

TypeB_AntsBees_VGG16_PyTorch_Training_for_loop_dataloader_03

January 11, 2022

1 Ants Bees VGG16

2 Fitting

3 TypeBTraining

```
[ ]: %pwd
from google.colab import drive
drive.mount('/content/gdrive')
```

Mounted at /content/gdrive

```
[ ]: '''
3.
'''

import numpy as np
from PIL import Image
from torchvision import transforms
import matplotlib.pyplot as plt
import os
import torch
import torch.utils.data as data
from pathlib import Path
```

```
[ ]: torch.cuda.synchronize()
print(torch.cuda.memory_allocated())
```

0

```
[ ]: data_dir = '/content/gdrive/My Drive/Colab Notebooks/AntsBees/data'
root_dir= '/content/gdrive/My Drive/Colab Notebooks/AntsBees/data/
→hymenoptera_data'
```

```
[ ]: os.chdir('/content/gdrive/My Drive/Colab Notebooks/AntsBees')
```

3.0.1 Device

```
[ ]: # (CPUGPU
device = torch.device('cuda' if torch.cuda.is_available() else 'cpu')
print(device)
```

cuda

4 (1) DataSet

4.0.1 train_list, val_list

```
[ ]: import glob
import pprint

def make_datapath_list(phase='train'):
    '''
    Parameters:
        phase(str): 'train' 'val'

    Returns:
        path_list(list):
    '''
    #
    #
    # rootpath +
    #   train/ants/*.jpg
    #   train/bees/*.jpg
    #   val/ants/*.jpg
    #   val/bees/*.jpg
    tt= phase + '/*/*.jpg'
    target_path = os.path.join(root_dir,tt)
    #
    path_list = [] #

    # glob()
    for path in glob.glob(target_path):
        path_list.append(path)

    return path_list

#
train_list = make_datapath_list(phase='train')
val_list = make_datapath_list(phase='val')
```

```

print(train_list)

# 5
print('train')
pprint.pprint(train_list[:5])
pprint.pprint(train_list[-6:-1])
# 5
print('val')
pprint.pprint(val_list[:5])
pprint.pprint(val_list[-6:-1])

```

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```

```
[ ]: p=Path(train_list[5])
      print(p.parts[-2])

      p2=Path(val_list[-4])
      print(p2.parts[-2])
```

ants
bees

5 DataSet

```
[ ]: from dsets.dsets import MakeDataset
      from util.ImageTransform import ImageTransform

[ ]: '''
      6.
      '''

      import torch

      #
      batch_size = 10
      SIZE = 224
      # RGB
      MEAN = (0.485, 0.456, 0.406) # ImageNet
      # RGB
      STD = (0.229, 0.224, 0.225) # ImageNet

      #
      size, mean, std = SIZE, MEAN, STD

      # MakeDataset
      train_dataset = MakeDataset(
          file_list=train_list, #
          transform=ImageTransform(size, mean, std), #
```

```

        phase='train')
# MakeDataset
val_dataset = MakeDataset(
    file_list=val_list, #
    transform=ImageTransform(size, mean, std), #
    phase='val')

```

```

[: print(len(train_list))
   print(len(val_list))

```

243

153

6 (2) DataLoader

```

[: '''
6.
'''
from torch.utils.data import DataLoader

# : (, 3, 224, 224)
train_dl = DataLoader(train_dataset, batch_size=batch_size, shuffle=True)

# : (, 3, 224, 224)
val_dl = DataLoader(val_dataset, batch_size=batch_size, shuffle=False)

```

7 (4)

```

[: '''
7. VGG16
'''
from torchvision import models
import torch.nn as nn

# ImageNetVGG16
model = models.vgg16(pretrained=True)

# VGG162
model.classifier[6] = nn.Linear(
    in_features=4096, # 4096
    out_features=2) # 10002

model = model.to(device)
print(model)

```

Downloading: "https://download.pytorch.org/models/vgg16-397923af.pth" to
/root/.cache/torch/hub/checkpoints/vgg16-397923af.pth

0%| | 0.00/528M [00:00<?, ?B/s]

```
VGG(
  (features): Sequential(
    (0): Conv2d(3, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (1): ReLU(inplace=True)
    (2): Conv2d(64, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (3): ReLU(inplace=True)
    (4): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1,
ceil_mode=False)
    (5): Conv2d(64, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (6): ReLU(inplace=True)
    (7): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (8): ReLU(inplace=True)
    (9): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1,
ceil_mode=False)
    (10): Conv2d(128, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (11): ReLU(inplace=True)
    (12): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (13): ReLU(inplace=True)
    (14): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (15): ReLU(inplace=True)
    (16): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1,
ceil_mode=False)
    (17): Conv2d(256, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (18): ReLU(inplace=True)
    (19): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (20): ReLU(inplace=True)
    (21): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (22): ReLU(inplace=True)
    (23): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1,
ceil_mode=False)
    (24): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (25): ReLU(inplace=True)
    (26): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (27): ReLU(inplace=True)
    (28): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
    (29): ReLU(inplace=True)
    (30): MaxPool2d(kernel_size=2, stride=2, padding=0, dilation=1,
ceil_mode=False)
  )
  (avgpool): AdaptiveAvgPool2d(output_size=(7, 7))
  (classifier): Sequential(
    (0): Linear(in_features=25088, out_features=4096, bias=True)
```



```

        (1): ReLU(inplace=True)
        (2): Dropout(p=0.5, inplace=False)
        (3): Linear(in_features=4096, out_features=4096, bias=True)
        (4): ReLU(inplace=True)
        (5): Dropout(p=0.5, inplace=False)
        (6): Linear(in_features=4096, out_features=2, bias=True)
    )
)

```

8 For Loop with DataLoader

8.0.1 enumerate(train_dl)

```

[ ]: import sys
    for batch_ndx, batch_tup in enumerate(train_dl):
        input_t, label_t = batch_tup
        print(batch_ndx, input_t.shape)
        var_name = 'input_t'
        print(sys.getsizeof(eval(var_name)))

    print(sys.getsizeof(eval(var_name)))

```

```

0 torch.Size([10, 3, 224, 224])
88
1 torch.Size([10, 3, 224, 224])
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2 torch.Size([10, 3, 224, 224])
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3 torch.Size([10, 3, 224, 224])
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11 torch.Size([10, 3, 224, 224])
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12 torch.Size([10, 3, 224, 224])

```

```

88
13 torch.Size([10, 3, 224, 224])
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14 torch.Size([10, 3, 224, 224])
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15 torch.Size([10, 3, 224, 224])
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18 torch.Size([10, 3, 224, 224])
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19 torch.Size([10, 3, 224, 224])
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20 torch.Size([10, 3, 224, 224])
88
21 torch.Size([10, 3, 224, 224])
88
22 torch.Size([10, 3, 224, 224])
88
23 torch.Size([10, 3, 224, 224])
88
24 torch.Size([3, 3, 224, 224])
88
88

```

```

[: metrics_g= torch.zeros(4,len(train_dl.dataset),device=device)
  var_name = 'metrics_g'
  print(sys.getsizeof(eval(var_name)))

```

```

88

```

```

[: print('Allocated:', round(torch.cuda.memory_allocated(0)/1024**3,1), 'GB')
  print('Cached:   ', round(torch.cuda.memory_reserved(0)/1024**3,1), 'GB')

```

```

Allocated: 0.5 GB
Cached:    0.5 GB

```

```

[: metrics_g= torch.zeros(4,len(train_dl.dataset),device=device)

import sys

for batch_ndx, batch_tup in enumerate(train_dl):

    input_t, label_t = batch_tup

```

```

input_g = input_t.to(device)
label_g = label_t.to(device)
model=model.to(device)

del input_t,label_t, batch_tup

outputs = model(input_g)

softmax = nn.Softmax(dim=1)
prob_g= softmax(outputs)
pred_label_g= outputs.argmax(dim=-1)
#print(prob_g[:,1])

loss_func = nn.CrossEntropyLoss(reduction='none')
loss_g = loss_func(outputs,label_g)

print('Allocated:', round(torch.cuda.memory_allocated(0)/1024**3,1), 'GB')
print('Cached: ', round(torch.cuda.memory_reserved(0)/1024**3,1), 'GB')

start_ndx = batch_ndx * batch_size
end_ndx = start_ndx + label_g.size()[0]
print('start_ndx,end_ndx',start_ndx,end_ndx,label_g.shape[0],prob_g.
→shape[0],loss_g.shape[0])

metrics_g= torch.zeros(4,len(train_dl.dataset),device=device)

```

```

Allocated: 1.2 GB
Cached:    1.5 GB
start_ndx,end_ndx 0 10 10 10 10
Allocated: 1.9 GB
Cached:    2.2 GB
start_ndx,end_ndx 10 20 10 10 10
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 20 30 10 10 10
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 30 40 10 10 10
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 40 50 10 10 10
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 50 60 10 10 10
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 60 70 10 10 10

```

Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 70 80 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 80 90 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 90 100 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 100 110 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 110 120 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 120 130 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 130 140 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 140 150 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 150 160 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 160 170 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 170 180 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 180 190 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 190 200 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 200 210 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 210 220 10 10 10
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 220 230 10 10 10

```
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 230 240 10 10 10
Allocated: 1.4 GB
Cached:    2.9 GB
start_ndx,end_ndx 240 243 3 3 3
```

```
[ ]: metrics_g= torch.zeros(1,len(train_dl.dataset),device=device)

import sys

for batch_ndx, batch_tup in enumerate(train_dl):

    input_t, label_t = batch_tup

    input_g = input_t.to(device)
    label_g = label_t.to(device)
    model=model.to(device)

    outputs = model(input_g)

    softmax = nn.Softmax(dim=1)
    prob_g= softmax(outputs)
    pred_label_g= outputs.argmax(dim=-1)
    #print(prob_g[:,1])

    loss_func = nn.CrossEntropyLoss(reduction='none')
    loss_g = loss_func(outputs,label_g)

    print('Allocated:', round(torch.cuda.memory_allocated(0)/1024**3,1), 'GB')
    print('Cached:    ', round(torch.cuda.memory_reserved(0)/1024**3,1), 'GB')

    start_ndx = batch_ndx * batch_size
    end_ndx = start_ndx + label_g.size()[0]
    print('start_ndx,end_ndx',start_ndx,end_ndx,label_g.shape[0],prob_g.
→shape[0],loss_g.shape[0])

    metrics_g[0, start_ndx:end_ndx] = label_g
    #metrics_g[1, start_ndx:end_ndx] = prob_g[:,1]
    #metrics_g[1, start_ndx:end_ndx] = loss_g
    #metrics_g[3, start_ndx:end_ndx] = pred_label_g

    var_name = 'metrics_g'
    print(sys.getsizeof(eval(var_name)))
```

```
Allocated: 1.4 GB
Cached:    2.9 GB
```

```

start_ndx,end_ndx 0 10 10 10 10
88
Allocated: 1.4 GB
Cached: 2.9 GB
start_ndx,end_ndx 10 20 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 20 30 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 30 40 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 40 50 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 50 60 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 60 70 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 70 80 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 80 90 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 90 100 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 100 110 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 110 120 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB

```

```

start_ndx,end_ndx 120 130 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 130 140 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 140 150 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 150 160 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 160 170 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 170 180 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 180 190 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 190 200 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 200 210 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 210 220 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 220 230 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 230 240 10 10 10
88
Allocated: 1.4 GB
Cached: 2.9 GB

```

```
start_ndx,end_ndx 240 243 3 3 3
88
```

```
[ ]: a=torch.arange(label_g.size()[0], device=device)
      print(a)
```

```
tensor([0, 1, 2], device='cuda:0')
```

```
[ ]: metrics_g= torch.zeros(4,len(train_dl.dataset),device=device)

import sys

for batch_ndx, batch_tup in enumerate(train_dl):

    input_t, label_t = batch_tup

    input_g = input_t.to(device)
    label_g = label_t.to(device)
    model=model.to(device)

    outputs = model(input_g)

    softmax = nn.Softmax(dim=1)
    prob_g= softmax(outputs)
    pred_label_g= outputs.argmax(dim=-1)
    #print(prob_g[:,1])

    loss_func = nn.CrossEntropyLoss(reduction='none')
    loss_g = loss_func(outputs,label_g)

    print('Allocated:', round(torch.cuda.memory_allocated(0)/1024**3,1), 'GB')
    print('Cached:    ', round(torch.cuda.memory_reserved(0)/1024**3,1), 'GB')

    start_ndx = batch_ndx * batch_size
    end_ndx = start_ndx + label_g.size()[0]
    print('start_ndx,end_ndx',start_ndx,end_ndx,label_g.shape[0],prob_g.
→shape[0],loss_g.shape[0])

    metrics_g[0, start_ndx:end_ndx] = label_g
    metrics_g[1, start_ndx:end_ndx] = torch.arange(label_g.size()[0],
→device=device)
    metrics_g[2, start_ndx:end_ndx] = torch.arange(label_g.size()[0],
→device=device)
    metrics_g[3, start_ndx:end_ndx] = torch.arange(label_g.size()[0],
→device=device)

    var_name = 'metrics_g'
```



```
print(sys.getsizeof(eval(var_name)))
```

```
Allocated: 1.4 GB
Cached:    2.9 GB
start_ndx,end_ndx 0 10 10 10 10
88
Allocated: 1.4 GB
Cached:    2.9 GB
start_ndx,end_ndx 10 20 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 20 30 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 30 40 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 40 50 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 50 60 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 60 70 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 70 80 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 80 90 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 90 100 10 10 10
88
Allocated: 1.9 GB
Cached:    2.9 GB
start_ndx,end_ndx 100 110 10 10 10
88
Allocated: 1.9 GB
```

```

Cached:      2.9 GB
start_ndx,end_ndx 110 120 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 120 130 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 130 140 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 140 150 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 150 160 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 160 170 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 170 180 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 180 190 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 190 200 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 200 210 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 210 220 10 10 10
88
Allocated: 1.9 GB
Cached:      2.9 GB
start_ndx,end_ndx 220 230 10 10 10
88
Allocated: 1.9 GB

```

```
Cached:      2.9 GB
start_ndx,end_ndx 230 240 10 10 10
88
Allocated: 1.4 GB
Cached:      2.9 GB
start_ndx,end_ndx 240 243 3 3 3
88
```

```
[ ]: metrics_g= torch.zeros(4,len(train_dl.dataset),device=device)

import sys

for batch_ndx, batch_tup in enumerate(train_dl):

    input_t, label_t = batch_tup

    input_g = input_t.to(device)
    label_g = label_t.to(device)
    model=model.to(device)

    outputs  = model(input_g)

    softmax = nn.Softmax(dim=1)
    prob_g= softmax(outputs)
    pred_label_g= outputs.argmax(dim=-1)
    #print(prob_g[:,1])

    loss_func = nn.CrossEntropyLoss(reduction='none')
    loss_g = loss_func(outputs,label_g)

    print('Allocated:', round(torch.cuda.memory_allocated(0)/1024**3,1), 'GB')
    print('Cached:   ', round(torch.cuda.memory_reserved(0)/1024**3,1), 'GB')

    start_ndx = batch_ndx * batch_size
    end_ndx = start_ndx + label_g.size()[0]
    print('start_ndx,end_ndx',start_ndx,end_ndx,label_g.shape[0],prob_g.
→shape[0],loss_g.shape[0])

    metrics_g[0, start_ndx:end_ndx] = label_g
    metrics_g[1, start_ndx:end_ndx] = prob_g[:,1].detach()
    metrics_g[2, start_ndx:end_ndx] = loss_g.detach()
    metrics_g[3, start_ndx:end_ndx] = pred_label_g.detach()

    var_name = 'metrics_g'
    print(sys.getsizeof(eval(var_name)))
```

```
Allocated: 1.9 GB
Cached:    2.9 GB
```

```
start_ndx,end_ndx 0 10 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 10 20 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 20 30 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 30 40 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 40 50 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 50 60 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 60 70 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 70 80 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 80 90 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 90 100 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 100 110 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 110 120 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
```

```

start_ndx,end_ndx 120 130 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 130 140 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 140 150 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 150 160 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 160 170 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 170 180 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 180 190 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 190 200 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 200 210 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 210 220 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 220 230 10 10 10
88
Allocated: 1.9 GB
Cached: 2.9 GB
start_ndx,end_ndx 230 240 10 10 10
88
Allocated: 1.4 GB
Cached: 2.9 GB

```

```
start_ndx,end_ndx 240 243 3 3 3
88
```

```
[ ]: var_name = 'metrics_g'
      print(sys.getsizeof(eval(var_name)))
```

```
88
```

```
[ ]: print('Allocated:', round(torch.cuda.memory_allocated(0)/1024**3,1), 'GB')
      print('Cached:   ', round(torch.cuda.memory_reserved(0)/1024**3,1), 'GB')
```

```
Allocated: 0.7 GB
Cached:    2.9 GB
```

9 END