 4.206902
Batch_id: 78	Training Loss: 3.876474	Validation Loss: 4.206713
Batch_id: 79	Training Loss: 3.876474	Validation Loss: 4.201342
Batch_id: 80	Training Loss: 3.876474	Validation Loss: 4.201375
Batch_id: 81	Training Loss: 3.876474	Validation Loss: 4.204658
Batch_id: 82	Training Loss: 3.876474	Validation Loss: 4.201172
Batch_id: 83	Training Loss: 3.876474	Validation Loss: 4.199960
Batch_id: 84	Training Loss: 3.876474	Validation Loss: 4.195341
Batch_id: 85	Training Loss: 3.876474	Validation Loss: 4.201266
Batch_id: 86	Training Loss: 3.876474	Validation Loss: 4.190488
Batch_id: 87	Training Loss: 3.876474	Validation Loss: 4.188310
Batch_id: 88	Training Loss: 3.876474	Validation Loss: 4.181913
Batch_id: 89	Training Loss: 3.876474	Validation Loss: 4.183123
Batch_id: 90	Training Loss: 3.876474	Validation Loss: 4.171569
Batch_id: 91	Training Loss: 3.876474	Validation Loss: 4.177850
Batch_id: 92	Training Loss: 3.876474	Validation Loss: 4.177551
Batch_id: 93	Training Loss: 3.876474	Validation Loss: 4.167484
Batch_id: 94	Training Loss: 3.876474	Validation Loss: 4.171416
Batch_id: 95	Training Loss: 3.876474	Validation Loss: 4.173652
Batch_id: 96	Training Loss: 3.876474	Validation Loss: 4.173402
Batch_id: 97	Training Loss: 3.876474	Validation Loss: 4.166857
Batch_id: 98	Training Loss: 3.876474	Validation Loss: 4.165850
Batch_id: 99	Training Loss: 3.876474	Validation Loss: 4.162498
Batch_id: 100	Training Loss: 3.876474	Validation Loss: 4.163175
Batch_id: 101	Training Loss: 3.876474	Validation Loss: 4.162698
Batch_id: 102	Training Loss: 3.876474	Validation Loss: 4.163696
Batch_id: 103	Training Loss: 3.876474	Validation Loss: 4.163105
Batch_id: 104	Training Loss: 3.876474	Validation Loss: 4.166416

Epoch: 7

Training Loss: 3.876474

Validation Loss: 4.166416

Batch_id: 0	Training Loss: 3.787895	Validation Loss: 4.260295
Batch_id: 1	Training Loss: 3.787895	Validation Loss: 4.175350
Batch_id: 2	Training Loss: 3.787895	Validation Loss: 4.197715
Batch_id: 3	Training Loss: 3.787895	Validation Loss: 4.320761
Batch_id: 4	Training Loss: 3.787895	Validation Loss: 4.408589
Batch_id: 5	Training Loss: 3.787895	Validation Loss: 4.409195
Batch_id: 6	Training Loss: 3.787895	Validation Loss: 4.375856
Batch_id: 7	Training Loss: 3.787895	Validation Loss: 4.291397
Batch_id: 8	Training Loss: 3.787895	Validation Loss: 4.300634
Batch_id: 9	Training Loss: 3.787895	Validation Loss: 4.384477
Batch_id: 10	Training Loss: 3.787895	Validation Loss: 4.399518
Batch_id: 11	Training Loss: 3.787895	Validation Loss: 4.436594
Batch_id: 12	Training Loss: 3.787895	Validation Loss: 4.480366
Batch_id: 13	Training Loss: 3.787895	Validation Loss: 4.448496
Batch_id: 14	Training Loss: 3.787895	Validation Loss: 4.440301
Batch_id: 15	Training Loss: 3.787895	Validation Loss: 4.406012
Batch_id: 16	Training Loss: 3.787895	Validation Loss: 4.417231
Batch_id: 17	Training Loss: 3.787895	Validation Loss: 4.386095
Batch_id: 18	Training Loss: 3.787895	Validation Loss: 4.397801
Batch_id: 19	Training Loss: 3.787895	Validation Loss: 4.380997
Batch_id: 20	Training Loss: 3.787895	Validation Loss: 4.346146
Batch_id: 21	Training Loss: 3.787895	Validation Loss: 4.353814
Batch_id: 22	Training Loss: 3.787895	Validation Loss: 4.357428
Batch_id: 23	Training Loss: 3.787895	Validation Loss: 4.352873
Batch_id: 24	Training Loss: 3.787895	Validation Loss: 4.310742
Batch_id: 25	Training Loss: 3.787895	Validation Loss: 4.302657
Batch_id: 26	Training Loss: 3.787895	Validation Loss: 4.296482
Batch_id: 27	Training Loss: 3.787895	Validation Loss: 4.296753
Batch_id: 28	Training Loss: 3.787895	Validation Loss: 4.284026
Batch_id: 29	Training Loss: 3.787895	Validation Loss: 4.293382
Batch_id: 30	Training Loss: 3.787895	Validation Loss: 4.286108
Batch_id: 31	Training Loss: 3.787895	Validation Loss: 4.280480
Batch_id: 32	Training Loss: 3.787895	Validation Loss: 4.277277
Batch_id: 33	Training Loss: 3.787895	Validation Loss: 4.269320
Batch_id: 34	Training Loss: 3.787895	Validation Loss: 4.272297
Batch_id: 35	Training Loss: 3.787895	Validation Loss: 4.268170
Batch_id: 36	Training Loss: 3.787895	Validation Loss: 4.252381
Batch_id: 37	Training Loss: 3.787895	Validation Loss: 4.265219
Batch_id: 38	Training Loss: 3.787895	Validation Loss: 4.261640
Batch_id: 39	Training Loss: 3.787895	Validation Loss: 4.252510
Batch_id: 40	Training Loss: 3.787895	Validation Loss: 4.247386
Batch_id: 41	Training Loss: 3.787895	Validation Loss: 4.249054
Batch_id: 42	Training Loss: 3.787895	Validation Loss: 4.255059
Batch_id: 43	Training Loss: 3.787895	Validation Loss: 4.265763
Batch_id: 44	Training Loss: 3.787895	Validation Loss: 4.274917
Batch_id: 45	Training Loss: 3.787895	Validation Loss: 4.268373
Batch_id: 46	Training Loss: 3.787895	Validation Loss: 4.268072

Batch_id: 47	Training Loss: 3.787895	Validation Loss: 4.272552
Batch_id: 48	Training Loss: 3.787895	Validation Loss: 4.278008
Batch_id: 49	Training Loss: 3.787895	Validation Loss: 4.277212
Batch_id: 50	Training Loss: 3.787895	Validation Loss: 4.263516
Batch_id: 51	Training Loss: 3.787895	Validation Loss: 4.260856
Batch_id: 52	Training Loss: 3.787895	Validation Loss: 4.243186
Batch_id: 53	Training Loss: 3.787895	Validation Loss: 4.234259
Batch_id: 54	Training Loss: 3.787895	Validation Loss: 4.252615
Batch_id: 55	Training Loss: 3.787895	Validation Loss: 4.242311
Batch_id: 56	Training Loss: 3.787895	Validation Loss: 4.262803
Batch_id: 57	Training Loss: 3.787895	Validation Loss: 4.262428
Batch_id: 58	Training Loss: 3.787895	Validation Loss: 4.252337
Batch_id: 59	Training Loss: 3.787895	Validation Loss: 4.242469
Batch_id: 60	Training Loss: 3.787895	Validation Loss: 4.234881
Batch_id: 61	Training Loss: 3.787895	Validation Loss: 4.232463
Batch_id: 62	Training Loss: 3.787895	Validation Loss: 4.250574
Batch_id: 63	Training Loss: 3.787895	Validation Loss: 4.256856
Batch_id: 64	Training Loss: 3.787895	Validation Loss: 4.246949
Batch_id: 65	Training Loss: 3.787895	Validation Loss: 4.239303
Batch_id: 66	Training Loss: 3.787895	Validation Loss: 4.229883
Batch_id: 67	Training Loss: 3.787895	Validation Loss: 4.229515
Batch_id: 68	Training Loss: 3.787895	Validation Loss: 4.222867
Batch_id: 69	Training Loss: 3.787895	Validation Loss: 4.223809
Batch_id: 70	Training Loss: 3.787895	Validation Loss: 4.215630
Batch_id: 71	Training Loss: 3.787895	Validation Loss: 4.212799
Batch_id: 72	Training Loss: 3.787895	Validation Loss: 4.199522
Batch_id: 73	Training Loss: 3.787895	Validation Loss: 4.197406
Batch_id: 74	Training Loss: 3.787895	Validation Loss: 4.193665
Batch_id: 75	Training Loss: 3.787895	Validation Loss: 4.198661
Batch_id: 76	Training Loss: 3.787895	Validation Loss: 4.195738
Batch_id: 77	Training Loss: 3.787895	Validation Loss: 4.202171
Batch_id: 78	Training Loss: 3.787895	Validation Loss: 4.200367
Batch_id: 79	Training Loss: 3.787895	Validation Loss: 4.194086
Batch_id: 80	Training Loss: 3.787895	Validation Loss: 4.192570
Batch_id: 81	Training Loss: 3.787895	Validation Loss: 4.193850
Batch_id: 82	Training Loss: 3.787895	Validation Loss: 4.201025
Batch_id: 83	Training Loss: 3.787895	Validation Loss: 4.197472
Batch_id: 84	Training Loss: 3.787895	Validation Loss: 4.187423
Batch_id: 85	Training Loss: 3.787895	Validation Loss: 4.187558
Batch_id: 86	Training Loss: 3.787895	Validation Loss: 4.179843
Batch_id: 87	Training Loss: 3.787895	Validation Loss: 4.175064
Batch_id: 88	Training Loss: 3.787895	Validation Loss: 4.173224
Batch_id: 89	Training Loss: 3.787895	Validation Loss: 4.182315
Batch_id: 90	Training Loss: 3.787895	Validation Loss: 4.182523
Batch_id: 91	Training Loss: 3.787895	Validation Loss: 4.172539
Batch_id: 92	Training Loss: 3.787895	Validation Loss: 4.163147
Batch_id: 93	Training Loss: 3.787895	Validation Loss: 4.164462
Batch_id: 94	Training Loss: 3.787895	Validation Loss: 4.158015

Batch_id: 95	Training Loss: 3.787895	Validation Loss: 4.161716
Batch_id: 96	Training Loss: 3.787895	Validation Loss: 4.158149
Batch_id: 97	Training Loss: 3.787895	Validation Loss: 4.162082
Batch_id: 98	Training Loss: 3.787895	Validation Loss: 4.169474
Batch_id: 99	Training Loss: 3.787895	Validation Loss: 4.169970
Batch_id: 100	Training Loss: 3.787895	Validation Loss: 4.160625
Batch_id: 101	Training Loss: 3.787895	Validation Loss: 4.157525
Batch_id: 102	Training Loss: 3.787895	Validation Loss: 4.155250
Batch_id: 103	Training Loss: 3.787895	Validation Loss: 4.156402
Batch_id: 104	Training Loss: 3.787895	Validation Loss: 4.156178

Epoch: 8	Training Loss: 3.787895	Validation Loss: 4.156178
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.702884	Validation Loss: 4.284630
Batch_id: 1	Training Loss: 3.702884	Validation Loss: 4.168609
Batch_id: 2	Training Loss: 3.702884	Validation Loss: 3.970355
Batch_id: 3	Training Loss: 3.702884	Validation Loss: 3.855852
Batch_id: 4	Training Loss: 3.702884	Validation Loss: 4.184290
Batch_id: 5	Training Loss: 3.702884	Validation Loss: 4.096097
Batch_id: 6	Training Loss: 3.702884	Validation Loss: 4.033116
Batch_id: 7	Training Loss: 3.702884	Validation Loss: 4.009159
Batch_id: 8	Training Loss: 3.702884	Validation Loss: 4.012391
Batch_id: 9	Training Loss: 3.702884	Validation Loss: 4.033426
Batch_id: 10	Training Loss: 3.702884	Validation Loss: 4.071327
Batch_id: 11	Training Loss: 3.702884	Validation Loss: 4.105222
Batch_id: 12	Training Loss: 3.702884	Validation Loss: 4.112801
Batch_id: 13	Training Loss: 3.702884	Validation Loss: 4.165797
Batch_id: 14	Training Loss: 3.702884	Validation Loss: 4.194017
Batch_id: 15	Training Loss: 3.702884	Validation Loss: 4.149137
Batch_id: 16	Training Loss: 3.702884	Validation Loss: 4.152790
Batch_id: 17	Training Loss: 3.702884	Validation Loss: 4.172384
Batch_id: 18	Training Loss: 3.702884	Validation Loss: 4.142502
Batch_id: 19	Training Loss: 3.702884	Validation Loss: 4.153419
Batch_id: 20	Training Loss: 3.702884	Validation Loss: 4.142090
Batch_id: 21	Training Loss: 3.702884	Validation Loss: 4.132077
Batch_id: 22	Training Loss: 3.702884	Validation Loss: 4.127345
Batch_id: 23	Training Loss: 3.702884	Validation Loss: 4.136786
Batch_id: 24	Training Loss: 3.702884	Validation Loss: 4.104791
Batch_id: 25	Training Loss: 3.702884	Validation Loss: 4.080684
Batch_id: 26	Training Loss: 3.702884	Validation Loss: 4.049097
Batch_id: 27	Training Loss: 3.702884	Validation Loss: 4.041512
Batch_id: 28	Training Loss: 3.702884	Validation Loss: 4.034992
Batch_id: 29	Training Loss: 3.702884	Validation Loss: 4.045363
Batch_id: 30	Training Loss: 3.702884	Validation Loss: 4.034028
Batch_id: 31	Training Loss: 3.702884	Validation Loss: 4.018754
Batch_id: 32	Training Loss: 3.702884	Validation Loss: 4.015614
Batch_id: 33	Training Loss: 3.702884	Validation Loss: 4.022617
Batch_id: 34	Training Loss: 3.702884	Validation Loss: 4.045361

Batch_id: 35	Training Loss: 3.702884	Validation Loss: 4.028546
Batch_id: 36	Training Loss: 3.702884	Validation Loss: 4.046868
Batch_id: 37	Training Loss: 3.702884	Validation Loss: 4.068200
Batch_id: 38	Training Loss: 3.702884	Validation Loss: 4.071227
Batch_id: 39	Training Loss: 3.702884	Validation Loss: 4.049006
Batch_id: 40	Training Loss: 3.702884	Validation Loss: 4.037508
Batch_id: 41	Training Loss: 3.702884	Validation Loss: 4.048252
Batch_id: 42	Training Loss: 3.702884	Validation Loss: 4.057087
Batch_id: 43	Training Loss: 3.702884	Validation Loss: 4.069393
Batch_id: 44	Training Loss: 3.702884	Validation Loss: 4.076910
Batch_id: 45	Training Loss: 3.702884	Validation Loss: 4.066500
Batch_id: 46	Training Loss: 3.702884	Validation Loss: 4.065054
Batch_id: 47	Training Loss: 3.702884	Validation Loss: 4.068788
Batch_id: 48	Training Loss: 3.702884	Validation Loss: 4.061106
Batch_id: 49	Training Loss: 3.702884	Validation Loss: 4.064429
Batch_id: 50	Training Loss: 3.702884	Validation Loss: 4.070564
Batch_id: 51	Training Loss: 3.702884	Validation Loss: 4.079928
Batch_id: 52	Training Loss: 3.702884	Validation Loss: 4.073772
Batch_id: 53	Training Loss: 3.702884	Validation Loss: 4.076475
Batch_id: 54	Training Loss: 3.702884	Validation Loss: 4.092556
Batch_id: 55	Training Loss: 3.702884	Validation Loss: 4.093606
Batch_id: 56	Training Loss: 3.702884	Validation Loss: 4.091199
Batch_id: 57	Training Loss: 3.702884	Validation Loss: 4.085192
Batch_id: 58	Training Loss: 3.702884	Validation Loss: 4.082603
Batch_id: 59	Training Loss: 3.702884	Validation Loss: 4.086944
Batch_id: 60	Training Loss: 3.702884	Validation Loss: 4.088382
Batch_id: 61	Training Loss: 3.702884	Validation Loss: 4.080340
Batch_id: 62	Training Loss: 3.702884	Validation Loss: 4.073609
Batch_id: 63	Training Loss: 3.702884	Validation Loss: 4.069960
Batch_id: 64	Training Loss: 3.702884	Validation Loss: 4.058393
Batch_id: 65	Training Loss: 3.702884	Validation Loss: 4.064639
Batch_id: 66	Training Loss: 3.702884	Validation Loss: 4.046921
Batch_id: 67	Training Loss: 3.702884	Validation Loss: 4.047744
Batch_id: 68	Training Loss: 3.702884	Validation Loss: 4.043866
Batch_id: 69	Training Loss: 3.702884	Validation Loss: 4.040219
Batch_id: 70	Training Loss: 3.702884	Validation Loss: 4.039983
Batch_id: 71	Training Loss: 3.702884	Validation Loss: 4.050280
Batch_id: 72	Training Loss: 3.702884	Validation Loss: 4.052656
Batch_id: 73	Training Loss: 3.702884	Validation Loss: 4.046731
Batch_id: 74	Training Loss: 3.702884	Validation Loss: 4.046082
Batch_id: 75	Training Loss: 3.702884	Validation Loss: 4.041910
Batch_id: 76	Training Loss: 3.702884	Validation Loss: 4.034230
Batch_id: 77	Training Loss: 3.702884	Validation Loss: 4.031864
Batch_id: 78	Training Loss: 3.702884	Validation Loss: 4.042389
Batch_id: 79	Training Loss: 3.702884	Validation Loss: 4.041409
Batch_id: 80	Training Loss: 3.702884	Validation Loss: 4.040437
Batch_id: 81	Training Loss: 3.702884	Validation Loss: 4.036259
Batch_id: 82	Training Loss: 3.702884	Validation Loss: 4.035584

Batch_id: 83	Training Loss: 3.702884	Validation Loss: 4.034017
Batch_id: 84	Training Loss: 3.702884	Validation Loss: 4.028885
Batch_id: 85	Training Loss: 3.702884	Validation Loss: 4.026560
Batch_id: 86	Training Loss: 3.702884	Validation Loss: 4.025517
Batch_id: 87	Training Loss: 3.702884	Validation Loss: 4.022112
Batch_id: 88	Training Loss: 3.702884	Validation Loss: 4.025409
Batch_id: 89	Training Loss: 3.702884	Validation Loss: 4.024779
Batch_id: 90	Training Loss: 3.702884	Validation Loss: 4.023980
Batch_id: 91	Training Loss: 3.702884	Validation Loss: 4.022176
Batch_id: 92	Training Loss: 3.702884	Validation Loss: 4.026200
Batch_id: 93	Training Loss: 3.702884	Validation Loss: 4.028195
Batch_id: 94	Training Loss: 3.702884	Validation Loss: 4.032361
Batch_id: 95	Training Loss: 3.702884	Validation Loss: 4.032499
Batch_id: 96	Training Loss: 3.702884	Validation Loss: 4.035905
Batch_id: 97	Training Loss: 3.702884	Validation Loss: 4.033904
Batch_id: 98	Training Loss: 3.702884	Validation Loss: 4.039175
Batch_id: 99	Training Loss: 3.702884	Validation Loss: 4.041639
Batch_id: 100	Training Loss: 3.702884	Validation Loss: 4.043434
Batch_id: 101	Training Loss: 3.702884	Validation Loss: 4.038224
Batch_id: 102	Training Loss: 3.702884	Validation Loss: 4.039255
Batch_id: 103	Training Loss: 3.702884	Validation Loss: 4.033457
Batch_id: 104	Training Loss: 3.702884	Validation Loss: 4.030919

Epoch: 9	Training Loss: 3.702884	Validation Loss: 4.030919
----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.602963	Validation Loss: 4.036531
Batch_id: 1	Training Loss: 3.602963	Validation Loss: 4.093529
Batch_id: 2	Training Loss: 3.602963	Validation Loss: 4.028302
Batch_id: 3	Training Loss: 3.602963	Validation Loss: 4.144238
Batch_id: 4	Training Loss: 3.602963	Validation Loss: 4.179192
Batch_id: 5	Training Loss: 3.602963	Validation Loss: 4.125367
Batch_id: 6	Training Loss: 3.602963	Validation Loss: 4.085088
Batch_id: 7	Training Loss: 3.602963	Validation Loss: 4.035962
Batch_id: 8	Training Loss: 3.602963	Validation Loss: 3.982732
Batch_id: 9	Training Loss: 3.602963	Validation Loss: 4.008136
Batch_id: 10	Training Loss: 3.602963	Validation Loss: 4.029064
Batch_id: 11	Training Loss: 3.602963	Validation Loss: 4.038863
Batch_id: 12	Training Loss: 3.602963	Validation Loss: 4.005420
Batch_id: 13	Training Loss: 3.602963	Validation Loss: 4.022479
Batch_id: 14	Training Loss: 3.602963	Validation Loss: 3.995020
Batch_id: 15	Training Loss: 3.602963	Validation Loss: 3.983394
Batch_id: 16	Training Loss: 3.602963	Validation Loss: 3.989979
Batch_id: 17	Training Loss: 3.602963	Validation Loss: 4.016993
Batch_id: 18	Training Loss: 3.602963	Validation Loss: 4.081778
Batch_id: 19	Training Loss: 3.602963	Validation Loss: 4.124763
Batch_id: 20	Training Loss: 3.602963	Validation Loss: 4.119211
Batch_id: 21	Training Loss: 3.602963	Validation Loss: 4.112823
Batch_id: 22	Training Loss: 3.602963	Validation Loss: 4.123522

Batch_id: 23	Training Loss: 3.602963	Validation Loss: 4.142640
Batch_id: 24	Training Loss: 3.602963	Validation Loss: 4.146516
Batch_id: 25	Training Loss: 3.602963	Validation Loss: 4.157497
Batch_id: 26	Training Loss: 3.602963	Validation Loss: 4.143065
Batch_id: 27	Training Loss: 3.602963	Validation Loss: 4.146536
Batch_id: 28	Training Loss: 3.602963	Validation Loss: 4.139521
Batch_id: 29	Training Loss: 3.602963	Validation Loss: 4.136253
Batch_id: 30	Training Loss: 3.602963	Validation Loss: 4.122655
Batch_id: 31	Training Loss: 3.602963	Validation Loss: 4.142653
Batch_id: 32	Training Loss: 3.602963	Validation Loss: 4.149951
Batch_id: 33	Training Loss: 3.602963	Validation Loss: 4.128911
Batch_id: 34	Training Loss: 3.602963	Validation Loss: 4.143976
Batch_id: 35	Training Loss: 3.602963	Validation Loss: 4.134424
Batch_id: 36	Training Loss: 3.602963	Validation Loss: 4.132689
Batch_id: 37	Training Loss: 3.602963	Validation Loss: 4.107514
Batch_id: 38	Training Loss: 3.602963	Validation Loss: 4.105730
Batch_id: 39	Training Loss: 3.602963	Validation Loss: 4.097394
Batch_id: 40	Training Loss: 3.602963	Validation Loss: 4.088612
Batch_id: 41	Training Loss: 3.602963	Validation Loss: 4.062759
Batch_id: 42	Training Loss: 3.602963	Validation Loss: 4.062387
Batch_id: 43	Training Loss: 3.602963	Validation Loss: 4.067483
Batch_id: 44	Training Loss: 3.602963	Validation Loss: 4.072114
Batch_id: 45	Training Loss: 3.602963	Validation Loss: 4.061037
Batch_id: 46	Training Loss: 3.602963	Validation Loss: 4.069098
Batch_id: 47	Training Loss: 3.602963	Validation Loss: 4.085526
Batch_id: 48	Training Loss: 3.602963	Validation Loss: 4.091166
Batch_id: 49	Training Loss: 3.602963	Validation Loss: 4.093153
Batch_id: 50	Training Loss: 3.602963	Validation Loss: 4.100079
Batch_id: 51	Training Loss: 3.602963	Validation Loss: 4.089519
Batch_id: 52	Training Loss: 3.602963	Validation Loss: 4.103894
Batch_id: 53	Training Loss: 3.602963	Validation Loss: 4.103020
Batch_id: 54	Training Loss: 3.602963	Validation Loss: 4.097587
Batch_id: 55	Training Loss: 3.602963	Validation Loss: 4.117098
Batch_id: 56	Training Loss: 3.602963	Validation Loss: 4.115874
Batch_id: 57	Training Loss: 3.602963	Validation Loss: 4.120108
Batch_id: 58	Training Loss: 3.602963	Validation Loss: 4.119093
Batch_id: 59	Training Loss: 3.602963	Validation Loss: 4.106321
Batch_id: 60	Training Loss: 3.602963	Validation Loss: 4.097656
Batch_id: 61	Training Loss: 3.602963	Validation Loss: 4.103169
Batch_id: 62	Training Loss: 3.602963	Validation Loss: 4.115819
Batch_id: 63	Training Loss: 3.602963	Validation Loss: 4.123366
Batch_id: 64	Training Loss: 3.602963	Validation Loss: 4.131355
Batch_id: 65	Training Loss: 3.602963	Validation Loss: 4.128009
Batch_id: 66	Training Loss: 3.602963	Validation Loss: 4.142564
Batch_id: 67	Training Loss: 3.602963	Validation Loss: 4.146137
Batch_id: 68	Training Loss: 3.602963	Validation Loss: 4.148557
Batch_id: 69	Training Loss: 3.602963	Validation Loss: 4.145637
Batch_id: 70	Training Loss: 3.602963	Validation Loss: 4.152750

Batch_id: 71	Training Loss: 3.602963	Validation Loss: 4.150926
Batch_id: 72	Training Loss: 3.602963	Validation Loss: 4.150935
Batch_id: 73	Training Loss: 3.602963	Validation Loss: 4.150477
Batch_id: 74	Training Loss: 3.602963	Validation Loss: 4.142752
Batch_id: 75	Training Loss: 3.602963	Validation Loss: 4.146317
Batch_id: 76	Training Loss: 3.602963	Validation Loss: 4.139841
Batch_id: 77	Training Loss: 3.602963	Validation Loss: 4.128528
Batch_id: 78	Training Loss: 3.602963	Validation Loss: 4.128997
Batch_id: 79	Training Loss: 3.602963	Validation Loss: 4.126404
Batch_id: 80	Training Loss: 3.602963	Validation Loss: 4.120313
Batch_id: 81	Training Loss: 3.602963	Validation Loss: 4.124624
Batch_id: 82	Training Loss: 3.602963	Validation Loss: 4.137909
Batch_id: 83	Training Loss: 3.602963	Validation Loss: 4.143719
Batch_id: 84	Training Loss: 3.602963	Validation Loss: 4.154081
Batch_id: 85	Training Loss: 3.602963	Validation Loss: 4.163192
Batch_id: 86	Training Loss: 3.602963	Validation Loss: 4.159350
Batch_id: 87	Training Loss: 3.602963	Validation Loss: 4.153049
Batch_id: 88	Training Loss: 3.602963	Validation Loss: 4.149662
Batch_id: 89	Training Loss: 3.602963	Validation Loss: 4.152518
Batch_id: 90	Training Loss: 3.602963	Validation Loss: 4.150957
Batch_id: 91	Training Loss: 3.602963	Validation Loss: 4.160851
Batch_id: 92	Training Loss: 3.602963	Validation Loss: 4.188055
Batch_id: 93	Training Loss: 3.602963	Validation Loss: 4.183558
Batch_id: 94	Training Loss: 3.602963	Validation Loss: 4.179762
Batch_id: 95	Training Loss: 3.602963	Validation Loss: 4.180574
Batch_id: 96	Training Loss: 3.602963	Validation Loss: 4.185413
Batch_id: 97	Training Loss: 3.602963	Validation Loss: 4.185426
Batch_id: 98	Training Loss: 3.602963	Validation Loss: 4.180177
Batch_id: 99	Training Loss: 3.602963	Validation Loss: 4.179488
Batch_id: 100	Training Loss: 3.602963	Validation Loss: 4.185986
Batch_id: 101	Training Loss: 3.602963	Validation Loss: 4.180009
Batch_id: 102	Training Loss: 3.602963	Validation Loss: 4.177250
Batch_id: 103	Training Loss: 3.602963	Validation Loss: 4.176354
Batch_id: 104	Training Loss: 3.602963	Validation Loss: 4.176571

Epoch: 10	Training Loss: 3.602963	Validation Loss: 4.176571
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.522853	Validation Loss: 3.933044
Batch_id: 1	Training Loss: 3.522853	Validation Loss: 4.555286
Batch_id: 2	Training Loss: 3.522853	Validation Loss: 4.500154
Batch_id: 3	Training Loss: 3.522853	Validation Loss: 4.370969
Batch_id: 4	Training Loss: 3.522853	Validation Loss: 4.400351
Batch_id: 5	Training Loss: 3.522853	Validation Loss: 4.467035
Batch_id: 6	Training Loss: 3.522853	Validation Loss: 4.398557
Batch_id: 7	Training Loss: 3.522853	Validation Loss: 4.362945
Batch_id: 8	Training Loss: 3.522853	Validation Loss: 4.315517
Batch_id: 9	Training Loss: 3.522853	Validation Loss: 4.243730
Batch_id: 10	Training Loss: 3.522853	Validation Loss: 4.238940

Batch_id: 11	Training Loss: 3.522853	Validation Loss: 4.156074
Batch_id: 12	Training Loss: 3.522853	Validation Loss: 4.167689
Batch_id: 13	Training Loss: 3.522853	Validation Loss: 4.096348
Batch_id: 14	Training Loss: 3.522853	Validation Loss: 4.095116
Batch_id: 15	Training Loss: 3.522853	Validation Loss: 4.104850
Batch_id: 16	Training Loss: 3.522853	Validation Loss: 4.105575
Batch_id: 17	Training Loss: 3.522853	Validation Loss: 4.094027
Batch_id: 18	Training Loss: 3.522853	Validation Loss: 4.088995
Batch_id: 19	Training Loss: 3.522853	Validation Loss: 4.158164
Batch_id: 20	Training Loss: 3.522853	Validation Loss: 4.173594
Batch_id: 21	Training Loss: 3.522853	Validation Loss: 4.145622
Batch_id: 22	Training Loss: 3.522853	Validation Loss: 4.169212
Batch_id: 23	Training Loss: 3.522853	Validation Loss: 4.180586
Batch_id: 24	Training Loss: 3.522853	Validation Loss: 4.162819
Batch_id: 25	Training Loss: 3.522853	Validation Loss: 4.177244
Batch_id: 26	Training Loss: 3.522853	Validation Loss: 4.184954
Batch_id: 27	Training Loss: 3.522853	Validation Loss: 4.172098
Batch_id: 28	Training Loss: 3.522853	Validation Loss: 4.166097
Batch_id: 29	Training Loss: 3.522853	Validation Loss: 4.160641
Batch_id: 30	Training Loss: 3.522853	Validation Loss: 4.120555
Batch_id: 31	Training Loss: 3.522853	Validation Loss: 4.117680
Batch_id: 32	Training Loss: 3.522853	Validation Loss: 4.145286
Batch_id: 33	Training Loss: 3.522853	Validation Loss: 4.149662
Batch_id: 34	Training Loss: 3.522853	Validation Loss: 4.138809
Batch_id: 35	Training Loss: 3.522853	Validation Loss: 4.133989
Batch_id: 36	Training Loss: 3.522853	Validation Loss: 4.143749
Batch_id: 37	Training Loss: 3.522853	Validation Loss: 4.141221
Batch_id: 38	Training Loss: 3.522853	Validation Loss: 4.132650
Batch_id: 39	Training Loss: 3.522853	Validation Loss: 4.120628
Batch_id: 40	Training Loss: 3.522853	Validation Loss: 4.118842
Batch_id: 41	Training Loss: 3.522853	Validation Loss: 4.104556
Batch_id: 42	Training Loss: 3.522853	Validation Loss: 4.091641
Batch_id: 43	Training Loss: 3.522853	Validation Loss: 4.081370
Batch_id: 44	Training Loss: 3.522853	Validation Loss: 4.079413
Batch_id: 45	Training Loss: 3.522853	Validation Loss: 4.074081
Batch_id: 46	Training Loss: 3.522853	Validation Loss: 4.073277
Batch_id: 47	Training Loss: 3.522853	Validation Loss: 4.083011
Batch_id: 48	Training Loss: 3.522853	Validation Loss: 4.078891
Batch_id: 49	Training Loss: 3.522853	Validation Loss: 4.098533
Batch_id: 50	Training Loss: 3.522853	Validation Loss: 4.102451
Batch_id: 51	Training Loss: 3.522853	Validation Loss: 4.086505
Batch_id: 52	Training Loss: 3.522853	Validation Loss: 4.080404
Batch_id: 53	Training Loss: 3.522853	Validation Loss: 4.088231
Batch_id: 54	Training Loss: 3.522853	Validation Loss: 4.074486
Batch_id: 55	Training Loss: 3.522853	Validation Loss: 4.066950
Batch_id: 56	Training Loss: 3.522853	Validation Loss: 4.066355
Batch_id: 57	Training Loss: 3.522853	Validation Loss: 4.069107
Batch_id: 58	Training Loss: 3.522853	Validation Loss: 4.055573

Batch_id: 59	Training Loss: 3.522853	Validation Loss: 4.044782
Batch_id: 60	Training Loss: 3.522853	Validation Loss: 4.047836
Batch_id: 61	Training Loss: 3.522853	Validation Loss: 4.045288
Batch_id: 62	Training Loss: 3.522853	Validation Loss: 4.059910
Batch_id: 63	Training Loss: 3.522853	Validation Loss: 4.062231
Batch_id: 64	Training Loss: 3.522853	Validation Loss: 4.051756
Batch_id: 65	Training Loss: 3.522853	Validation Loss: 4.044466
Batch_id: 66	Training Loss: 3.522853	Validation Loss: 4.056226
Batch_id: 67	Training Loss: 3.522853	Validation Loss: 4.047555
Batch_id: 68	Training Loss: 3.522853	Validation Loss: 4.051588
Batch_id: 69	Training Loss: 3.522853	Validation Loss: 4.064059
Batch_id: 70	Training Loss: 3.522853	Validation Loss: 4.067750
Batch_id: 71	Training Loss: 3.522853	Validation Loss: 4.061861
Batch_id: 72	Training Loss: 3.522853	Validation Loss: 4.046714
Batch_id: 73	Training Loss: 3.522853	Validation Loss: 4.044908
Batch_id: 74	Training Loss: 3.522853	Validation Loss: 4.043983
Batch_id: 75	Training Loss: 3.522853	Validation Loss: 4.044325
Batch_id: 76	Training Loss: 3.522853	Validation Loss: 4.038457
Batch_id: 77	Training Loss: 3.522853	Validation Loss: 4.038678
Batch_id: 78	Training Loss: 3.522853	Validation Loss: 4.031269
Batch_id: 79	Training Loss: 3.522853	Validation Loss: 4.028669
Batch_id: 80	Training Loss: 3.522853	Validation Loss: 4.037463
Batch_id: 81	Training Loss: 3.522853	Validation Loss: 4.039289
Batch_id: 82	Training Loss: 3.522853	Validation Loss: 4.047593
Batch_id: 83	Training Loss: 3.522853	Validation Loss: 4.046134
Batch_id: 84	Training Loss: 3.522853	Validation Loss: 4.035643
Batch_id: 85	Training Loss: 3.522853	Validation Loss: 4.043117
Batch_id: 86	Training Loss: 3.522853	Validation Loss: 4.046662
Batch_id: 87	Training Loss: 3.522853	Validation Loss: 4.042216
Batch_id: 88	Training Loss: 3.522853	Validation Loss: 4.038182
Batch_id: 89	Training Loss: 3.522853	Validation Loss: 4.038755
Batch_id: 90	Training Loss: 3.522853	Validation Loss: 4.046740
Batch_id: 91	Training Loss: 3.522853	Validation Loss: 4.044993
Batch_id: 92	Training Loss: 3.522853	Validation Loss: 4.055592
Batch_id: 93	Training Loss: 3.522853	Validation Loss: 4.053156
Batch_id: 94	Training Loss: 3.522853	Validation Loss: 4.054929
Batch_id: 95	Training Loss: 3.522853	Validation Loss: 4.064357
Batch_id: 96	Training Loss: 3.522853	Validation Loss: 4.064817
Batch_id: 97	Training Loss: 3.522853	Validation Loss: 4.069200
Batch_id: 98	Training Loss: 3.522853	Validation Loss: 4.069535
Batch_id: 99	Training Loss: 3.522853	Validation Loss: 4.071807
Batch_id: 100	Training Loss: 3.522853	Validation Loss: 4.076701
Batch_id: 101	Training Loss: 3.522853	Validation Loss: 4.081441
Batch_id: 102	Training Loss: 3.522853	Validation Loss: 4.077412
Batch_id: 103	Training Loss: 3.522853	Validation Loss: 4.068747
Batch_id: 104	Training Loss: 3.522853	Validation Loss: 4.066099

Epoch: 11

Training Loss: 3.522853

Validation Loss: 4.066099

Batch_id: 0	Training Loss: 3.446873	Validation Loss: 4.648608
Batch_id: 1	Training Loss: 3.446873	Validation Loss: 4.149773
Batch_id: 2	Training Loss: 3.446873	Validation Loss: 4.208932
Batch_id: 3	Training Loss: 3.446873	Validation Loss: 4.097767
Batch_id: 4	Training Loss: 3.446873	Validation Loss: 3.946456
Batch_id: 5	Training Loss: 3.446873	Validation Loss: 3.925601
Batch_id: 6	Training Loss: 3.446873	Validation Loss: 3.847990
Batch_id: 7	Training Loss: 3.446873	Validation Loss: 3.903947
Batch_id: 8	Training Loss: 3.446873	Validation Loss: 3.817551
Batch_id: 9	Training Loss: 3.446873	Validation Loss: 3.879922
Batch_id: 10	Training Loss: 3.446873	Validation Loss: 3.829784
Batch_id: 11	Training Loss: 3.446873	Validation Loss: 3.836542
Batch_id: 12	Training Loss: 3.446873	Validation Loss: 3.868073
Batch_id: 13	Training Loss: 3.446873	Validation Loss: 3.813890
Batch_id: 14	Training Loss: 3.446873	Validation Loss: 3.880858
Batch_id: 15	Training Loss: 3.446873	Validation Loss: 3.952824
Batch_id: 16	Training Loss: 3.446873	Validation Loss: 3.953493
Batch_id: 17	Training Loss: 3.446873	Validation Loss: 3.930817
Batch_id: 18	Training Loss: 3.446873	Validation Loss: 3.897108
Batch_id: 19	Training Loss: 3.446873	Validation Loss: 3.881713
Batch_id: 20	Training Loss: 3.446873	Validation Loss: 3.912995
Batch_id: 21	Training Loss: 3.446873	Validation Loss: 3.922606
Batch_id: 22	Training Loss: 3.446873	Validation Loss: 3.973716
Batch_id: 23	Training Loss: 3.446873	Validation Loss: 3.977009
Batch_id: 24	Training Loss: 3.446873	Validation Loss: 3.995394
Batch_id: 25	Training Loss: 3.446873	Validation Loss: 3.991530
Batch_id: 26	Training Loss: 3.446873	Validation Loss: 4.022368
Batch_id: 27	Training Loss: 3.446873	Validation Loss: 4.013664
Batch_id: 28	Training Loss: 3.446873	Validation Loss: 4.028927
Batch_id: 29	Training Loss: 3.446873	Validation Loss: 4.021409
Batch_id: 30	Training Loss: 3.446873	Validation Loss: 4.035646
Batch_id: 31	Training Loss: 3.446873	Validation Loss: 4.049594
Batch_id: 32	Training Loss: 3.446873	Validation Loss: 4.067707
Batch_id: 33	Training Loss: 3.446873	Validation Loss: 4.058087
Batch_id: 34	Training Loss: 3.446873	Validation Loss: 4.050037
Batch_id: 35	Training Loss: 3.446873	Validation Loss: 4.041514
Batch_id: 36	Training Loss: 3.446873	Validation Loss: 4.024767
Batch_id: 37	Training Loss: 3.446873	Validation Loss: 4.015255
Batch_id: 38	Training Loss: 3.446873	Validation Loss: 4.014922
Batch_id: 39	Training Loss: 3.446873	Validation Loss: 4.033657
Batch_id: 40	Training Loss: 3.446873	Validation Loss: 4.025537
Batch_id: 41	Training Loss: 3.446873	Validation Loss: 4.002339
Batch_id: 42	Training Loss: 3.446873	Validation Loss: 4.006545
Batch_id: 43	Training Loss: 3.446873	Validation Loss: 4.010539
Batch_id: 44	Training Loss: 3.446873	Validation Loss: 4.019431
Batch_id: 45	Training Loss: 3.446873	Validation Loss: 4.025408
Batch_id: 46	Training Loss: 3.446873	Validation Loss: 4.019869

Batch_id: 47	Training Loss: 3.446873	Validation Loss: 4.023518
Batch_id: 48	Training Loss: 3.446873	Validation Loss: 4.018909
Batch_id: 49	Training Loss: 3.446873	Validation Loss: 4.004381
Batch_id: 50	Training Loss: 3.446873	Validation Loss: 3.997630
Batch_id: 51	Training Loss: 3.446873	Validation Loss: 4.000732
Batch_id: 52	Training Loss: 3.446873	Validation Loss: 4.011095
Batch_id: 53	Training Loss: 3.446873	Validation Loss: 4.014647
Batch_id: 54	Training Loss: 3.446873	Validation Loss: 4.032178
Batch_id: 55	Training Loss: 3.446873	Validation Loss: 4.024391
Batch_id: 56	Training Loss: 3.446873	Validation Loss: 4.025538
Batch_id: 57	Training Loss: 3.446873	Validation Loss: 4.031947
Batch_id: 58	Training Loss: 3.446873	Validation Loss: 4.050191
Batch_id: 59	Training Loss: 3.446873	Validation Loss: 4.037312
Batch_id: 60	Training Loss: 3.446873	Validation Loss: 4.049654
Batch_id: 61	Training Loss: 3.446873	Validation Loss: 4.050934
Batch_id: 62	Training Loss: 3.446873	Validation Loss: 4.056474
Batch_id: 63	Training Loss: 3.446873	Validation Loss: 4.067807
Batch_id: 64	Training Loss: 3.446873	Validation Loss: 4.051768
Batch_id: 65	Training Loss: 3.446873	Validation Loss: 4.065971
Batch_id: 66	Training Loss: 3.446873	Validation Loss: 4.052317
Batch_id: 67	Training Loss: 3.446873	Validation Loss: 4.045942
Batch_id: 68	Training Loss: 3.446873	Validation Loss: 4.033195
Batch_id: 69	Training Loss: 3.446873	Validation Loss: 4.052749
Batch_id: 70	Training Loss: 3.446873	Validation Loss: 4.049304
Batch_id: 71	Training Loss: 3.446873	Validation Loss: 4.047970
Batch_id: 72	Training Loss: 3.446873	Validation Loss: 4.062524
Batch_id: 73	Training Loss: 3.446873	Validation Loss: 4.062379
Batch_id: 74	Training Loss: 3.446873	Validation Loss: 4.066791
Batch_id: 75	Training Loss: 3.446873	Validation Loss: 4.066724
Batch_id: 76	Training Loss: 3.446873	Validation Loss: 4.065133
Batch_id: 77	Training Loss: 3.446873	Validation Loss: 4.068596
Batch_id: 78	Training Loss: 3.446873	Validation Loss: 4.064044
Batch_id: 79	Training Loss: 3.446873	Validation Loss: 4.055902
Batch_id: 80	Training Loss: 3.446873	Validation Loss: 4.057599
Batch_id: 81	Training Loss: 3.446873	Validation Loss: 4.058765
Batch_id: 82	Training Loss: 3.446873	Validation Loss: 4.053619
Batch_id: 83	Training Loss: 3.446873	Validation Loss: 4.056404
Batch_id: 84	Training Loss: 3.446873	Validation Loss: 4.062468
Batch_id: 85	Training Loss: 3.446873	Validation Loss: 4.060599
Batch_id: 86	Training Loss: 3.446873	Validation Loss: 4.071001
Batch_id: 87	Training Loss: 3.446873	Validation Loss: 4.068667
Batch_id: 88	Training Loss: 3.446873	Validation Loss: 4.064568
Batch_id: 89	Training Loss: 3.446873	Validation Loss: 4.071752
Batch_id: 90	Training Loss: 3.446873	Validation Loss: 4.080685
Batch_id: 91	Training Loss: 3.446873	Validation Loss: 4.077601
Batch_id: 92	Training Loss: 3.446873	Validation Loss: 4.079924
Batch_id: 93	Training Loss: 3.446873	Validation Loss: 4.077954
Batch_id: 94	Training Loss: 3.446873	Validation Loss: 4.066023

Batch_id: 95	Training Loss: 3.446873	Validation Loss: 4.053584
Batch_id: 96	Training Loss: 3.446873	Validation Loss: 4.054975
Batch_id: 97	Training Loss: 3.446873	Validation Loss: 4.053059
Batch_id: 98	Training Loss: 3.446873	Validation Loss: 4.049707
Batch_id: 99	Training Loss: 3.446873	Validation Loss: 4.047050
Batch_id: 100	Training Loss: 3.446873	Validation Loss: 4.039611
Batch_id: 101	Training Loss: 3.446873	Validation Loss: 4.035523
Batch_id: 102	Training Loss: 3.446873	Validation Loss: 4.039405
Batch_id: 103	Training Loss: 3.446873	Validation Loss: 4.041519
Batch_id: 104	Training Loss: 3.446873	Validation Loss: 4.032383

Epoch: 12	Training Loss: 3.446873	Validation Loss: 4.032383
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.285221	Validation Loss: 4.036132
Batch_id: 1	Training Loss: 3.285221	Validation Loss: 4.188136
Batch_id: 2	Training Loss: 3.285221	Validation Loss: 4.127264
Batch_id: 3	Training Loss: 3.285221	Validation Loss: 4.244946
Batch_id: 4	Training Loss: 3.285221	Validation Loss: 4.079501
Batch_id: 5	Training Loss: 3.285221	Validation Loss: 4.120314
Batch_id: 6	Training Loss: 3.285221	Validation Loss: 4.172539
Batch_id: 7	Training Loss: 3.285221	Validation Loss: 4.126251
Batch_id: 8	Training Loss: 3.285221	Validation Loss: 4.172705
Batch_id: 9	Training Loss: 3.285221	Validation Loss: 4.099473
Batch_id: 10	Training Loss: 3.285221	Validation Loss: 4.061999
Batch_id: 11	Training Loss: 3.285221	Validation Loss: 3.986024
Batch_id: 12	Training Loss: 3.285221	Validation Loss: 3.994107
Batch_id: 13	Training Loss: 3.285221	Validation Loss: 3.950219
Batch_id: 14	Training Loss: 3.285221	Validation Loss: 3.958900
Batch_id: 15	Training Loss: 3.285221	Validation Loss: 3.992851
Batch_id: 16	Training Loss: 3.285221	Validation Loss: 4.043958
Batch_id: 17	Training Loss: 3.285221	Validation Loss: 4.053823
Batch_id: 18	Training Loss: 3.285221	Validation Loss: 4.054615
Batch_id: 19	Training Loss: 3.285221	Validation Loss: 4.045659
Batch_id: 20	Training Loss: 3.285221	Validation Loss: 4.070322
Batch_id: 21	Training Loss: 3.285221	Validation Loss: 4.079470
Batch_id: 22	Training Loss: 3.285221	Validation Loss: 4.082534
Batch_id: 23	Training Loss: 3.285221	Validation Loss: 4.078546
Batch_id: 24	Training Loss: 3.285221	Validation Loss: 4.130783
Batch_id: 25	Training Loss: 3.285221	Validation Loss: 4.093297
Batch_id: 26	Training Loss: 3.285221	Validation Loss: 4.096457
Batch_id: 27	Training Loss: 3.285221	Validation Loss: 4.090996
Batch_id: 28	Training Loss: 3.285221	Validation Loss: 4.095523
Batch_id: 29	Training Loss: 3.285221	Validation Loss: 4.092076
Batch_id: 30	Training Loss: 3.285221	Validation Loss: 4.119742
Batch_id: 31	Training Loss: 3.285221	Validation Loss: 4.111733
Batch_id: 32	Training Loss: 3.285221	Validation Loss: 4.131300
Batch_id: 33	Training Loss: 3.285221	Validation Loss: 4.121411
Batch_id: 34	Training Loss: 3.285221	Validation Loss: 4.111955

Batch_id: 35	Training Loss: 3.285221	Validation Loss: 4.120758
Batch_id: 36	Training Loss: 3.285221	Validation Loss: 4.112457
Batch_id: 37	Training Loss: 3.285221	Validation Loss: 4.091193
Batch_id: 38	Training Loss: 3.285221	Validation Loss: 4.083239
Batch_id: 39	Training Loss: 3.285221	Validation Loss: 4.074004
Batch_id: 40	Training Loss: 3.285221	Validation Loss: 4.089709
Batch_id: 41	Training Loss: 3.285221	Validation Loss: 4.063011
Batch_id: 42	Training Loss: 3.285221	Validation Loss: 4.076052
Batch_id: 43	Training Loss: 3.285221	Validation Loss: 4.076382
Batch_id: 44	Training Loss: 3.285221	Validation Loss: 4.079520
Batch_id: 45	Training Loss: 3.285221	Validation Loss: 4.096354
Batch_id: 46	Training Loss: 3.285221	Validation Loss: 4.095119
Batch_id: 47	Training Loss: 3.285221	Validation Loss: 4.100845
Batch_id: 48	Training Loss: 3.285221	Validation Loss: 4.102310
Batch_id: 49	Training Loss: 3.285221	Validation Loss: 4.113063
Batch_id: 50	Training Loss: 3.285221	Validation Loss: 4.105317
Batch_id: 51	Training Loss: 3.285221	Validation Loss: 4.135180
Batch_id: 52	Training Loss: 3.285221	Validation Loss: 4.125407
Batch_id: 53	Training Loss: 3.285221	Validation Loss: 4.116490
Batch_id: 54	Training Loss: 3.285221	Validation Loss: 4.125545
Batch_id: 55	Training Loss: 3.285221	Validation Loss: 4.137420
Batch_id: 56	Training Loss: 3.285221	Validation Loss: 4.144007
Batch_id: 57	Training Loss: 3.285221	Validation Loss: 4.148530
Batch_id: 58	Training Loss: 3.285221	Validation Loss: 4.147983
Batch_id: 59	Training Loss: 3.285221	Validation Loss: 4.160041
Batch_id: 60	Training Loss: 3.285221	Validation Loss: 4.183794
Batch_id: 61	Training Loss: 3.285221	Validation Loss: 4.166276
Batch_id: 62	Training Loss: 3.285221	Validation Loss: 4.166590
Batch_id: 63	Training Loss: 3.285221	Validation Loss: 4.164389
Batch_id: 64	Training Loss: 3.285221	Validation Loss: 4.164017
Batch_id: 65	Training Loss: 3.285221	Validation Loss: 4.149456
Batch_id: 66	Training Loss: 3.285221	Validation Loss: 4.145423
Batch_id: 67	Training Loss: 3.285221	Validation Loss: 4.139388
Batch_id: 68	Training Loss: 3.285221	Validation Loss: 4.133914
Batch_id: 69	Training Loss: 3.285221	Validation Loss: 4.143644
Batch_id: 70	Training Loss: 3.285221	Validation Loss: 4.144997
Batch_id: 71	Training Loss: 3.285221	Validation Loss: 4.136318
Batch_id: 72	Training Loss: 3.285221	Validation Loss: 4.131218
Batch_id: 73	Training Loss: 3.285221	Validation Loss: 4.133482
Batch_id: 74	Training Loss: 3.285221	Validation Loss: 4.130805
Batch_id: 75	Training Loss: 3.285221	Validation Loss: 4.143341
Batch_id: 76	Training Loss: 3.285221	Validation Loss: 4.132067
Batch_id: 77	Training Loss: 3.285221	Validation Loss: 4.131517
Batch_id: 78	Training Loss: 3.285221	Validation Loss: 4.144791
Batch_id: 79	Training Loss: 3.285221	Validation Loss: 4.134480
Batch_id: 80	Training Loss: 3.285221	Validation Loss: 4.120866
Batch_id: 81	Training Loss: 3.285221	Validation Loss: 4.130831
Batch_id: 82	Training Loss: 3.285221	Validation Loss: 4.134161

Batch_id: 83	Training Loss: 3.285221	Validation Loss: 4.133210
Batch_id: 84	Training Loss: 3.285221	Validation Loss: 4.134379
Batch_id: 85	Training Loss: 3.285221	Validation Loss: 4.137315
Batch_id: 86	Training Loss: 3.285221	Validation Loss: 4.131660
Batch_id: 87	Training Loss: 3.285221	Validation Loss: 4.132726
Batch_id: 88	Training Loss: 3.285221	Validation Loss: 4.121177
Batch_id: 89	Training Loss: 3.285221	Validation Loss: 4.117311
Batch_id: 90	Training Loss: 3.285221	Validation Loss: 4.124637
Batch_id: 91	Training Loss: 3.285221	Validation Loss: 4.124379
Batch_id: 92	Training Loss: 3.285221	Validation Loss: 4.121574
Batch_id: 93	Training Loss: 3.285221	Validation Loss: 4.127106
Batch_id: 94	Training Loss: 3.285221	Validation Loss: 4.124043
Batch_id: 95	Training Loss: 3.285221	Validation Loss: 4.117378
Batch_id: 96	Training Loss: 3.285221	Validation Loss: 4.118439
Batch_id: 97	Training Loss: 3.285221	Validation Loss: 4.111938
Batch_id: 98	Training Loss: 3.285221	Validation Loss: 4.110545
Batch_id: 99	Training Loss: 3.285221	Validation Loss: 4.103321
Batch_id: 100	Training Loss: 3.285221	Validation Loss: 4.103331
Batch_id: 101	Training Loss: 3.285221	Validation Loss: 4.108334
Batch_id: 102	Training Loss: 3.285221	Validation Loss: 4.110444
Batch_id: 103	Training Loss: 3.285221	Validation Loss: 4.106313
Batch_id: 104	Training Loss: 3.285221	Validation Loss: 4.106756

Epoch: 13	Training Loss: 3.285221	Validation Loss: 4.106756
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.214947	Validation Loss: 4.298831
Batch_id: 1	Training Loss: 3.214947	Validation Loss: 3.708062
Batch_id: 2	Training Loss: 3.214947	Validation Loss: 3.880346
Batch_id: 3	Training Loss: 3.214947	Validation Loss: 3.879412
Batch_id: 4	Training Loss: 3.214947	Validation Loss: 4.199269
Batch_id: 5	Training Loss: 3.214947	Validation Loss: 4.115516
Batch_id: 6	Training Loss: 3.214947	Validation Loss: 4.260086
Batch_id: 7	Training Loss: 3.214947	Validation Loss: 4.326625
Batch_id: 8	Training Loss: 3.214947	Validation Loss: 4.247854
Batch_id: 9	Training Loss: 3.214947	Validation Loss: 4.187212
Batch_id: 10	Training Loss: 3.214947	Validation Loss: 4.170661
Batch_id: 11	Training Loss: 3.214947	Validation Loss: 4.180919
Batch_id: 12	Training Loss: 3.214947	Validation Loss: 4.135420
Batch_id: 13	Training Loss: 3.214947	Validation Loss: 4.087384
Batch_id: 14	Training Loss: 3.214947	Validation Loss: 4.112422
Batch_id: 15	Training Loss: 3.214947	Validation Loss: 4.121051
Batch_id: 16	Training Loss: 3.214947	Validation Loss: 4.092611
Batch_id: 17	Training Loss: 3.214947	Validation Loss: 4.092326
Batch_id: 18	Training Loss: 3.214947	Validation Loss: 4.063075
Batch_id: 19	Training Loss: 3.214947	Validation Loss: 4.004914
Batch_id: 20	Training Loss: 3.214947	Validation Loss: 4.048792
Batch_id: 21	Training Loss: 3.214947	Validation Loss: 4.069993
Batch_id: 22	Training Loss: 3.214947	Validation Loss: 4.055261

Batch_id: 23	Training Loss: 3.214947	Validation Loss: 4.049287
Batch_id: 24	Training Loss: 3.214947	Validation Loss: 4.061814
Batch_id: 25	Training Loss: 3.214947	Validation Loss: 4.074340
Batch_id: 26	Training Loss: 3.214947	Validation Loss: 4.064089
Batch_id: 27	Training Loss: 3.214947	Validation Loss: 4.096428
Batch_id: 28	Training Loss: 3.214947	Validation Loss: 4.069314
Batch_id: 29	Training Loss: 3.214947	Validation Loss: 4.100665
Batch_id: 30	Training Loss: 3.214947	Validation Loss: 4.154274
Batch_id: 31	Training Loss: 3.214947	Validation Loss: 4.124164
Batch_id: 32	Training Loss: 3.214947	Validation Loss: 4.167574
Batch_id: 33	Training Loss: 3.214947	Validation Loss: 4.152363
Batch_id: 34	Training Loss: 3.214947	Validation Loss: 4.170045
Batch_id: 35	Training Loss: 3.214947	Validation Loss: 4.169415
Batch_id: 36	Training Loss: 3.214947	Validation Loss: 4.188943
Batch_id: 37	Training Loss: 3.214947	Validation Loss: 4.191761
Batch_id: 38	Training Loss: 3.214947	Validation Loss: 4.192604
Batch_id: 39	Training Loss: 3.214947	Validation Loss: 4.198770
Batch_id: 40	Training Loss: 3.214947	Validation Loss: 4.206950
Batch_id: 41	Training Loss: 3.214947	Validation Loss: 4.186568
Batch_id: 42	Training Loss: 3.214947	Validation Loss: 4.190747
Batch_id: 43	Training Loss: 3.214947	Validation Loss: 4.190344
Batch_id: 44	Training Loss: 3.214947	Validation Loss: 4.188931
Batch_id: 45	Training Loss: 3.214947	Validation Loss: 4.192608
Batch_id: 46	Training Loss: 3.214947	Validation Loss: 4.183577
Batch_id: 47	Training Loss: 3.214947	Validation Loss: 4.159527
Batch_id: 48	Training Loss: 3.214947	Validation Loss: 4.174811
Batch_id: 49	Training Loss: 3.214947	Validation Loss: 4.158081
Batch_id: 50	Training Loss: 3.214947	Validation Loss: 4.156208
Batch_id: 51	Training Loss: 3.214947	Validation Loss: 4.159872
Batch_id: 52	Training Loss: 3.214947	Validation Loss: 4.162684
Batch_id: 53	Training Loss: 3.214947	Validation Loss: 4.164825
Batch_id: 54	Training Loss: 3.214947	Validation Loss: 4.181261
Batch_id: 55	Training Loss: 3.214947	Validation Loss: 4.164659
Batch_id: 56	Training Loss: 3.214947	Validation Loss: 4.170742
Batch_id: 57	Training Loss: 3.214947	Validation Loss: 4.167395
Batch_id: 58	Training Loss: 3.214947	Validation Loss: 4.162445
Batch_id: 59	Training Loss: 3.214947	Validation Loss: 4.175539
Batch_id: 60	Training Loss: 3.214947	Validation Loss: 4.164266
Batch_id: 61	Training Loss: 3.214947	Validation Loss: 4.157613
Batch_id: 62	Training Loss: 3.214947	Validation Loss: 4.156118
Batch_id: 63	Training Loss: 3.214947	Validation Loss: 4.154081
Batch_id: 64	Training Loss: 3.214947	Validation Loss: 4.155313
Batch_id: 65	Training Loss: 3.214947	Validation Loss: 4.145262
Batch_id: 66	Training Loss: 3.214947	Validation Loss: 4.148197
Batch_id: 67	Training Loss: 3.214947	Validation Loss: 4.140311
Batch_id: 68	Training Loss: 3.214947	Validation Loss: 4.145910
Batch_id: 69	Training Loss: 3.214947	Validation Loss: 4.151402
Batch_id: 70	Training Loss: 3.214947	Validation Loss: 4.143976

Batch_id: 71	Training Loss: 3.214947	Validation Loss: 4.134197
Batch_id: 72	Training Loss: 3.214947	Validation Loss: 4.126492
Batch_id: 73	Training Loss: 3.214947	Validation Loss: 4.130876
Batch_id: 74	Training Loss: 3.214947	Validation Loss: 4.133383
Batch_id: 75	Training Loss: 3.214947	Validation Loss: 4.125106
Batch_id: 76	Training Loss: 3.214947	Validation Loss: 4.126503
Batch_id: 77	Training Loss: 3.214947	Validation Loss: 4.141368
Batch_id: 78	Training Loss: 3.214947	Validation Loss: 4.150552
Batch_id: 79	Training Loss: 3.214947	Validation Loss: 4.156526
Batch_id: 80	Training Loss: 3.214947	Validation Loss: 4.153443
Batch_id: 81	Training Loss: 3.214947	Validation Loss: 4.152891
Batch_id: 82	Training Loss: 3.214947	Validation Loss: 4.146790
Batch_id: 83	Training Loss: 3.214947	Validation Loss: 4.139025
Batch_id: 84	Training Loss: 3.214947	Validation Loss: 4.148389
Batch_id: 85	Training Loss: 3.214947	Validation Loss: 4.136243
Batch_id: 86	Training Loss: 3.214947	Validation Loss: 4.131997
Batch_id: 87	Training Loss: 3.214947	Validation Loss: 4.143554
Batch_id: 88	Training Loss: 3.214947	Validation Loss: 4.140468
Batch_id: 89	Training Loss: 3.214947	Validation Loss: 4.153475
Batch_id: 90	Training Loss: 3.214947	Validation Loss: 4.147090
Batch_id: 91	Training Loss: 3.214947	Validation Loss: 4.156840
Batch_id: 92	Training Loss: 3.214947	Validation Loss: 4.157126
Batch_id: 93	Training Loss: 3.214947	Validation Loss: 4.151471
Batch_id: 94	Training Loss: 3.214947	Validation Loss: 4.154091
Batch_id: 95	Training Loss: 3.214947	Validation Loss: 4.150392
Batch_id: 96	Training Loss: 3.214947	Validation Loss: 4.152147
Batch_id: 97	Training Loss: 3.214947	Validation Loss: 4.150889
Batch_id: 98	Training Loss: 3.214947	Validation Loss: 4.157124
Batch_id: 99	Training Loss: 3.214947	Validation Loss: 4.159647
Batch_id: 100	Training Loss: 3.214947	Validation Loss: 4.154327
Batch_id: 101	Training Loss: 3.214947	Validation Loss: 4.162988
Batch_id: 102	Training Loss: 3.214947	Validation Loss: 4.161910
Batch_id: 103	Training Loss: 3.214947	Validation Loss: 4.161998
Batch_id: 104	Training Loss: 3.214947	Validation Loss: 4.158825

Epoch: 14	Training Loss: 3.214947	Validation Loss: 4.158825
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 3.098364	Validation Loss: 3.813565
Batch_id: 1	Training Loss: 3.098364	Validation Loss: 3.628964
Batch_id: 2	Training Loss: 3.098364	Validation Loss: 3.684715
Batch_id: 3	Training Loss: 3.098364	Validation Loss: 3.845819
Batch_id: 4	Training Loss: 3.098364	Validation Loss: 3.969073
Batch_id: 5	Training Loss: 3.098364	Validation Loss: 4.110094
Batch_id: 6	Training Loss: 3.098364	Validation Loss: 4.058927
Batch_id: 7	Training Loss: 3.098364	Validation Loss: 4.018771
Batch_id: 8	Training Loss: 3.098364	Validation Loss: 4.014490
Batch_id: 9	Training Loss: 3.098364	Validation Loss: 3.965396
Batch_id: 10	Training Loss: 3.098364	Validation Loss: 4.000404

Batch_id: 11	Training Loss: 3.098364	Validation Loss: 4.067372
Batch_id: 12	Training Loss: 3.098364	Validation Loss: 4.091299
Batch_id: 13	Training Loss: 3.098364	Validation Loss: 4.088395
Batch_id: 14	Training Loss: 3.098364	Validation Loss: 4.099319
Batch_id: 15	Training Loss: 3.098364	Validation Loss: 4.056557
Batch_id: 16	Training Loss: 3.098364	Validation Loss: 4.071935
Batch_id: 17	Training Loss: 3.098364	Validation Loss: 4.072713
Batch_id: 18	Training Loss: 3.098364	Validation Loss: 4.018756
Batch_id: 19	Training Loss: 3.098364	Validation Loss: 4.040067
Batch_id: 20	Training Loss: 3.098364	Validation Loss: 4.052793
Batch_id: 21	Training Loss: 3.098364	Validation Loss: 4.030665
Batch_id: 22	Training Loss: 3.098364	Validation Loss: 4.038228
Batch_id: 23	Training Loss: 3.098364	Validation Loss: 3.994860
Batch_id: 24	Training Loss: 3.098364	Validation Loss: 3.991416
Batch_id: 25	Training Loss: 3.098364	Validation Loss: 3.967695
Batch_id: 26	Training Loss: 3.098364	Validation Loss: 4.002047
Batch_id: 27	Training Loss: 3.098364	Validation Loss: 4.018893
Batch_id: 28	Training Loss: 3.098364	Validation Loss: 3.998651
Batch_id: 29	Training Loss: 3.098364	Validation Loss: 3.992035
Batch_id: 30	Training Loss: 3.098364	Validation Loss: 4.002668
Batch_id: 31	Training Loss: 3.098364	Validation Loss: 3.983840
Batch_id: 32	Training Loss: 3.098364	Validation Loss: 4.012513
Batch_id: 33	Training Loss: 3.098364	Validation Loss: 4.024028
Batch_id: 34	Training Loss: 3.098364	Validation Loss: 4.040526
Batch_id: 35	Training Loss: 3.098364	Validation Loss: 4.026699
Batch_id: 36	Training Loss: 3.098364	Validation Loss: 4.022130
Batch_id: 37	Training Loss: 3.098364	Validation Loss: 4.026946
Batch_id: 38	Training Loss: 3.098364	Validation Loss: 4.018954
Batch_id: 39	Training Loss: 3.098364	Validation Loss: 4.045509
Batch_id: 40	Training Loss: 3.098364	Validation Loss: 4.041488
Batch_id: 41	Training Loss: 3.098364	Validation Loss: 4.029306
Batch_id: 42	Training Loss: 3.098364	Validation Loss: 4.053236
Batch_id: 43	Training Loss: 3.098364	Validation Loss: 4.061136
Batch_id: 44	Training Loss: 3.098364	Validation Loss: 4.051617
Batch_id: 45	Training Loss: 3.098364	Validation Loss: 4.069470
Batch_id: 46	Training Loss: 3.098364	Validation Loss: 4.084260
Batch_id: 47	Training Loss: 3.098364	Validation Loss: 4.074655
Batch_id: 48	Training Loss: 3.098364	Validation Loss: 4.062620
Batch_id: 49	Training Loss: 3.098364	Validation Loss: 4.053417
Batch_id: 50	Training Loss: 3.098364	Validation Loss: 4.062047
Batch_id: 51	Training Loss: 3.098364	Validation Loss: 4.086449
Batch_id: 52	Training Loss: 3.098364	Validation Loss: 4.099956
Batch_id: 53	Training Loss: 3.098364	Validation Loss: 4.100509
Batch_id: 54	Training Loss: 3.098364	Validation Loss: 4.094103
Batch_id: 55	Training Loss: 3.098364	Validation Loss: 4.089485
Batch_id: 56	Training Loss: 3.098364	Validation Loss: 4.093917
Batch_id: 57	Training Loss: 3.098364	Validation Loss: 4.110457
Batch_id: 58	Training Loss: 3.098364	Validation Loss: 4.109438

Batch_id: 59	Training Loss: 3.098364	Validation Loss: 4.123971
Batch_id: 60	Training Loss: 3.098364	Validation Loss: 4.137700
Batch_id: 61	Training Loss: 3.098364	Validation Loss: 4.148686
Batch_id: 62	Training Loss: 3.098364	Validation Loss: 4.145986
Batch_id: 63	Training Loss: 3.098364	Validation Loss: 4.167824
Batch_id: 64	Training Loss: 3.098364	Validation Loss: 4.165451
Batch_id: 65	Training Loss: 3.098364	Validation Loss: 4.163688
Batch_id: 66	Training Loss: 3.098364	Validation Loss: 4.141313
Batch_id: 67	Training Loss: 3.098364	Validation Loss: 4.139029
Batch_id: 68	Training Loss: 3.098364	Validation Loss: 4.136693
Batch_id: 69	Training Loss: 3.098364	Validation Loss: 4.126186
Batch_id: 70	Training Loss: 3.098364	Validation Loss: 4.114608
Batch_id: 71	Training Loss: 3.098364	Validation Loss: 4.117985
Batch_id: 72	Training Loss: 3.098364	Validation Loss: 4.118902
Batch_id: 73	Training Loss: 3.098364	Validation Loss: 4.114693
Batch_id: 74	Training Loss: 3.098364	Validation Loss: 4.126032
Batch_id: 75	Training Loss: 3.098364	Validation Loss: 4.124839
Batch_id: 76	Training Loss: 3.098364	Validation Loss: 4.134131
Batch_id: 77	Training Loss: 3.098364	Validation Loss: 4.128097
Batch_id: 78	Training Loss: 3.098364	Validation Loss: 4.137174
Batch_id: 79	Training Loss: 3.098364	Validation Loss: 4.135915
Batch_id: 80	Training Loss: 3.098364	Validation Loss: 4.131012
Batch_id: 81	Training Loss: 3.098364	Validation Loss: 4.149241
Batch_id: 82	Training Loss: 3.098364	Validation Loss: 4.141449
Batch_id: 83	Training Loss: 3.098364	Validation Loss: 4.146105
Batch_id: 84	Training Loss: 3.098364	Validation Loss: 4.128312
Batch_id: 85	Training Loss: 3.098364	Validation Loss: 4.140189
Batch_id: 86	Training Loss: 3.098364	Validation Loss: 4.152071
Batch_id: 87	Training Loss: 3.098364	Validation Loss: 4.157354
Batch_id: 88	Training Loss: 3.098364	Validation Loss: 4.152051
Batch_id: 89	Training Loss: 3.098364	Validation Loss: 4.148207
Batch_id: 90	Training Loss: 3.098364	Validation Loss: 4.150166
Batch_id: 91	Training Loss: 3.098364	Validation Loss: 4.145578
Batch_id: 92	Training Loss: 3.098364	Validation Loss: 4.148221
Batch_id: 93	Training Loss: 3.098364	Validation Loss: 4.142836
Batch_id: 94	Training Loss: 3.098364	Validation Loss: 4.130662
Batch_id: 95	Training Loss: 3.098364	Validation Loss: 4.126773
Batch_id: 96	Training Loss: 3.098364	Validation Loss: 4.123829
Batch_id: 97	Training Loss: 3.098364	Validation Loss: 4.128601
Batch_id: 98	Training Loss: 3.098364	Validation Loss: 4.125041
Batch_id: 99	Training Loss: 3.098364	Validation Loss: 4.124900
Batch_id: 100	Training Loss: 3.098364	Validation Loss: 4.124508
Batch_id: 101	Training Loss: 3.098364	Validation Loss: 4.128575
Batch_id: 102	Training Loss: 3.098364	Validation Loss: 4.122984
Batch_id: 103	Training Loss: 3.098364	Validation Loss: 4.128671
Batch_id: 104	Training Loss: 3.098364	Validation Loss: 4.126697

Epoch: 15

Training Loss: 3.098364

Validation Loss: 4.126697

Batch_id: 0	Training Loss: 2.987438	Validation Loss: 3.891010
Batch_id: 1	Training Loss: 2.987438	Validation Loss: 3.948180
Batch_id: 2	Training Loss: 2.987438	Validation Loss: 4.002775
Batch_id: 3	Training Loss: 2.987438	Validation Loss: 4.107818
Batch_id: 4	Training Loss: 2.987438	Validation Loss: 3.968165
Batch_id: 5	Training Loss: 2.987438	Validation Loss: 4.014758
Batch_id: 6	Training Loss: 2.987438	Validation Loss: 4.060091
Batch_id: 7	Training Loss: 2.987438	Validation Loss: 3.941934
Batch_id: 8	Training Loss: 2.987438	Validation Loss: 4.081299
Batch_id: 9	Training Loss: 2.987438	Validation Loss: 4.096993
Batch_id: 10	Training Loss: 2.987438	Validation Loss: 4.045768
Batch_id: 11	Training Loss: 2.987438	Validation Loss: 4.231416
Batch_id: 12	Training Loss: 2.987438	Validation Loss: 4.208972
Batch_id: 13	Training Loss: 2.987438	Validation Loss: 4.246315
Batch_id: 14	Training Loss: 2.987438	Validation Loss: 4.206046
Batch_id: 15	Training Loss: 2.987438	Validation Loss: 4.181799
Batch_id: 16	Training Loss: 2.987438	Validation Loss: 4.116381
Batch_id: 17	Training Loss: 2.987438	Validation Loss: 4.143152
Batch_id: 18	Training Loss: 2.987438	Validation Loss: 4.202818
Batch_id: 19	Training Loss: 2.987438	Validation Loss: 4.200050
Batch_id: 20	Training Loss: 2.987438	Validation Loss: 4.205611
Batch_id: 21	Training Loss: 2.987438	Validation Loss: 4.202659
Batch_id: 22	Training Loss: 2.987438	Validation Loss: 4.203500
Batch_id: 23	Training Loss: 2.987438	Validation Loss: 4.183984
Batch_id: 24	Training Loss: 2.987438	Validation Loss: 4.158516
Batch_id: 25	Training Loss: 2.987438	Validation Loss: 4.193694
Batch_id: 26	Training Loss: 2.987438	Validation Loss: 4.205530
Batch_id: 27	Training Loss: 2.987438	Validation Loss: 4.176764
Batch_id: 28	Training Loss: 2.987438	Validation Loss: 4.190938
Batch_id: 29	Training Loss: 2.987438	Validation Loss: 4.170367
Batch_id: 30	Training Loss: 2.987438	Validation Loss: 4.197550
Batch_id: 31	Training Loss: 2.987438	Validation Loss: 4.176470
Batch_id: 32	Training Loss: 2.987438	Validation Loss: 4.196270
Batch_id: 33	Training Loss: 2.987438	Validation Loss: 4.211653
Batch_id: 34	Training Loss: 2.987438	Validation Loss: 4.228311
Batch_id: 35	Training Loss: 2.987438	Validation Loss: 4.231306
Batch_id: 36	Training Loss: 2.987438	Validation Loss: 4.217924
Batch_id: 37	Training Loss: 2.987438	Validation Loss: 4.196052
Batch_id: 38	Training Loss: 2.987438	Validation Loss: 4.226389
Batch_id: 39	Training Loss: 2.987438	Validation Loss: 4.239143
Batch_id: 40	Training Loss: 2.987438	Validation Loss: 4.231510
Batch_id: 41	Training Loss: 2.987438	Validation Loss: 4.219468
Batch_id: 42	Training Loss: 2.987438	Validation Loss: 4.231870
Batch_id: 43	Training Loss: 2.987438	Validation Loss: 4.227975
Batch_id: 44	Training Loss: 2.987438	Validation Loss: 4.239722
Batch_id: 45	Training Loss: 2.987438	Validation Loss: 4.223397
Batch_id: 46	Training Loss: 2.987438	Validation Loss: 4.217772

Batch_id: 47	Training Loss: 2.987438	Validation Loss: 4.229790
Batch_id: 48	Training Loss: 2.987438	Validation Loss: 4.253642
Batch_id: 49	Training Loss: 2.987438	Validation Loss: 4.255153
Batch_id: 50	Training Loss: 2.987438	Validation Loss: 4.271385
Batch_id: 51	Training Loss: 2.987438	Validation Loss: 4.276390
Batch_id: 52	Training Loss: 2.987438	Validation Loss: 4.286193
Batch_id: 53	Training Loss: 2.987438	Validation Loss: 4.263037
Batch_id: 54	Training Loss: 2.987438	Validation Loss: 4.251730
Batch_id: 55	Training Loss: 2.987438	Validation Loss: 4.252571
Batch_id: 56	Training Loss: 2.987438	Validation Loss: 4.272778
Batch_id: 57	Training Loss: 2.987438	Validation Loss: 4.268250
Batch_id: 58	Training Loss: 2.987438	Validation Loss: 4.263472
Batch_id: 59	Training Loss: 2.987438	Validation Loss: 4.260004
Batch_id: 60	Training Loss: 2.987438	Validation Loss: 4.265062
Batch_id: 61	Training Loss: 2.987438	Validation Loss: 4.273727
Batch_id: 62	Training Loss: 2.987438	Validation Loss: 4.247828
Batch_id: 63	Training Loss: 2.987438	Validation Loss: 4.263327
Batch_id: 64	Training Loss: 2.987438	Validation Loss: 4.257129
Batch_id: 65	Training Loss: 2.987438	Validation Loss: 4.265448
Batch_id: 66	Training Loss: 2.987438	Validation Loss: 4.256149
Batch_id: 67	Training Loss: 2.987438	Validation Loss: 4.256838
Batch_id: 68	Training Loss: 2.987438	Validation Loss: 4.265756
Batch_id: 69	Training Loss: 2.987438	Validation Loss: 4.272961
Batch_id: 70	Training Loss: 2.987438	Validation Loss: 4.283189
Batch_id: 71	Training Loss: 2.987438	Validation Loss: 4.303966
Batch_id: 72	Training Loss: 2.987438	Validation Loss: 4.294681
Batch_id: 73	Training Loss: 2.987438	Validation Loss: 4.277833
Batch_id: 74	Training Loss: 2.987438	Validation Loss: 4.290172
Batch_id: 75	Training Loss: 2.987438	Validation Loss: 4.270634
Batch_id: 76	Training Loss: 2.987438	Validation Loss: 4.280052
Batch_id: 77	Training Loss: 2.987438	Validation Loss: 4.270078
Batch_id: 78	Training Loss: 2.987438	Validation Loss: 4.262282
Batch_id: 79	Training Loss: 2.987438	Validation Loss: 4.259022
Batch_id: 80	Training Loss: 2.987438	Validation Loss: 4.262173
Batch_id: 81	Training Loss: 2.987438	Validation Loss: 4.276204
Batch_id: 82	Training Loss: 2.987438	Validation Loss: 4.260845
Batch_id: 83	Training Loss: 2.987438	Validation Loss: 4.269815
Batch_id: 84	Training Loss: 2.987438	Validation Loss: 4.262179
Batch_id: 85	Training Loss: 2.987438	Validation Loss: 4.253901
Batch_id: 86	Training Loss: 2.987438	Validation Loss: 4.258864
Batch_id: 87	Training Loss: 2.987438	Validation Loss: 4.264404
Batch_id: 88	Training Loss: 2.987438	Validation Loss: 4.272905
Batch_id: 89	Training Loss: 2.987438	Validation Loss: 4.279335
Batch_id: 90	Training Loss: 2.987438	Validation Loss: 4.287915
Batch_id: 91	Training Loss: 2.987438	Validation Loss: 4.295434
Batch_id: 92	Training Loss: 2.987438	Validation Loss: 4.299354
Batch_id: 93	Training Loss: 2.987438	Validation Loss: 4.296021
Batch_id: 94	Training Loss: 2.987438	Validation Loss: 4.290190

Batch_id: 95	Training Loss: 2.987438	Validation Loss: 4.287309
Batch_id: 96	Training Loss: 2.987438	Validation Loss: 4.282817
Batch_id: 97	Training Loss: 2.987438	Validation Loss: 4.270347
Batch_id: 98	Training Loss: 2.987438	Validation Loss: 4.267070
Batch_id: 99	Training Loss: 2.987438	Validation Loss: 4.263291
Batch_id: 100	Training Loss: 2.987438	Validation Loss: 4.267167
Batch_id: 101	Training Loss: 2.987438	Validation Loss: 4.270412
Batch_id: 102	Training Loss: 2.987438	Validation Loss: 4.276748
Batch_id: 103	Training Loss: 2.987438	Validation Loss: 4.265653
Batch_id: 104	Training Loss: 2.987438	Validation Loss: 4.265287

Epoch: 16	Training Loss: 2.987438	Validation Loss: 4.265287
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 2.895943	Validation Loss: 5.354654
Batch_id: 1	Training Loss: 2.895943	Validation Loss: 5.152167
Batch_id: 2	Training Loss: 2.895943	Validation Loss: 4.583846
Batch_id: 3	Training Loss: 2.895943	Validation Loss: 4.297986
Batch_id: 4	Training Loss: 2.895943	Validation Loss: 4.165758
Batch_id: 5	Training Loss: 2.895943	Validation Loss: 3.820803
Batch_id: 6	Training Loss: 2.895943	Validation Loss: 3.803576
Batch_id: 7	Training Loss: 2.895943	Validation Loss: 3.884217
Batch_id: 8	Training Loss: 2.895943	Validation Loss: 3.934703
Batch_id: 9	Training Loss: 2.895943	Validation Loss: 3.998870
Batch_id: 10	Training Loss: 2.895943	Validation Loss: 3.973445
Batch_id: 11	Training Loss: 2.895943	Validation Loss: 3.988753
Batch_id: 12	Training Loss: 2.895943	Validation Loss: 4.094999
Batch_id: 13	Training Loss: 2.895943	Validation Loss: 4.126974
Batch_id: 14	Training Loss: 2.895943	Validation Loss: 4.092411
Batch_id: 15	Training Loss: 2.895943	Validation Loss: 4.053146
Batch_id: 16	Training Loss: 2.895943	Validation Loss: 3.991331
Batch_id: 17	Training Loss: 2.895943	Validation Loss: 4.010198
Batch_id: 18	Training Loss: 2.895943	Validation Loss: 4.020238
Batch_id: 19	Training Loss: 2.895943	Validation Loss: 4.021884
Batch_id: 20	Training Loss: 2.895943	Validation Loss: 3.967834
Batch_id: 21	Training Loss: 2.895943	Validation Loss: 3.995926
Batch_id: 22	Training Loss: 2.895943	Validation Loss: 3.938919
Batch_id: 23	Training Loss: 2.895943	Validation Loss: 3.982483
Batch_id: 24	Training Loss: 2.895943	Validation Loss: 3.993779
Batch_id: 25	Training Loss: 2.895943	Validation Loss: 3.969430
Batch_id: 26	Training Loss: 2.895943	Validation Loss: 4.022101
Batch_id: 27	Training Loss: 2.895943	Validation Loss: 4.037144
Batch_id: 28	Training Loss: 2.895943	Validation Loss: 4.022507
Batch_id: 29	Training Loss: 2.895943	Validation Loss: 4.012115
Batch_id: 30	Training Loss: 2.895943	Validation Loss: 4.008785
Batch_id: 31	Training Loss: 2.895943	Validation Loss: 4.014463
Batch_id: 32	Training Loss: 2.895943	Validation Loss: 4.032525
Batch_id: 33	Training Loss: 2.895943	Validation Loss: 4.018411
Batch_id: 34	Training Loss: 2.895943	Validation Loss: 4.051407

Batch_id: 35	Training Loss: 2.895943	Validation Loss: 4.086738
Batch_id: 36	Training Loss: 2.895943	Validation Loss: 4.093658
Batch_id: 37	Training Loss: 2.895943	Validation Loss: 4.067841
Batch_id: 38	Training Loss: 2.895943	Validation Loss: 4.076553
Batch_id: 39	Training Loss: 2.895943	Validation Loss: 4.067583
Batch_id: 40	Training Loss: 2.895943	Validation Loss: 4.053486
Batch_id: 41	Training Loss: 2.895943	Validation Loss: 4.075126
Batch_id: 42	Training Loss: 2.895943	Validation Loss: 4.064689
Batch_id: 43	Training Loss: 2.895943	Validation Loss: 4.058831
Batch_id: 44	Training Loss: 2.895943	Validation Loss: 4.075316
Batch_id: 45	Training Loss: 2.895943	Validation Loss: 4.064069
Batch_id: 46	Training Loss: 2.895943	Validation Loss: 4.052931
Batch_id: 47	Training Loss: 2.895943	Validation Loss: 4.054853
Batch_id: 48	Training Loss: 2.895943	Validation Loss: 4.041612
Batch_id: 49	Training Loss: 2.895943	Validation Loss: 4.047946
Batch_id: 50	Training Loss: 2.895943	Validation Loss: 4.047867
Batch_id: 51	Training Loss: 2.895943	Validation Loss: 4.046781
Batch_id: 52	Training Loss: 2.895943	Validation Loss: 4.043822
Batch_id: 53	Training Loss: 2.895943	Validation Loss: 4.042560
Batch_id: 54	Training Loss: 2.895943	Validation Loss: 4.022687
Batch_id: 55	Training Loss: 2.895943	Validation Loss: 4.022399
Batch_id: 56	Training Loss: 2.895943	Validation Loss: 4.037632
Batch_id: 57	Training Loss: 2.895943	Validation Loss: 4.037708
Batch_id: 58	Training Loss: 2.895943	Validation Loss: 4.043907
Batch_id: 59	Training Loss: 2.895943	Validation Loss: 4.045502
Batch_id: 60	Training Loss: 2.895943	Validation Loss: 4.058625
Batch_id: 61	Training Loss: 2.895943	Validation Loss: 4.045249
Batch_id: 62	Training Loss: 2.895943	Validation Loss: 4.041963
Batch_id: 63	Training Loss: 2.895943	Validation Loss: 4.055285
Batch_id: 64	Training Loss: 2.895943	Validation Loss: 4.058090
Batch_id: 65	Training Loss: 2.895943	Validation Loss: 4.069705
Batch_id: 66	Training Loss: 2.895943	Validation Loss: 4.058690
Batch_id: 67	Training Loss: 2.895943	Validation Loss: 4.064528
Batch_id: 68	Training Loss: 2.895943	Validation Loss: 4.072990
Batch_id: 69	Training Loss: 2.895943	Validation Loss: 4.080071
Batch_id: 70	Training Loss: 2.895943	Validation Loss: 4.083572
Batch_id: 71	Training Loss: 2.895943	Validation Loss: 4.070868
Batch_id: 72	Training Loss: 2.895943	Validation Loss: 4.069664
Batch_id: 73	Training Loss: 2.895943	Validation Loss: 4.075713
Batch_id: 74	Training Loss: 2.895943	Validation Loss: 4.088567
Batch_id: 75	Training Loss: 2.895943	Validation Loss: 4.091091
Batch_id: 76	Training Loss: 2.895943	Validation Loss: 4.090395
Batch_id: 77	Training Loss: 2.895943	Validation Loss: 4.095489
Batch_id: 78	Training Loss: 2.895943	Validation Loss: 4.080070
Batch_id: 79	Training Loss: 2.895943	Validation Loss: 4.084296
Batch_id: 80	Training Loss: 2.895943	Validation Loss: 4.084873
Batch_id: 81	Training Loss: 2.895943	Validation Loss: 4.093815
Batch_id: 82	Training Loss: 2.895943	Validation Loss: 4.103232

Batch_id: 83	Training Loss: 2.895943	Validation Loss: 4.105867
Batch_id: 84	Training Loss: 2.895943	Validation Loss: 4.103080
Batch_id: 85	Training Loss: 2.895943	Validation Loss: 4.112142
Batch_id: 86	Training Loss: 2.895943	Validation Loss: 4.115969
Batch_id: 87	Training Loss: 2.895943	Validation Loss: 4.120290
Batch_id: 88	Training Loss: 2.895943	Validation Loss: 4.121624
Batch_id: 89	Training Loss: 2.895943	Validation Loss: 4.113605
Batch_id: 90	Training Loss: 2.895943	Validation Loss: 4.113611
Batch_id: 91	Training Loss: 2.895943	Validation Loss: 4.114833
Batch_id: 92	Training Loss: 2.895943	Validation Loss: 4.119416
Batch_id: 93	Training Loss: 2.895943	Validation Loss: 4.124724
Batch_id: 94	Training Loss: 2.895943	Validation Loss: 4.134312
Batch_id: 95	Training Loss: 2.895943	Validation Loss: 4.138099
Batch_id: 96	Training Loss: 2.895943	Validation Loss: 4.149556
Batch_id: 97	Training Loss: 2.895943	Validation Loss: 4.152012
Batch_id: 98	Training Loss: 2.895943	Validation Loss: 4.149956
Batch_id: 99	Training Loss: 2.895943	Validation Loss: 4.152752
Batch_id: 100	Training Loss: 2.895943	Validation Loss: 4.144131
Batch_id: 101	Training Loss: 2.895943	Validation Loss: 4.145398
Batch_id: 102	Training Loss: 2.895943	Validation Loss: 4.146351
Batch_id: 103	Training Loss: 2.895943	Validation Loss: 4.139194
Batch_id: 104	Training Loss: 2.895943	Validation Loss: 4.159498

Epoch: 17	Training Loss: 2.895943	Validation Loss: 4.159498
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 2.724022	Validation Loss: 3.550939
Batch_id: 1	Training Loss: 2.724022	Validation Loss: 4.064996
Batch_id: 2	Training Loss: 2.724022	Validation Loss: 3.807431
Batch_id: 3	Training Loss: 2.724022	Validation Loss: 4.223155
Batch_id: 4	Training Loss: 2.724022	Validation Loss: 3.927362
Batch_id: 5	Training Loss: 2.724022	Validation Loss: 4.167427
Batch_id: 6	Training Loss: 2.724022	Validation Loss: 4.157387
Batch_id: 7	Training Loss: 2.724022	Validation Loss: 4.127909
Batch_id: 8	Training Loss: 2.724022	Validation Loss: 4.122444
Batch_id: 9	Training Loss: 2.724022	Validation Loss: 3.999491
Batch_id: 10	Training Loss: 2.724022	Validation Loss: 4.022178
Batch_id: 11	Training Loss: 2.724022	Validation Loss: 4.005999
Batch_id: 12	Training Loss: 2.724022	Validation Loss: 4.008018
Batch_id: 13	Training Loss: 2.724022	Validation Loss: 4.000489
Batch_id: 14	Training Loss: 2.724022	Validation Loss: 3.963654
Batch_id: 15	Training Loss: 2.724022	Validation Loss: 4.022494
Batch_id: 16	Training Loss: 2.724022	Validation Loss: 3.928232
Batch_id: 17	Training Loss: 2.724022	Validation Loss: 3.962441
Batch_id: 18	Training Loss: 2.724022	Validation Loss: 4.000095
Batch_id: 19	Training Loss: 2.724022	Validation Loss: 3.978175
Batch_id: 20	Training Loss: 2.724022	Validation Loss: 3.936752
Batch_id: 21	Training Loss: 2.724022	Validation Loss: 3.946109
Batch_id: 22	Training Loss: 2.724022	Validation Loss: 3.967743

Batch_id: 23	Training Loss: 2.724022	Validation Loss: 3.979316
Batch_id: 24	Training Loss: 2.724022	Validation Loss: 4.020356
Batch_id: 25	Training Loss: 2.724022	Validation Loss: 4.025437
Batch_id: 26	Training Loss: 2.724022	Validation Loss: 4.051209
Batch_id: 27	Training Loss: 2.724022	Validation Loss: 4.045800
Batch_id: 28	Training Loss: 2.724022	Validation Loss: 4.056967
Batch_id: 29	Training Loss: 2.724022	Validation Loss: 4.049458
Batch_id: 30	Training Loss: 2.724022	Validation Loss: 4.091790
Batch_id: 31	Training Loss: 2.724022	Validation Loss: 4.109843
Batch_id: 32	Training Loss: 2.724022	Validation Loss: 4.101384
Batch_id: 33	Training Loss: 2.724022	Validation Loss: 4.084349
Batch_id: 34	Training Loss: 2.724022	Validation Loss: 4.070035
Batch_id: 35	Training Loss: 2.724022	Validation Loss: 4.071386
Batch_id: 36	Training Loss: 2.724022	Validation Loss: 4.075353
Batch_id: 37	Training Loss: 2.724022	Validation Loss: 4.111520
Batch_id: 38	Training Loss: 2.724022	Validation Loss: 4.081702
Batch_id: 39	Training Loss: 2.724022	Validation Loss: 4.081486
Batch_id: 40	Training Loss: 2.724022	Validation Loss: 4.067004
Batch_id: 41	Training Loss: 2.724022	Validation Loss: 4.096240
Batch_id: 42	Training Loss: 2.724022	Validation Loss: 4.112001
Batch_id: 43	Training Loss: 2.724022	Validation Loss: 4.109438
Batch_id: 44	Training Loss: 2.724022	Validation Loss: 4.132004
Batch_id: 45	Training Loss: 2.724022	Validation Loss: 4.123318
Batch_id: 46	Training Loss: 2.724022	Validation Loss: 4.129984
Batch_id: 47	Training Loss: 2.724022	Validation Loss: 4.104010
Batch_id: 48	Training Loss: 2.724022	Validation Loss: 4.098658
Batch_id: 49	Training Loss: 2.724022	Validation Loss: 4.094215
Batch_id: 50	Training Loss: 2.724022	Validation Loss: 4.097279
Batch_id: 51	Training Loss: 2.724022	Validation Loss: 4.127877
Batch_id: 52	Training Loss: 2.724022	Validation Loss: 4.129270
Batch_id: 53	Training Loss: 2.724022	Validation Loss: 4.137509
Batch_id: 54	Training Loss: 2.724022	Validation Loss: 4.110326
Batch_id: 55	Training Loss: 2.724022	Validation Loss: 4.109854
Batch_id: 56	Training Loss: 2.724022	Validation Loss: 4.117905
Batch_id: 57	Training Loss: 2.724022	Validation Loss: 4.122955
Batch_id: 58	Training Loss: 2.724022	Validation Loss: 4.118633
Batch_id: 59	Training Loss: 2.724022	Validation Loss: 4.115499
Batch_id: 60	Training Loss: 2.724022	Validation Loss: 4.107500
Batch_id: 61	Training Loss: 2.724022	Validation Loss: 4.110811
Batch_id: 62	Training Loss: 2.724022	Validation Loss: 4.112652
Batch_id: 63	Training Loss: 2.724022	Validation Loss: 4.125744
Batch_id: 64	Training Loss: 2.724022	Validation Loss: 4.120156
Batch_id: 65	Training Loss: 2.724022	Validation Loss: 4.126350
Batch_id: 66	Training Loss: 2.724022	Validation Loss: 4.148921
Batch_id: 67	Training Loss: 2.724022	Validation Loss: 4.147600
Batch_id: 68	Training Loss: 2.724022	Validation Loss: 4.155511
Batch_id: 69	Training Loss: 2.724022	Validation Loss: 4.155342
Batch_id: 70	Training Loss: 2.724022	Validation Loss: 4.149464

Batch_id: 71	Training Loss: 2.724022	Validation Loss: 4.157937
Batch_id: 72	Training Loss: 2.724022	Validation Loss: 4.156168
Batch_id: 73	Training Loss: 2.724022	Validation Loss: 4.150143
Batch_id: 74	Training Loss: 2.724022	Validation Loss: 4.160354
Batch_id: 75	Training Loss: 2.724022	Validation Loss: 4.154850
Batch_id: 76	Training Loss: 2.724022	Validation Loss: 4.172399
Batch_id: 77	Training Loss: 2.724022	Validation Loss: 4.163456
Batch_id: 78	Training Loss: 2.724022	Validation Loss: 4.185521
Batch_id: 79	Training Loss: 2.724022	Validation Loss: 4.182043
Batch_id: 80	Training Loss: 2.724022	Validation Loss: 4.187703
Batch_id: 81	Training Loss: 2.724022	Validation Loss: 4.181614
Batch_id: 82	Training Loss: 2.724022	Validation Loss: 4.183640
Batch_id: 83	Training Loss: 2.724022	Validation Loss: 4.170647
Batch_id: 84	Training Loss: 2.724022	Validation Loss: 4.173797
Batch_id: 85	Training Loss: 2.724022	Validation Loss: 4.171574
Batch_id: 86	Training Loss: 2.724022	Validation Loss: 4.168437
Batch_id: 87	Training Loss: 2.724022	Validation Loss: 4.174622
Batch_id: 88	Training Loss: 2.724022	Validation Loss: 4.182809
Batch_id: 89	Training Loss: 2.724022	Validation Loss: 4.177540
Batch_id: 90	Training Loss: 2.724022	Validation Loss: 4.180113
Batch_id: 91	Training Loss: 2.724022	Validation Loss: 4.172726
Batch_id: 92	Training Loss: 2.724022	Validation Loss: 4.176282
Batch_id: 93	Training Loss: 2.724022	Validation Loss: 4.164961
Batch_id: 94	Training Loss: 2.724022	Validation Loss: 4.176086
Batch_id: 95	Training Loss: 2.724022	Validation Loss: 4.177515
Batch_id: 96	Training Loss: 2.724022	Validation Loss: 4.169790
Batch_id: 97	Training Loss: 2.724022	Validation Loss: 4.172379
Batch_id: 98	Training Loss: 2.724022	Validation Loss: 4.173306
Batch_id: 99	Training Loss: 2.724022	Validation Loss: 4.183132
Batch_id: 100	Training Loss: 2.724022	Validation Loss: 4.191130
Batch_id: 101	Training Loss: 2.724022	Validation Loss: 4.186336
Batch_id: 102	Training Loss: 2.724022	Validation Loss: 4.191854
Batch_id: 103	Training Loss: 2.724022	Validation Loss: 4.191439
Batch_id: 104	Training Loss: 2.724022	Validation Loss: 4.193618

Epoch: 18	Training Loss: 2.724022	Validation Loss: 4.193618
-----------	-------------------------	---------------------------

Batch_id: 0	Training Loss: 2.628092	Validation Loss: 4.381819
Batch_id: 1	Training Loss: 2.628092	Validation Loss: 4.211687
Batch_id: 2	Training Loss: 2.628092	Validation Loss: 4.483180
Batch_id: 3	Training Loss: 2.628092	Validation Loss: 4.137131
Batch_id: 4	Training Loss: 2.628092	Validation Loss: 4.232405
Batch_id: 5	Training Loss: 2.628092	Validation Loss: 4.244695
Batch_id: 6	Training Loss: 2.628092	Validation Loss: 4.153865
Batch_id: 7	Training Loss: 2.628092	Validation Loss: 4.197212
Batch_id: 8	Training Loss: 2.628092	Validation Loss: 4.229596
Batch_id: 9	Training Loss: 2.628092	Validation Loss: 4.271398
Batch_id: 10	Training Loss: 2.628092	Validation Loss: 4.378374

Batch_id: 11	Training Loss: 2.628092	Validation Loss: 4.375980
Batch_id: 12	Training Loss: 2.628092	Validation Loss: 4.417304
Batch_id: 13	Training Loss: 2.628092	Validation Loss: 4.349751
Batch_id: 14	Training Loss: 2.628092	Validation Loss: 4.320753
Batch_id: 15	Training Loss: 2.628092	Validation Loss: 4.320370
Batch_id: 16	Training Loss: 2.628092	Validation Loss: 4.315871
Batch_id: 17	Training Loss: 2.628092	Validation Loss: 4.334415
Batch_id: 18	Training Loss: 2.628092	Validation Loss: 4.304308
Batch_id: 19	Training Loss: 2.628092	Validation Loss: 4.250589
Batch_id: 20	Training Loss: 2.628092	Validation Loss: 4.237806
Batch_id: 21	Training Loss: 2.628092	Validation Loss: 4.267386
Batch_id: 22	Training Loss: 2.628092	Validation Loss: 4.237715
Batch_id: 23	Training Loss: 2.628092	Validation Loss: 4.229502
Batch_id: 24	Training Loss: 2.628092	Validation Loss: 4.180400
Batch_id: 25	Training Loss: 2.628092	Validation Loss: 4.224366
Batch_id: 26	Training Loss: 2.628092	Validation Loss: 4.217521
Batch_id: 27	Training Loss: 2.628092	Validation Loss: 4.238472
Batch_id: 28	Training Loss: 2.628092	Validation Loss: 4.217350
Batch_id: 29	Training Loss: 2.628092	Validation Loss: 4.202455
Batch_id: 30	Training Loss: 2.628092	Validation Loss: 4.207775
Batch_id: 31	Training Loss: 2.628092	Validation Loss: 4.190801
Batch_id: 32	Training Loss: 2.628092	Validation Loss: 4.189382
Batch_id: 33	Training Loss: 2.628092	Validation Loss: 4.202929
Batch_id: 34	Training Loss: 2.628092	Validation Loss: 4.152774
Batch_id: 35	Training Loss: 2.628092	Validation Loss: 4.134624
Batch_id: 36	Training Loss: 2.628092	Validation Loss: 4.116210
Batch_id: 37	Training Loss: 2.628092	Validation Loss: 4.109995
Batch_id: 38	Training Loss: 2.628092	Validation Loss: 4.115956
Batch_id: 39	Training Loss: 2.628092	Validation Loss: 4.130178
Batch_id: 40	Training Loss: 2.628092	Validation Loss: 4.090413
Batch_id: 41	Training Loss: 2.628092	Validation Loss: 4.118073
Batch_id: 42	Training Loss: 2.628092	Validation Loss: 4.122097
Batch_id: 43	Training Loss: 2.628092	Validation Loss: 4.117091
Batch_id: 44	Training Loss: 2.628092	Validation Loss: 4.129340
Batch_id: 45	Training Loss: 2.628092	Validation Loss: 4.145170
Batch_id: 46	Training Loss: 2.628092	Validation Loss: 4.122506
Batch_id: 47	Training Loss: 2.628092	Validation Loss: 4.131108
Batch_id: 48	Training Loss: 2.628092	Validation Loss: 4.151211
Batch_id: 49	Training Loss: 2.628092	Validation Loss: 4.139937
Batch_id: 50	Training Loss: 2.628092	Validation Loss: 4.135212
Batch_id: 51	Training Loss: 2.628092	Validation Loss: 4.122333
Batch_id: 52	Training Loss: 2.628092	Validation Loss: 4.136529
Batch_id: 53	Training Loss: 2.628092	Validation Loss: 4.139959
Batch_id: 54	Training Loss: 2.628092	Validation Loss: 4.123808
Batch_id: 55	Training Loss: 2.628092	Validation Loss: 4.106198
Batch_id: 56	Training Loss: 2.628092	Validation Loss: 4.092856
Batch_id: 57	Training Loss: 2.628092	Validation Loss: 4.081918
Batch_id: 58	Training Loss: 2.628092	Validation Loss: 4.076557

Batch_id: 59	Training Loss: 2.628092	Validation Loss: 4.084374
Batch_id: 60	Training Loss: 2.628092	Validation Loss: 4.080335
Batch_id: 61	Training Loss: 2.628092	Validation Loss: 4.073589
Batch_id: 62	Training Loss: 2.628092	Validation Loss: 4.078167
Batch_id: 63	Training Loss: 2.628092	Validation Loss: 4.100189
Batch_id: 64	Training Loss: 2.628092	Validation Loss: 4.075165
Batch_id: 65	Training Loss: 2.628092	Validation Loss: 4.087162
Batch_id: 66	Training Loss: 2.628092	Validation Loss: 4.077255
Batch_id: 67	Training Loss: 2.628092	Validation Loss: 4.078550
Batch_id: 68	Training Loss: 2.628092	Validation Loss: 4.082047
Batch_id: 69	Training Loss: 2.628092	Validation Loss: 4.092142
Batch_id: 70	Training Loss: 2.628092	Validation Loss: 4.094671
Batch_id: 71	Training Loss: 2.628092	Validation Loss: 4.090025
Batch_id: 72	Training Loss: 2.628092	Validation Loss: 4.091593
Batch_id: 73	Training Loss: 2.628092	Validation Loss: 4.083038
Batch_id: 74	Training Loss: 2.628092	Validation Loss: 4.076628
Batch_id: 75	Training Loss: 2.628092	Validation Loss: 4.064944
Batch_id: 76	Training Loss: 2.628092	Validation Loss: 4.062624
Batch_id: 77	Training Loss: 2.628092	Validation Loss: 4.079017
Batch_id: 78	Training Loss: 2.628092	Validation Loss: 4.077097
Batch_id: 79	Training Loss: 2.628092	Validation Loss: 4.073925
Batch_id: 80	Training Loss: 2.628092	Validation Loss: 4.081540
Batch_id: 81	Training Loss: 2.628092	Validation Loss: 4.103938
Batch_id: 82	Training Loss: 2.628092	Validation Loss: 4.118514
Batch_id: 83	Training Loss: 2.628092	Validation Loss: 4.122901
Batch_id: 84	Training Loss: 2.628092	Validation Loss: 4.120921
Batch_id: 85	Training Loss: 2.628092	Validation Loss: 4.130394
Batch_id: 86	Training Loss: 2.628092	Validation Loss: 4.117561
Batch_id: 87	Training Loss: 2.628092	Validation Loss: 4.112442
Batch_id: 88	Training Loss: 2.628092	Validation Loss: 4.110542
Batch_id: 89	Training Loss: 2.628092	Validation Loss: 4.113740
Batch_id: 90	Training Loss: 2.628092	Validation Loss: 4.107406
Batch_id: 91	Training Loss: 2.628092	Validation Loss: 4.113886
Batch_id: 92	Training Loss: 2.628092	Validation Loss: 4.108693
Batch_id: 93	Training Loss: 2.628092	Validation Loss: 4.105880
Batch_id: 94	Training Loss: 2.628092	Validation Loss: 4.110772
Batch_id: 95	Training Loss: 2.628092	Validation Loss: 4.106087
Batch_id: 96	Training Loss: 2.628092	Validation Loss: 4.108346
Batch_id: 97	Training Loss: 2.628092	Validation Loss: 4.109144
Batch_id: 98	Training Loss: 2.628092	Validation Loss: 4.102771
Batch_id: 99	Training Loss: 2.628092	Validation Loss: 4.105015
Batch_id: 100	Training Loss: 2.628092	Validation Loss: 4.108070
Batch_id: 101	Training Loss: 2.628092	Validation Loss: 4.100464
Batch_id: 102	Training Loss: 2.628092	Validation Loss: 4.095263
Batch_id: 103	Training Loss: 2.628092	Validation Loss: 4.103865
Batch_id: 104	Training Loss: 2.628092	Validation Loss: 4.120863

Epoch: 19

Training Loss: 2.628092

Validation Loss: 4.120863

Batch_id: 0	Training Loss: 2.476579	Validation Loss: 4.297197
Batch_id: 1	Training Loss: 2.476579	Validation Loss: 4.227356
Batch_id: 2	Training Loss: 2.476579	Validation Loss: 4.367330
Batch_id: 3	Training Loss: 2.476579	Validation Loss: 4.385720
Batch_id: 4	Training Loss: 2.476579	Validation Loss: 4.286623
Batch_id: 5	Training Loss: 2.476579	Validation Loss: 4.166388
Batch_id: 6	Training Loss: 2.476579	Validation Loss: 4.257041
Batch_id: 7	Training Loss: 2.476579	Validation Loss: 4.326433
Batch_id: 8	Training Loss: 2.476579	Validation Loss: 4.428181
Batch_id: 9	Training Loss: 2.476579	Validation Loss: 4.437731
Batch_id: 10	Training Loss: 2.476579	Validation Loss: 4.382396
Batch_id: 11	Training Loss: 2.476579	Validation Loss: 4.379177
Batch_id: 12	Training Loss: 2.476579	Validation Loss: 4.427403
Batch_id: 13	Training Loss: 2.476579	Validation Loss: 4.389357
Batch_id: 14	Training Loss: 2.476579	Validation Loss: 4.352030
Batch_id: 15	Training Loss: 2.476579	Validation Loss: 4.414636
Batch_id: 16	Training Loss: 2.476579	Validation Loss: 4.453141
Batch_id: 17	Training Loss: 2.476579	Validation Loss: 4.455603
Batch_id: 18	Training Loss: 2.476579	Validation Loss: 4.418827
Batch_id: 19	Training Loss: 2.476579	Validation Loss: 4.448332
Batch_id: 20	Training Loss: 2.476579	Validation Loss: 4.437378
Batch_id: 21	Training Loss: 2.476579	Validation Loss: 4.472790
Batch_id: 22	Training Loss: 2.476579	Validation Loss: 4.490791
Batch_id: 23	Training Loss: 2.476579	Validation Loss: 4.499484
Batch_id: 24	Training Loss: 2.476579	Validation Loss: 4.551886
Batch_id: 25	Training Loss: 2.476579	Validation Loss: 4.493708
Batch_id: 26	Training Loss: 2.476579	Validation Loss: 4.490411
Batch_id: 27	Training Loss: 2.476579	Validation Loss: 4.456763
Batch_id: 28	Training Loss: 2.476579	Validation Loss: 4.444042
Batch_id: 29	Training Loss: 2.476579	Validation Loss: 4.411763
Batch_id: 30	Training Loss: 2.476579	Validation Loss: 4.453112
Batch_id: 31	Training Loss: 2.476579	Validation Loss: 4.428076
Batch_id: 32	Training Loss: 2.476579	Validation Loss: 4.405548
Batch_id: 33	Training Loss: 2.476579	Validation Loss: 4.414576
Batch_id: 34	Training Loss: 2.476579	Validation Loss: 4.425584
Batch_id: 35	Training Loss: 2.476579	Validation Loss: 4.408386
Batch_id: 36	Training Loss: 2.476579	Validation Loss: 4.400731
Batch_id: 37	Training Loss: 2.476579	Validation Loss: 4.393515
Batch_id: 38	Training Loss: 2.476579	Validation Loss: 4.356311
Batch_id: 39	Training Loss: 2.476579	Validation Loss: 4.365585
Batch_id: 40	Training Loss: 2.476579	Validation Loss: 4.359297
Batch_id: 41	Training Loss: 2.476579	Validation Loss: 4.379662
Batch_id: 42	Training Loss: 2.476579	Validation Loss: 4.369927
Batch_id: 43	Training Loss: 2.476579	Validation Loss: 4.358574
Batch_id: 44	Training Loss: 2.476579	Validation Loss: 4.366419
Batch_id: 45	Training Loss: 2.476579	Validation Loss: 4.380174
Batch_id: 46	Training Loss: 2.476579	Validation Loss: 4.377442

Batch_id: 47	Training Loss: 2.476579	Validation Loss: 4.389154
Batch_id: 48	Training Loss: 2.476579	Validation Loss: 4.384858
Batch_id: 49	Training Loss: 2.476579	Validation Loss: 4.382235
Batch_id: 50	Training Loss: 2.476579	Validation Loss: 4.392263
Batch_id: 51	Training Loss: 2.476579	Validation Loss: 4.398470
Batch_id: 52	Training Loss: 2.476579	Validation Loss: 4.392855
Batch_id: 53	Training Loss: 2.476579	Validation Loss: 4.395927
Batch_id: 54	Training Loss: 2.476579	Validation Loss: 4.396284
Batch_id: 55	Training Loss: 2.476579	Validation Loss: 4.375270
Batch_id: 56	Training Loss: 2.476579	Validation Loss: 4.394217
Batch_id: 57	Training Loss: 2.476579	Validation Loss: 4.396628
Batch_id: 58	Training Loss: 2.476579	Validation Loss: 4.377427
Batch_id: 59	Training Loss: 2.476579	Validation Loss: 4.360889
Batch_id: 60	Training Loss: 2.476579	Validation Loss: 4.385291
Batch_id: 61	Training Loss: 2.476579	Validation Loss: 4.383094
Batch_id: 62	Training Loss: 2.476579	Validation Loss: 4.381655
Batch_id: 63	Training Loss: 2.476579	Validation Loss: 4.386529
Batch_id: 64	Training Loss: 2.476579	Validation Loss: 4.373164
Batch_id: 65	Training Loss: 2.476579	Validation Loss: 4.374219
Batch_id: 66	Training Loss: 2.476579	Validation Loss: 4.369934
Batch_id: 67	Training Loss: 2.476579	Validation Loss: 4.361461
Batch_id: 68	Training Loss: 2.476579	Validation Loss: 4.361060
Batch_id: 69	Training Loss: 2.476579	Validation Loss: 4.370145
Batch_id: 70	Training Loss: 2.476579	Validation Loss: 4.365173
Batch_id: 71	Training Loss: 2.476579	Validation Loss: 4.388026
Batch_id: 72	Training Loss: 2.476579	Validation Loss: 4.392705
Batch_id: 73	Training Loss: 2.476579	Validation Loss: 4.380551
Batch_id: 74	Training Loss: 2.476579	Validation Loss: 4.367041
Batch_id: 75	Training Loss: 2.476579	Validation Loss: 4.362013
Batch_id: 76	Training Loss: 2.476579	Validation Loss: 4.383798
Batch_id: 77	Training Loss: 2.476579	Validation Loss: 4.378845
Batch_id: 78	Training Loss: 2.476579	Validation Loss: 4.373795
Batch_id: 79	Training Loss: 2.476579	Validation Loss: 4.379584
Batch_id: 80	Training Loss: 2.476579	Validation Loss: 4.382268
Batch_id: 81	Training Loss: 2.476579	Validation Loss: 4.372206
Batch_id: 82	Training Loss: 2.476579	Validation Loss: 4.381430
Batch_id: 83	Training Loss: 2.476579	Validation Loss: 4.373304
Batch_id: 84	Training Loss: 2.476579	Validation Loss: 4.379202
Batch_id: 85	Training Loss: 2.476579	Validation Loss: 4.370156
Batch_id: 86	Training Loss: 2.476579	Validation Loss: 4.377265
Batch_id: 87	Training Loss: 2.476579	Validation Loss: 4.391118
Batch_id: 88	Training Loss: 2.476579	Validation Loss: 4.402179
Batch_id: 89	Training Loss: 2.476579	Validation Loss: 4.401714
Batch_id: 90	Training Loss: 2.476579	Validation Loss: 4.392290
Batch_id: 91	Training Loss: 2.476579	Validation Loss: 4.390429
Batch_id: 92	Training Loss: 2.476579	Validation Loss: 4.387889
Batch_id: 93	Training Loss: 2.476579	Validation Loss: 4.375501
Batch_id: 94	Training Loss: 2.476579	Validation Loss: 4.372267

Batch_id: 95	Training Loss: 2.476579	Validation Loss: 4.368521
Batch_id: 96	Training Loss: 2.476579	Validation Loss: 4.354583
Batch_id: 97	Training Loss: 2.476579	Validation Loss: 4.356159
Batch_id: 98	Training Loss: 2.476579	Validation Loss: 4.348678
Batch_id: 99	Training Loss: 2.476579	Validation Loss: 4.349856
Batch_id: 100	Training Loss: 2.476579	Validation Loss: 4.348016
Batch_id: 101	Training Loss: 2.476579	Validation Loss: 4.337847
Batch_id: 102	Training Loss: 2.476579	Validation Loss: 4.332248
Batch_id: 103	Training Loss: 2.476579	Validation Loss: 4.324595
Batch_id: 104	Training Loss: 2.476579	Validation Loss: 4.326040

Epoch: 20	Training Loss: 2.476579	Validation Loss: 4.326040
-----------	-------------------------	---------------------------

```
In [24]: # model_scratch.load_state_dict(torch.load('./model_scratch.pt'))
        torch.save(model_scratch.state_dict(), 'model_scratch.pt')
```

```
In [25]: # load the model that got the best validation accuracy
        model_scratch.load_state_dict(torch.load('model_scratch.pt'))
        # print(model_scratch.pt)
```

1.1.11 (IMPLEMENTATION) Test the Model

Try out your model on the test dataset of dog images. Use the code cell below to calculate and print the test loss and accuracy. Ensure that your test accuracy is greater than 10%.

```
In [26]: def test(loaders, model, criterion, use_cuda):

        # monitor test loss and accuracy
        test_loss = 0.0
        correct = 0.0
        total = 0.0

        model.eval()
        for batch_idx, (data, target) in enumerate(loaders['test']):
            # move to GPU
            if use_cuda:
                data, target = data.cuda(), target.cuda()
            # forward pass: compute predicted outputs by passing inputs to the model
            output = model(data)
            # calculate the loss
            loss = criterion(output, target)
            # update average test loss
            test_loss = test_loss + ((1 / (batch_idx + 1)) * (loss.data - test_loss))
            # convert output probabilities to predicted class
            pred = output.data.max(1, keepdim=True)[1]
            # compare predictions to true label
            correct += np.sum(np.squeeze(pred.eq(target.data.view_as(pred))).cpu().numpy())
```

```

        total += data.size(0)

    print('Test Loss: {:.6f}\n'.format(test_loss))

    print('\nTest Accuracy: %2d%% (%2d/%2d)' % (
        100. * correct / total, correct, total))

    # call test function
    test(loaders_scratch, model_scratch, criterion_scratch, use_cuda)

```

Test Loss: 4.305877

Test Accuracy: 10% (91/836)

Step 4: Create a CNN to Classify Dog Breeds (using Transfer Learning)

You will now use transfer learning to create a CNN that can identify dog breed from images. Your CNN must attain at least 60% accuracy on the test set.

1.1.12 (IMPLEMENTATION) Specify Data Loaders for the Dog Dataset

Use the code cell below to write three separate [data loaders](#) for the training, validation, and test datasets of dog images (located at dogImages/train, dogImages/valid, and dogImages/test, respectively).

If you like, **you are welcome to use the same data loaders from the previous step**, when you created a CNN from scratch.

```

In [29]: ## TODO: Specify data loaders
        loaders_transfer = loaders_scratch
        print(loaders_transfer)

```

```
{'train': <torch.utils.data.dataloader.DataLoader object at 0x7f87bd24e358>, 'valid': <torch.uti
```

1.1.13 (IMPLEMENTATION) Model Architecture

Use transfer learning to create a CNN to classify dog breed. Use the code cell below, and save your initialized model as the variable `model_transfer`.

```

In [30]: import torchvision.models as models
        import torch.nn as nn

        ## TODO: Specify model architecture
        model_transfer = models.resnet50(pretrained=True)
        # Freeze parameters so we don't backprop through them
        for param in model_transfer.parameters():

```

```

        param.requires_grad = False
        # Replace the last fully connected layer with a Linear layer with 133 out features
        model_transfer.fc = nn.Linear(2048, 133)
        if use_cuda:
            model_transfer = model_transfer.cuda()

```

Question 5: Outline the steps you took to get to your final CNN architecture and your reasoning at each step. Describe why you think the architecture is suitable for the current problem.

Answer:

ResNet as a transfer model because it performed outstanding on Image Classification. ResNet have perfect layer structure with convolution and activation function to extract features gradually. just need to transfer final output layer for required no outputs as 133 dog breeds.

(fc): Linear(in_features=2048, out_features=133, bias=True)

1.1.14 (IMPLEMENTATION) Specify Loss Function and Optimizer

Use the next code cell to specify a [loss function](#) and [optimizer](#). Save the chosen loss function as `criterion_transfer`, and the optimizer as `optimizer_transfer` below.

```

In [34]: criterion_transfer = nn.CrossEntropyLoss()
        optimizer_transfer = optim.Adam(model_transfer.fc.parameters(), lr=0.005)

```

1.1.15 (IMPLEMENTATION) Train and Validate the Model

Train and validate your model in the code cell below. [Save the final model parameters](#) at filepath `'model_transfer.pt'`.

```

In [35]: def train(n_epochs, loaders, model, optimizer, criterion, use_cuda, save_path):
        """returns trained model"""
        # initialize tracker for minimum validation loss
        valid_loss_min = np.Inf

        for epoch in range(1, n_epochs+1):
            # initialize variables to monitor training and validation loss
            train_loss = 0.0
            valid_loss = 0.0

            #####
            # train the model #
            #####
            model.train()
            for batch_idx, (data, target) in enumerate(loaders['train']):
                # move to GPU
                if use_cuda:
                    data, target = data.cuda(), target.cuda()

                # initialize weights to zero
                optimizer.zero_grad()

```

```

        output = model(data)

        # calculate loss
        loss = criterion(output, target)

        # back prop
        loss.backward()

        # grad
        optimizer.step()

        train_loss = train_loss + ((1 / (batch_idx + 1)) * (loss.data - train_loss))

        if batch_idx % 100 == 0:
            print('Epoch %d, Batch %d loss: %.6f' %
                  (epoch, batch_idx + 1, train_loss))

#####
# validate the model #
#####
model.eval()
for batch_idx, (data, target) in enumerate(loaders['valid']):
    # move to GPU
    if use_cuda:
        data, target = data.cuda(), target.cuda()
    ## update the average validation loss
    output = model(data)
    loss = criterion(output, target)
    valid_loss = valid_loss + ((1 / (batch_idx + 1)) * (loss.data - valid_loss))

# print training/validation statistics
print('Epoch: {} \tTraining Loss: {:.6f} \tValidation Loss: {:.6f}'.format(
    epoch,
    train_loss,
    valid_loss
))

## TODO: save the model if validation loss has decreased
if valid_loss < valid_loss_min:
    torch.save(model.state_dict(), save_path)
    print('Validation loss decreased ({:.6f} --> {:.6f}). Saving model ...'.format(
        valid_loss_min,
        valid_loss))
    valid_loss_min = valid_loss

# return trained model
return model

```

```

In [36]: # train the model
         # train the model
         model_transfer = train(2, loaders_transfer, model_transfer, optimizer_transfer, criterion_transfer)

Epoch 1, Batch 1 loss: 4.944936
Epoch 1, Batch 101 loss: 5.052818
Epoch 1, Batch 201 loss: 4.031952
Epoch 1, Batch 301 loss: 3.440007
Epoch 1, Batch 401 loss: 3.062503
Epoch 1, Batch 501 loss: 2.795802
Epoch 1, Batch 601 loss: 2.600297
Epoch 1, Batch 701 loss: 2.441255
Epoch 1, Batch 801 loss: 2.305764
Epoch: 1          Training Loss: 2.272491          Validation Loss: 0.836627
Validation loss decreased (inf --> 0.836627).  Saving model ...
Epoch 2, Batch 1 loss: 0.958345
Epoch 2, Batch 101 loss: 1.011053
Epoch 2, Batch 201 loss: 1.028527
Epoch 2, Batch 301 loss: 1.069919
Epoch 2, Batch 401 loss: 1.105675
Epoch 2, Batch 501 loss: 1.101217
Epoch 2, Batch 601 loss: 1.077997
Epoch 2, Batch 701 loss: 1.080276
Epoch 2, Batch 801 loss: 1.075158
Epoch: 2          Training Loss: 1.077895          Validation Loss: 0.739235
Validation loss decreased (0.836627 --> 0.739235).  Saving model ...

```

1.1.16 (IMPLEMENTATION) Test the Model

Try out your model on the test dataset of dog images. Use the code cell below to calculate and print the test loss and accuracy. Ensure that your test accuracy is greater than 60%.

```

In [37]: test(loaders_transfer, model_transfer, criterion_transfer, use_cuda)

```

```

Test Loss: 0.773312

```

```

Test Accuracy: 77% (649/836)

```

```

In [59]: torch.save(model_transfer.state_dict(), 'model_Trnsfer_Learning.pt')

```

1.1.17 (IMPLEMENTATION) Predict Dog Breed with the Model

Write a function that takes an image path as input and returns the dog breed (Affenpinscher, Afghan hound, etc) that is predicted by your model.

```

In [41]: ### TODO: Write a function that takes a path to an image as input
         ### and returns the dog breed that is predicted by the model.

         # list of class names by index, i.e. a name can be accessed like class_names[0]
class_names = [item[4:].replace("_", " ") for item in image_datasets['train'].classes]

def predict_breed_transfer(img_path):
    # load the image and return the predicted breed
    image_tensor = image_to_tensor(img_path)

    # move model inputs to cuda, if GPU available
    if use_cuda:
        image_tensor = image_tensor.cuda()

    # get sample outputs
    output = model_transfer(image_tensor)
    # convert output probabilities to predicted class
    _, preds_tensor = torch.max(output, 1)
    pred = np.squeeze(preds_tensor.numpy()) if not use_cuda else np.squeeze(preds_tensor)

    return class_names[pred]

def display_image(img_path, title="Title"):
    image = Image.open(img_path)
    plt.title(title)
    plt.imshow(image)
    plt.show()

import random

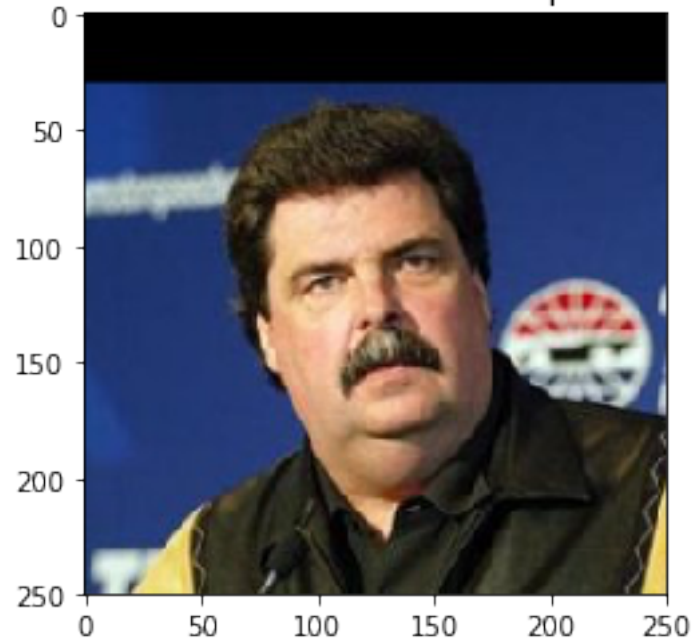
# Try out the function
for image in random.sample(list(human_files_short), 4):
    predicted_breed = predict_breed_transfer(image)
    display_image(image, title=f"Predicted:{predicted_breed}")

```

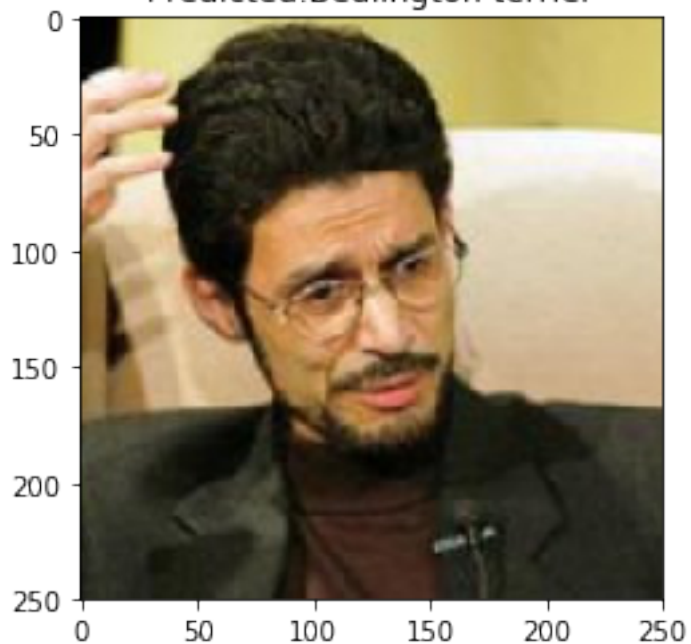
Predicted:Chinese crested



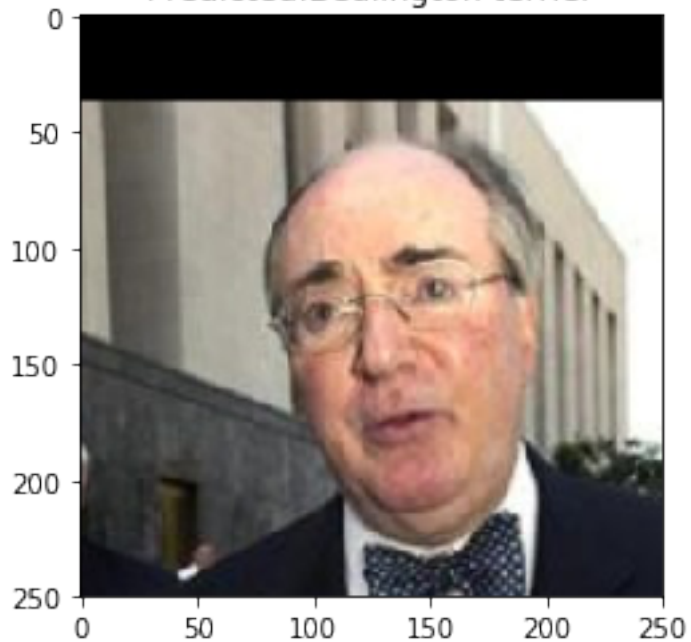
Predicted:American water spaniel



Predicted:Bedlington terrier



Predicted:Bedlington terrier





Sample Human Output

Step 5: Write your Algorithm

Write an algorithm that accepts a file path to an image and first determines whether the image contains a human, dog, or neither. Then, - if a **dog** is detected in the image, return the predicted breed. - if a **human** is detected in the image, return the resembling dog breed. - if **neither** is detected in the image, provide output that indicates an error.

You are welcome to write your own functions for detecting humans and dogs in images, but feel free to use the `face_detector` and `human_detector` functions developed above. You are **required** to use your CNN from Step 4 to predict dog breed.

Some sample output for our algorithm is provided below, but feel free to design your own user experience!

1.1.18 (IMPLEMENTATION) Write your Algorithm

In [56]: *### Feel free to use as many code cells as needed.*

```
def run_app(img_path):
    # check if image has human faces:
    if (face_detector(img_path)):
        print("Hello Human!")
        predicted_breed = predict_breed_transfer(img_path)
        display_image(img_path, title=f"Predicted:{predicted_breed}")

        print("You look like a ...")
        print(predicted_breed.upper())
    # check if image has dogs:
    elif dog_detector(img_path):
        print("Hello Doggie!")
        predicted_breed = predict_breed_transfer(img_path)
        display_image(img_path, title=f"Predicted:{predicted_breed}")

        print("Your breed is most likley ...")
        print(predicted_breed.upper())
    else:
        print("Oh, we're sorry! We couldn't detect any dog or human face in the image.")
        display_image(img_path, title="...")
```

```
print("Try another!")
print("\n")
```

Step 6: Test Your Algorithm

In this section, you will take your new algorithm for a spin! What kind of dog does the algorithm think that *you* look like? If you have a dog, does it predict your dog's breed accurately? If you have a cat, does it mistakenly think that your cat is a dog?

1.1.19 (IMPLEMENTATION) Test Your Algorithm on Sample Images!

Test your algorithm at least six images on your computer. Feel free to use any images you like. Use at least two human and two dog images.

Question 6: Is the output better than you expected :) ? Or worse :(? Provide at least three possible points of improvement for your algorithm.

Answer: (Three possible points for improvement)

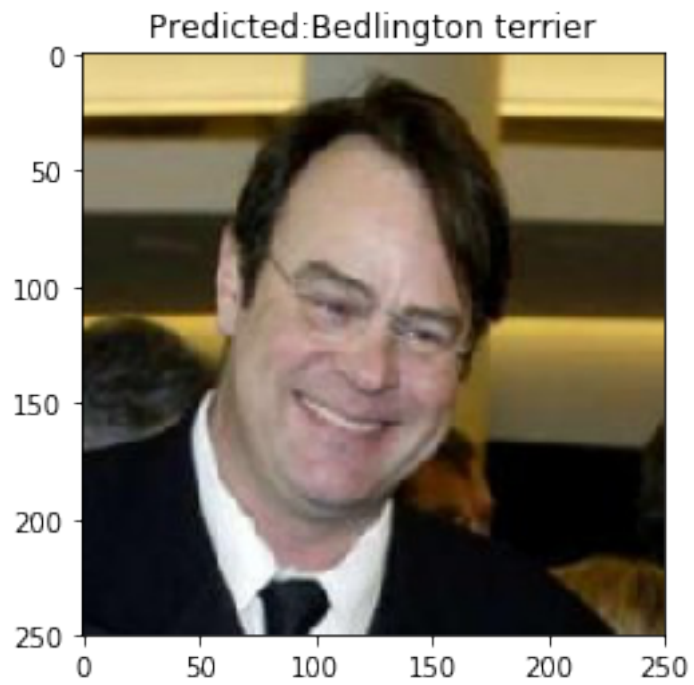
Some improvements:

1. Fine tune the model to give a better accuracy. 2. Serve this function as an API (Flask, AWS, etc.) 3. Try with different models, optimizers and loss functions, as well as different input image sizes. 4. Must increase no of epochs to get better accuracy.

```
In [57]: ## TODO: Execute your algorithm from Step 6 on
         ## at least 6 images on your computer.
         ## Feel free to use as many code cells as needed.

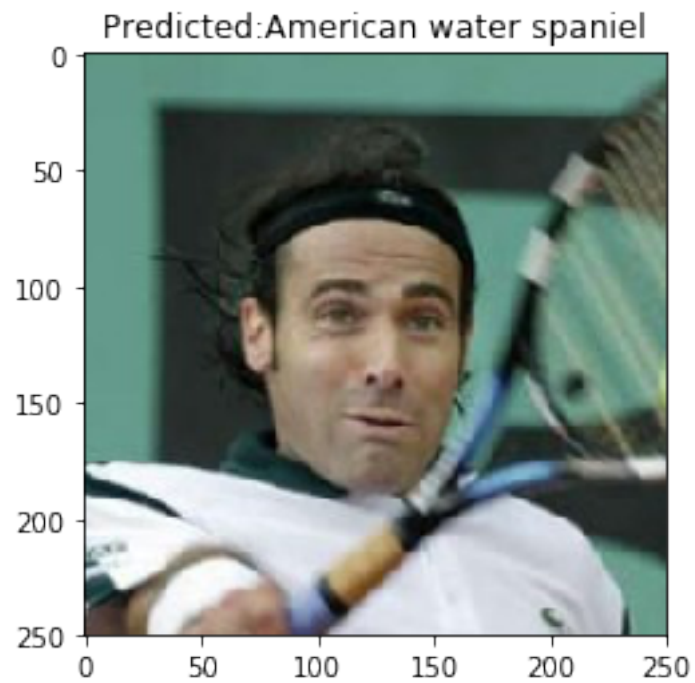
         ## suggested code, below
         for file in np.hstack((human_files[:3], dog_files[:3])):
             run_app(file)
```

Hello Human!



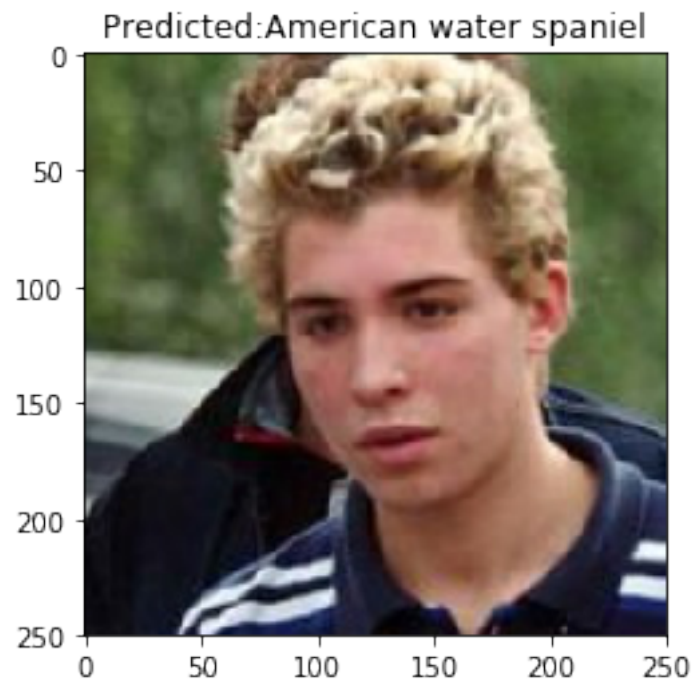
You look like a ...
BEDLINGTON TERRIER

Hello Human!



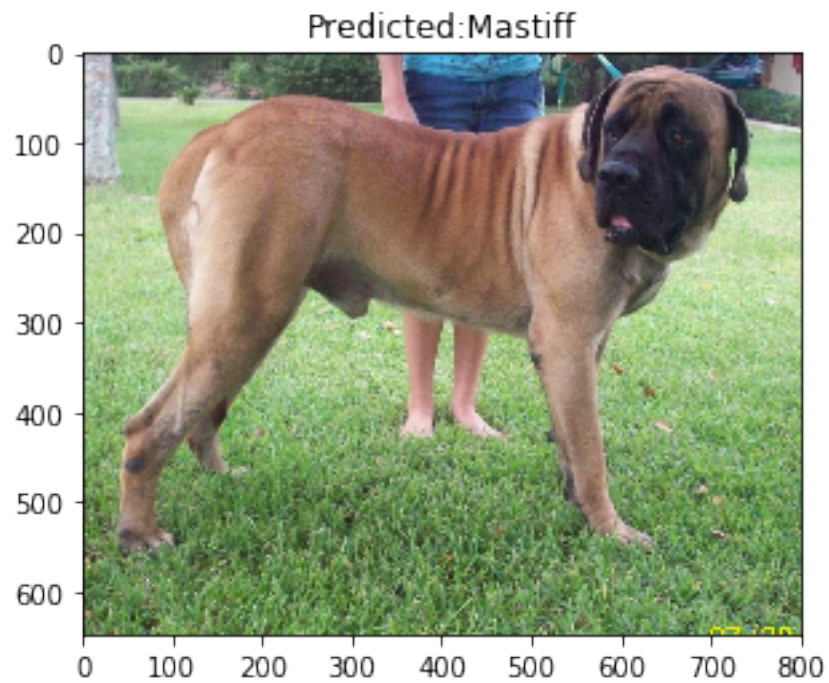
You look like a ...
AMERICAN WATER SPANIEL

Hello Human!



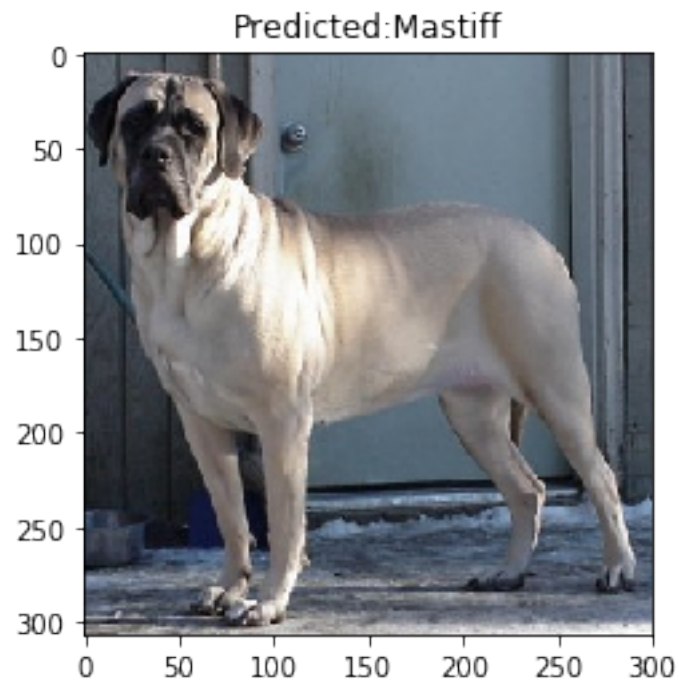
You look like a ...
AMERICAN WATER SPANIEL

Hello Doggie!



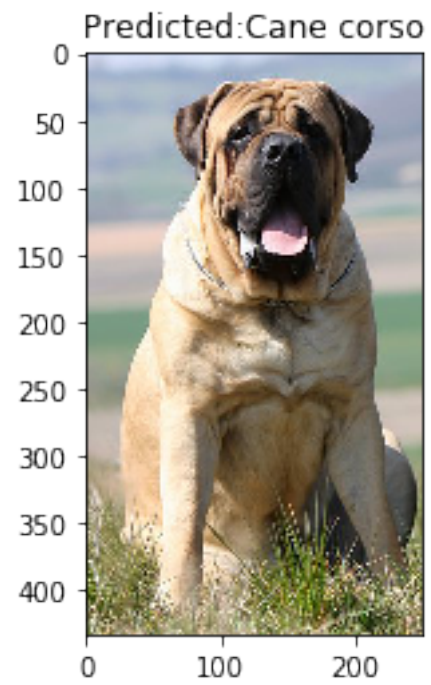
Your breed is most likley ...
MASTIFF

Hello Doggie!



Your breed is most likley ...
MASTIFF

Hello Doggie!



Your breed is most likley ...
CANE CORSO

In []: