PA2 Problem 3

```
In [1]:
from google.colab import drive
drive.mount('/content/drive')
Mounted at /content/drive
In [2]:
import os
import sys
sys.path.append(os.path.abspath('/content/drive/MyDrive/2 pose estimation'))
from model import *
import torch
import numpy as np
import torchvision
import tqdm
from torch.utils.data import Dataset
from torch.utils.data import DataLoader
import cv2
import math
import torch.nn as nn
import torch.optim as optim
from glob import glob
import pandas
import matplotlib.pyplot as plt
device = 'cuda:0'
num joints = 21
In [3]:
class Dataset(Dataset):
    def init (self, method=None):
        self.root = '/content/drive/MyDrive/2 pose estimation/dataset/'
        self.x data = []
        self.y data = []
        if method == 'train':
            self.root = self.root + 'train/'
            self.img path = sorted(glob(self.root + 'rgb/*.jpg'))
        elif method == 'test':
            self.root = self.root + 'test/'
            self.img path = sorted(glob(self.root + 'rgb/*.jpg'))
        for i in tqdm.tqdm(range(len(self.img path))):
            img = cv2.imread(self.img path[i], cv2.IMREAD COLOR)
            b, g, r = cv2.split(img)
            img = cv2.merge([r, g, b])
            self.x_data.append(img)
            num = self.img path[i].split('.')[0].split('/')[-1]
            img pkl = self.root + 'meta/' + str(num) + '.pkl'
            pkl = pandas.read pickle(img pkl)
            coords 2d = pkl['coords 2d']
            self.y data.append(coords 2d)
    def len (self):
        return len(self.img path)
    def __getitem__(self, idx):
    transform1 = torchvision.transforms.ToTensor()
        new x data = transform1(self.x data[idx])
```

```
return new_x_data, self.y_data[idx]
```

In [4]:

```
class Tester(object):
    def init (self, batch size):
        self.batch size = batch size
        self. build model()
        self.root = '/content/drive/MyDrive/2 pose estimation/dataset/'
        # Load of pretrained weight file
        weight PATH = '/content/drive/MyDrive/2 pose estimation/dataset/pretrained weight
.pth'
        self.poseNet.load state dict(torch.load(weight PATH))
        print("Testing...")
    def build model(self):
        # 2d pose estimator
        poseNet = CPM2DPose()
        self.poseNet = poseNet.to(device)
        print('Finish build model.')
    def heatmap2skeleton(self, heatmapsPoseNet):
        skeletons = np.zeros((heatmapsPoseNet.shape[0], heatmapsPoseNet.shape[1], 2))
        for m in range(heatmapsPoseNet.shape[0]):
            for i in range(heatmapsPoseNet.shape[1]):
                u, v = np.unravel\_index(np.argmax(heatmapsPoseNet[m][i]), (32, 32))
                skeletons[m, i, 0] = u * 8
                skeletons[m, i, 1] = v * 8
        return skeletons
    @staticmethod
    def plot hand(coords hw, axis, color fixed=None, linewidth='1'):
        colors = np.array([[0., 0., 1.]],
                            [0., 0., 1.],
                            [0., 0., 1.],
                            [0., 0., 1.],
                            [1., 0., 1.],
                            [1., 0., 1.],
                            [1., 0., 1.],
                            [1., 0., 1.],
                            [1., 0., 0.],
                            [1., 0., 0.],
                            [1., 0., 0.],
                            [1., 0., 0.],
                            [0., 1., 0.],
                            [0., 1., 0.],
                            [0., 1., 0.],
                            [0., 1., 0.],
                            [1., 0.5, 0.],
                            [1., 0.5, 0.],
                            [1., 0.5, 0.],
                           [1., 0.5, 0.]])
        bones = [((1, 0), colors[0, :]),
                  ((2, 1), colors[1, :]),
                 ((3, 2), colors[2, :]),
                 ((4, 3), colors[3, :]),
                 ((0, 5), colors[4, :]),
                  ((5, 6), colors[5, :]),
                 ((6, 7), colors[6, :]),
((7, 8), colors[7, :]),
                  ((0, 9), colors[8, :]),
                 ((9, 10), colors[9, :]),
                 ((10, 11), colors[10, :]),
                 ((11, 12), colors[11, :]),
                 ((0, 13), colors[12, :]),
                  ((13, 14), colors[13, :]),
```

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((14, 15), colors[14, :]),
                 ((15, 16), colors[15, :]),
                 ((0, 17), colors[16, :]),
                 ((17, 18), colors[17, :]),
                 ((18, 19), colors[18, :]),
                 ((19, 20), colors[19, :])]
        for connection, color in bones:
            coord1 = coords hw[connection[0], :]
            coord2 = coords hw[connection[1], :]
            coords = np.stack([coord1, coord2])
            if color fixed is None:
                axis.plot(coords[:, 1], coords[:, 0], color=color, linewidth=linewidth)
            else:
                axis.plot(coords[:, 1], coords[:, 0], color fixed, linewidth=linewidth)
    # test '106.png' image
    def test106(self, epochs, batch size, learning rate, finetuned=False):
        print("Finetuned" if finetuned else "Not finetuned")
        # load weight file
        if finetuned:
            weight PATH = "/content/drive/MyDrive/2 pose estimation/dataset/train/finetu
ned_{epochs}_{batch_size}_{learning_rate}.pth".format(epochs=epochs, batch_size=batch_siz
e, learning rate=learning rate)
        else:
            weight PATH = '/content/drive/MyDrive/2 pose estimation/dataset/train/pretra
ined weight.pth'
        self.poseNet.load state dict(torch.load(weight PATH))
        path = self.root + 'test/rgb/106.jpg'
        pkl path = self.root + 'test/meta/106.pkl'
        print (path)
        print(pkl path)
        img = cv2.imread(path, cv2.IMREAD COLOR)
        b, g, r = cv2.split(img)
        img = cv2.merge([r, g, b])
        transform1 = torchvision.transforms.ToTensor()
        x_{data} = transform1(img)
        pkl = pandas.read pickle(pkl path)
        y test = pkl['coords 2d']
        self.poseNet.eval()
        print("Testing 106.jpg heatmap")
       print(x data.size())
        heatmapsPoseNet = self.poseNet(x data.unsqueeze(0).cuda()).cpu().detach().numpy(
        heatmap = np.transpose(heatmapsPoseNet[0], (1, 2, 0))
        save path = "/content/drive/MyDrive/2 pose estimation/dataset/"
        plt.rcParams['figure.figsize'] = [12, 5]
        for i in range(num_joints):
            ax = plt.subplot(3, 7, i + 1)
            ax.imshow(heatmap[:, :, i])
        plt.savefig(save_path + "heatmap_{epochs}_{batch_size}_{learning_rate}.png".form
at(epochs=epochs, batch_size=batch_size, learning_rate=learning_rate))
        plt.show()
        print("Testing 106.jpg heatmap")
        ax = plt.subplot(1, 1, 1)
        ax.imshow(imq)
        pred = self.heatmap2skeleton(heatmapsPoseNet)[0]
        self.plot hand(pred, ax)
        error = self.calc error(y test, pred)
        print(f"Error is {error}")
        plt.savefig(save_path + "result_{epochs}_{batch_size}_{learning_rate}.png".forma
t(epochs=epochs, batch size=batch size, learning rate=learning rate))
```

```
plt.show()
    # test all images
    def test(self, epochs, batch_size, learning_rate, finetuned=False):
       print("Finetuned" if finetuned else "Not finetuned")
        # load weight file
        if finetuned:
            weight PATH = "/content/drive/MyDrive/2 pose estimation/dataset/train/finetu
ned {epochs} {batch size} {learning rate}.pth".format(epochs=epochs, batch size=batch siz
e, learning rate=learning rate)
        else:
            weight PATH = '/content/drive/MyDrive/2 pose estimation/dataset/train/pretra
ined weight.pth'
        self.poseNet.load state dict(torch.load(weight PATH))
        totalError = 0
        for i in range (500):
            img path = self.root + 'test/rgb/%d.jpg' % (i)
            pkl path = self.root + 'test/meta/%d.pkl' % (i)
            print(img path)
            img = cv2.imread(img path, cv2.IMREAD COLOR)
            b, g, r = cv2.split(img)
            img = cv2.merge([r, g, b])
            transform1 = torchvision.transforms.ToTensor()
            x data = transform1(img)
            pkl = pandas.read pickle(pkl path)
            y test = pkl['coords 2d']
            self.poseNet.eval()
            heatmapsPoseNet = self.poseNet(x data.unsqueeze(0).cuda()).cpu().detach().nu
mpy()
            heatmap = np.transpose(heatmapsPoseNet[0], (1, 2, 0))
            pred = self.heatmap2skeleton(heatmapsPoseNet)[0]
            error = self.calc error(y test, pred)
            print(f"Testing {i}-th image's error is {error}")
            totalError += error
        print(f"Total Error is {totalError/500}")
    def calc error(self, gt, pred):
        k = 21 \# num \ of \ keypoints
        err = 0
        for i in range(k):
            err += math.sqrt(math.pow((gt[i][0] - pred[i][0]),2) + math.pow((gt[i][1] - pred[i]))
pred[i][1]),2)) # calculate Loss
        err = err/k # Loss average of keypoints
        return err
```

In [5]:

```
class Trainer(object):
    def __init__(self, epochs, batch_size, lr):
        self.epochs = epochs
        self.batch_size = batch_size
        self.learning_rate = lr
        self._build_model()

        self.cost = nn.MSELoss()
        self.optimizer = optim.Adam(self.poseNet.parameters(), lr=self.learning_rate)

        dataset = Dataset(method='train')
        self.root = dataset.root
        self.dataloader = DataLoader(dataset, batch_size=self.batch_size, shuffle=True)
```

```
# Load of pretrained weight file
        weight_PATH = '/content/drive/MyDrive/2_pose_estimation/dataset/pretrained weight
.pth'
        self.poseNet.load state dict(torch.load(weight PATH))
    def build model(self):
       # 2d pose estimator
        poseNet = CPM2DPose()
        self.poseNet = poseNet.to(device)
        self.poseNet.train()
    def skeleton2heatmap(self, heatmap, keypoint targets):
        heatmap gt = torch.zeros like( heatmap, device= heatmap.device)
        keypoint targets = (((keypoint targets)) // 8)
        for i in range(keypoint targets.shape[0]):
            for j in range (21):
                x = int(keypoint_targets[i, j, 0])
                y = int(keypoint_targets[i, j, 1])
                heatmap_gt[i, j, x, y] = 1
        heatmap gt = heatmap gt.detach().cpu().numpy()
        for i in range(keypoint_targets.shape[0]):
            for j in range(21):
                heatmap gt[i, j, :, :] = cv2.GaussianBlur(heatmap gt[i, j, :, :], ksize=
(3, 3), sigmaX=2,
                                                          sigmaY=2) * 9 / 1.1772
        heatmap gt = torch.FloatTensor(heatmap gt).to(device)
        return heatmap gt
    def heatmap2skeleton(self, heatmapsPoseNet):
        skeletons = np.zeros((heatmapsPoseNet.shape[0], heatmapsPoseNet.shape[1], 2))
        for m in range(heatmapsPoseNet.shape[0]):
            for i in range(heatmapsPoseNet.shape[1]):
               u, v = np.unravel_index(np.argmax(heatmapsPoseNet[m][i]), (32, 32)) skeletons[m, i, 0] = u * 8
                skeletons[m, i, 1] = v * 8
        return skeletons
    # Prob 2
    def train(self):
        date = '202211'
        for epoch in tqdm.tqdm(range(self.epochs + 1)):
            totalLoss = 0
            if epoch % 2 == 0:
                torch.save(self.poseNet.state dict(), self.root + " ".join(['model ', st
r(epoch), '.pth']))
            for batch idx, samples in enumerate(self.dataloader):
                ##----
                # Implement your code here
                x train, y train = samples
                self.poseNet.eval()
                heatmapsPoseNet = self.poseNet(x_train.cuda()) # pred value
                loss = self.cost(heatmapsPoseNet, self.skeleton2heatmap(heatmapsPoseNet,
y train)) # calculate loss
                # leaning
                self.optimizer.zero grad()
                loss.backward()
                self.optimizer.step()
                totalLoss += loss.item()
                print(f"Epoch {epoch}/{self.epochs}, Batch {batch idx} loss is {loss.ite
m()} \n")
                ##-----
                ## Write train result
                if batch idx % 20 == 0: # 21개의 keypoint
```

In [6]:

```
epochs = 60
batchSize = 20
learningRate = 2e-5

# Prob 2
# trainer = Trainer(epochs, batchSize, learningRate)
# trainer.train()

# Prob 3
tester = Tester(batchSize)
# Prob 3 - 1)
print("Prob 3 - 1)")
tester.test106(epochs, batchSize, learningRate, True)
# Prob 3 - 2)
print("Prob 3 - 2)")
tester.test(epochs, batchSize, learningRate, True)
```

Finish build model.

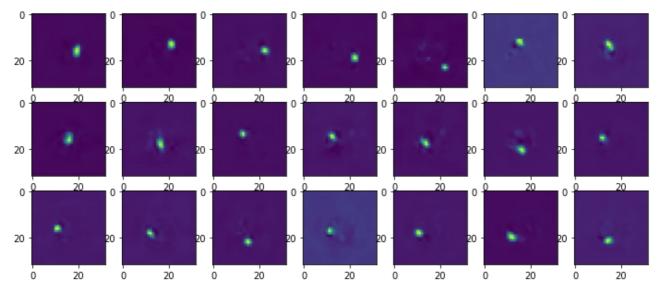
Testing...

Prob 3 - 1)

Finetuned

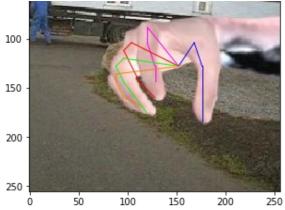
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/106.jpg
/content/drive/MyDrive/2_pose_estimation/dataset/test/meta/106.pkl

Testing 106.jpg heatmap
torch.Size([3, 256, 256])



Testing 106.jpg heatmap Error is 10.020755988449496





Prob 3 - 2) Finetuned /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/0.jpg Testing 0-th image's error is 14.57666802079228 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/1.jpg Testing 1-th image's error is 8.283794718840314 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/2.jpg Testing 2-th image's error is 8.285075986790012 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/3.jpg Testing 3-th image's error is 49.65380247414166 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/4.jpg Testing 4-th image's error is 17.10651721834851 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/5.jpg Testing 5-th image's error is 9.760886415444515 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/6.jpg Testing 6-th image's error is 7.501209210835403 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/7.jpg Testing 7-th image's error is 10.998848529868871 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/8.jpg Testing 8-th image's error is 8.04320909314365 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/9.jpg Testing 9-th image's error is 10.6900731421096 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/10.jpg Testing 10-th image's error is 7.531418018562716 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/11.jpg Testing 11-th image's error is 8.334675600535556 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/12.jpg Testing 12-th image's error is 26.942034302590173 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/13.jpg Testing 13-th image's error is 7.6563221312905485 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/14.jpg Testing 14-th image's error is 17.35705305551173 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/15.jpg Testing 15-th image's error is 8.031274481823102 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/16.jpg Testing 16-th image's error is 11.300824662584645 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/17.jpg Testing 17-th image's error is 12.228571381934406 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/18.jpg Testing 18-th image's error is 7.2362757616475974 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/19.jpg Testing 19-th image's error is 9.60486919856485 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/20.jpg Testing 20-th image's error is 8.29806843574787 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/21.jpg Testing 21-th image's error is 10.343819257470445 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/22.jpg Testing 22-th image's error is 12.110655434077993 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/23.jpg Testing 23-th image's error is 13.54932344288587 /content/drive/MyDrive/2 pose estimation/dataset/test/rgb/24.jpg Testing 24-th image's error is 20.219486768958014 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/25.jpg Testing 25-th image's error is 53.883002394544334 /content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/26.jpg

Testing 26-th image's error is 10.421479733050765

Tooting 27-th image! 0 0707 is 10 12601062002205

/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/27.jpg

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restring 71-cm rmage 2 error 12 12.13021007207003
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/28.jpg
Testing 28-th image's error is 35.35877547896036
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/29.jpg
Testing 29-th image's error is 18.806104334829385
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/30.jpg
Testing 30-th image's error is 20.072609829878818
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/31.jpg
Testing 31-th image's error is 9.089820426568378
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/32.jpg
Testing 32-th image's error is 18.031724042137828
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/33.jpg
Testing 33-th image's error is 27.999954470999114
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/34.jpg
Testing 34-th image's error is 11.278999149371307
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/35.jpg
Testing 35-th image's error is 8.113234824269643
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/36.jpg
Testing 36-th image's error is 11.86437329827891
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/37.jpg
Testing 37-th image's error is 7.876346327883394
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/38.jpg
Testing 38-th image's error is 16.626519906748303
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/39.jpg
Testing 39-th image's error is 36.55663756420968
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/40.jpg
Testing 40-th image's error is 11.390052312727855
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/41.jpg
Testing 41-th image's error is 44.443163999223295
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/42.jpg
Testing 42-th image's error is 39.55086214586098
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/43.jpg
Testing 43-th image's error is 11.836093416684562
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/44.jpg
Testing 44-th image's error is 30.591048389141108
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/45.jpg
Testing 45-th image's error is 18.465238766587845
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/46.jpg
Testing 46-th image's error is 9.25878330353694
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/47.jpg
Testing 47-th image's error is 32.23312072824347
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/48.jpg
Testing 48-th image's error is 28.359925833716645
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/49.jpg
Testing 49-th image's error is 32.590436054281426
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/50.jpg
Testing 50-th image's error is 24.078696813757418
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/51.jpg
Testing 51-th image's error is 26.800059718871413
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/52.jpg
Testing 52-th image's error is 18.212659178763747
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/53.jpg
Testing 53-th image's error is 21.06444592965359
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/54.jpg
Testing 54-th image's error is 25.99524699868535
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/55.jpg
Testing 55-th image's error is 10.157922449709606
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/56.jpg
Testing 56-th image's error is 20.189800368644285
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/57.jpg
Testing 57-th image's error is 13.97759143111298
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/58.jpg
Testing 58-th image's error is 14.779452974712033
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/59.jpg
Testing 59-th image's error is 20.557782572584753
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/60.jpg
Testing 60-th image's error is 16.997747426676895
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/61.jpg
Testing 61-th image's error is 15.486848668311412
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/62.jpg
Testing 62-th image's error is 12.967378644468951
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/63.jpg
Tooting 62-th image! or or is 10 100777/6760111/
```

```
16201119 03-011 1111aye & 61101 15 12.103///43/021114
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/64.jpg
Testing 64-th image's error is 10.923566609237165
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/65.jpg
Testing 65-th image's error is 9.039944905644195
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/66.jpg
Testing 66-th image's error is 27.39323077920885
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/67.jpg
Testing 67-th image's error is 16.29342949906841
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/68.jpg
Testing 68-th image's error is 28.157188745392506
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/69.jpg
Testing 69-th image's error is 16.23416665663752
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/70.jpg
Testing 70-th image's error is 8.082066409520465
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/71.jpg
Testing 71-th image's error is 18.325630007477656
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/72.jpg
Testing 72-th image's error is 11.077753844634532
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/73.jpg
Testing 73-th image's error is 13.098173226395069
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/74.jpg
Testing 74-th image's error is 37.18865811646887
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/75.jpg
Testing 75-th image's error is 8.725334872070732
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/76.jpg
Testing 76-th image's error is 23.502246216972633
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/77.jpg
Testing 77-th image's error is 15.750035689349312
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/78.jpg
Testing 78-th image's error is 27.612572692940727
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/79.jpg
Testing 79-th image's error is 13.40709751190156
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/80.jpg
Testing 80-th image's error is 29.360996141866448
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/81.jpg
Testing 81-th image's error is 8.630352379414724
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/82.jpg
Testing 82-th image's error is 16.52842248619547
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/83.jpg
Testing 83-th image's error is 11.644581846284037
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/84.jpg
Testing 84-th image's error is 23.37221290113066
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/85.jpg
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/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/93.jpg
Testing 93-th image's error is 26.087365915041907
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/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/95.jpg
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/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/98.jpg
Testing 98-th image's error is 10.764041130175784
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Testing 276-th image's error is 26.56887938961785
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TESCIIIY 2/3-CII IMaye & EIIOI 18 0.304040033/03133
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16501119 423-011 1111aye 5 61101 15 43.32000023333322
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/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/463.jpg
Testing 463-th image's error is 11.853633397047137
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/464.jpg
Testing 464-th image's error is 23.670746387692855
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/465.jpg
Testing 465-th image's error is 21.473214492148905
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/466.jpg
Testing 466-th image's error is 16.20971273829694
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/467.jpg
Testing 467-th image's error is 12.847088716654302
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/468.jpg
Testing 468-th image's error is 12.973810418998827
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/469.jpg
Testing 469-th image's error is 27.349417706414503
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/470.jpg
Testing 470-th image's error is 8.058944370145053
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/471.jpg
Testing 471-th image's error is 15.165275754563822
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/472.jpg
Testing 472-th image's error is 27.97844461221802
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/473.jpg
Testing 473-th image's error is 36.389750613449316
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/474.jpg
Testing 474-th image's error is 7.16323493304836
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/475.jpg
Testing 475-th image's error is 33.55662942202537
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/476.jpg
Testing 476-th image's error is 8.549902736970216
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/477.jpg
Testing 477-th image's error is 15.910414959994585
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/478.jpg
Testing 478-th image's error is 16.333808916548488
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/479.jpg
Testing 479-th image's error is 22.529100661921596
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/480.jpg
Testing 480-th image's error is 18.529421683235505
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/481.jpg
Testing 481-th image's error is 18.70401003344859
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/482.jpg
Testing 482-th image's error is 11.029611412464035
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/483.jpg
Testing 483-th image's error is 8.129747966103887
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/484.jpg
Testing 484-th image's error is 11.467678074704946
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/485.jpg
Testing 485-th image's error is 18.514701015197435
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/486.jpg
Testing 486-th image's error is 52.08515946484785
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/487.jpg
Testing 487-th image's error is 54.02254865594016
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/488.jpg
Testing 488-th image's error is 26.168865575312754
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/489.jpg
Testing 489-th image's error is 9.31443278136388
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/490.jpg
Testing 490-th image's error is 15.730774432370099
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/491.jpg
Testing 491-th image's error is 17.53542636625429
/content/drive/MyDrive/2 pose estimation/dataset/test/rgb/492.jpg
Testing 492-th image's error is 9.367889872718871
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/493.jpg
Testing 493-th image's error is 14.6038054437711
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/494.jpg
Testing 494-th image's error is 52.9133853630968
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/495.jpg
Tooting 105-th image! 0 0000 is 11 050100512270607
```

resting 495-th image's error is 13.739542261063754
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/496.jpg
Testing 496-th image's error is 13.739542261063754
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/497.jpg
Testing 497-th image's error is 32.03395970335101
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/498.jpg
Testing 498-th image's error is 24.422455927787798
/content/drive/MyDrive/2_pose_estimation/dataset/test/rgb/499.jpg
Testing 499-th image's error is 39.03022842504942
Total Error is 20.439749676773214