Reconstruct

March 4, 2019

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In [19]: import torch

         from torch.autograd import Variable
         from torchvision.datasets import MNIST
         from torchvision.transforms import ToTensor
         from data_loader import ImageFolder
         from torchvision import transforms

         from net import CapsNetWithReconstruction, CapsNet, ReconstructionNet

         %matplotlib inline
         import matplotlib.pyplot as plt

         # initialize network classes
         capsnet = CapsNet(3, 33)
         reconstructionnet = ReconstructionNet(16, 33)
         model = CapsNetWithReconstruction(capsnet, reconstructionnet)

         # Load trained model
         MODEL_PATH = '100_model_dict_3routing_reconstructionTrue.pth'
         model.load_state_dict(torch.load(MODEL_PATH))

         transform = transforms.Compose([transforms.Grayscale(), transforms.ToTensor(), transf

         dataset = ImageFolder("/media/jiashu/Data/Peal_Test/Re/",transform)

         # (1x28x28 tensor input)
         def get_digit_caps(model, image):
             input_ = Variable(image.unsqueeze(0), volatile=True)
             digit_caps, probs = model.capsnet(input_)
             return digit_caps

         # takes digit_caps output and target label
         def get_reconstruction(model, digit_caps, label):
             target = Variable(torch.LongTensor([label]), volatile=True)
             reconstruction = model.reconstruction_net(digit_caps, target)
             return reconstruction.data.cpu().numpy()[0].reshape(224, 224)
         # create reconstructions with perturbed digit capsule
         def dimension_perturbation_reconstructions(model, digit_caps, label, dimension, dim_va
             reconstructions = []
             label = label.long()
             for dim_value in dim_values:
                 digit_caps_perturbed = digit_caps.clone()
                 digit_caps_perturbed[0, label, dimension] = dim_value
                 reconstruction = get_reconstruction(model, digit_caps_perturbed, label)
                 reconstructions.append(reconstruction)
             return reconstructions

         print("OVER")
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In [20]: # Get reconstructions
         images = []
         reconstructions = []
         for i in range(10):
             image_tensor, label = dataset[i]
             # print(type(image_tensor))
             digit_caps = get_digit_caps(model, image_tensor)
             reconstruction = get_reconstruction(model, digit_caps, label)
             images.append(image_tensor.numpy()[0])
             reconstructions.append(reconstruction)
         print("OVER")
```

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/home/jiashu/.local/lib/python3.6/site-packages/ipykernel_launcher.py:29: UserWarning: volatile
/home/jiashu/.local/lib/python3.6/site-packages/ipykernel_launcher.py:35: UserWarning: volatile
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In [21]: # Plot reconstructions

         fig, axs = plt.subplots(2, 10, figsize=(16, 4))
         axs[0, 0].set_ylabel('Org image', size='large')
         axs[1, 0].set_ylabel('Reconstruction', size='large')
         for i in range(10):
             axs[0, i].imshow(images[i], cmap='gray')
             axs[1, i].imshow(reconstructions[i], cmap='gray')
             axs[0, i].set_yticks([])
             axs[0, i].set_xticks([])
             axs[1, i].set_yticks([])
             axs[1, i].set_xticks([])
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digit, label = dataset[9]
perturbed_reconstructions = []
perturbation_values = [0.05*i for i in range(-7, 8)]
digit_caps = get_digit_caps(model, digit)
for dimension in range(16):
    perturbed_reconstructions.append(
        dimension_perturbation_reconstructions(model, digit_caps, label,
                                               dimension, perturbation_values)
    )


fig, axs = plt.subplots(16, 15, figsize=(11*1.5, 16*1.5))
for i in range(16):
    axs[i, 0].set_ylabel('dim {}'.format(i), size='large')
    for j in range(15):
        axs[i, j].imshow(perturbed_reconstructions[i][j], cmap='gray')
        axs[i, j].set_yticks([])
        axs[i, j].set_xticks([])

print("OVER")
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/home/jiashu/.local/lib/python3.6/site-packages/ipykernel_launcher.py:29: UserWarning: volatil
/home/jiashu/.local/lib/python3.6/site-packages/ipykernel_launcher.py:35: UserWarning: volatil


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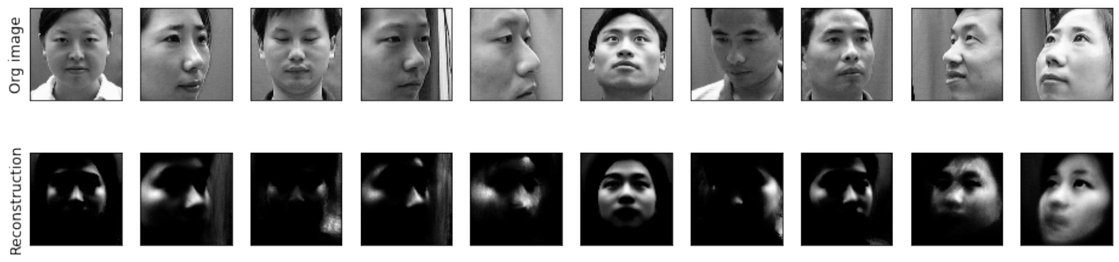

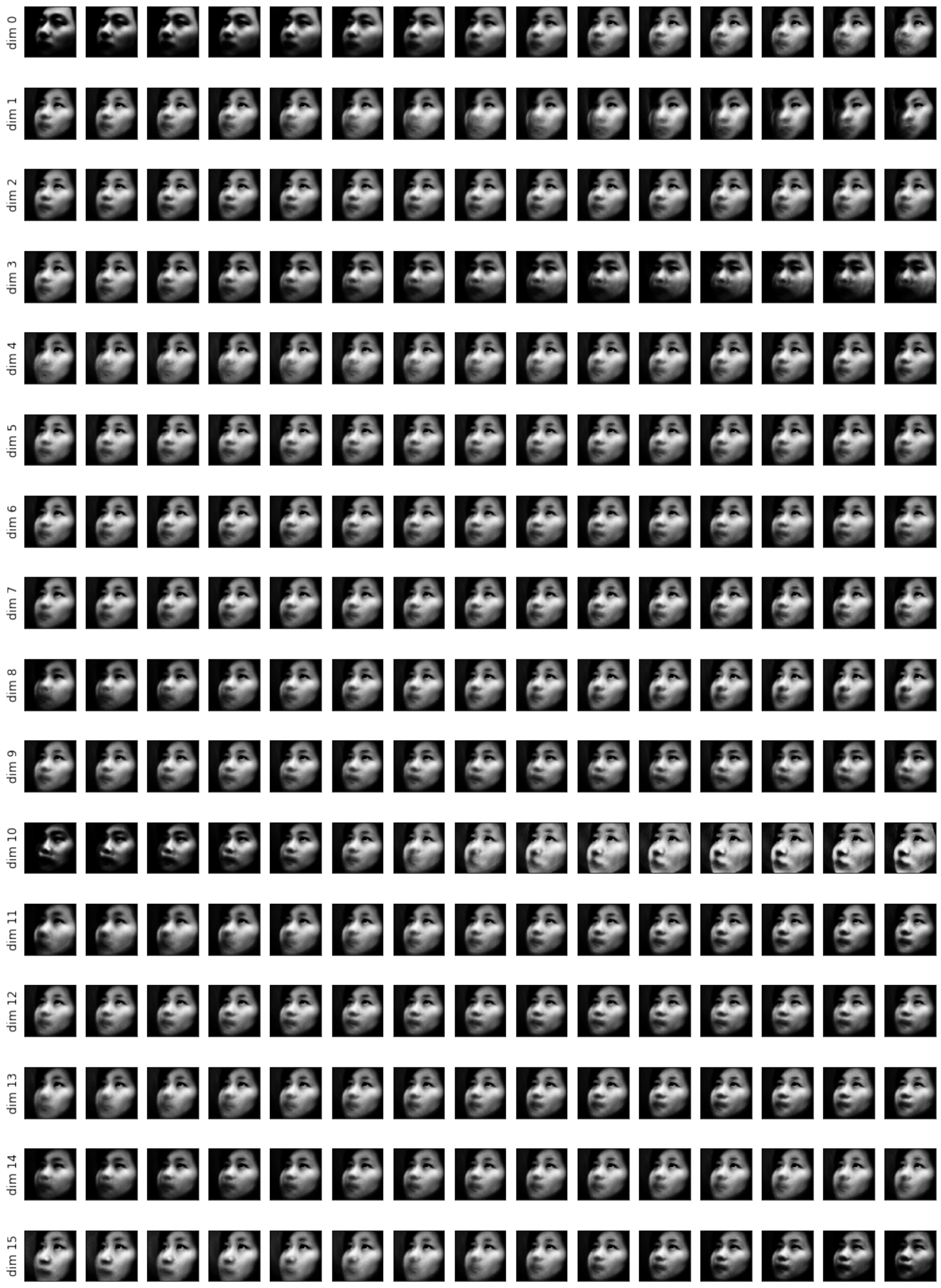
dim 0
dim 1
dim 2
dim 3
dim 4
dim 5
dim 6
dim 7
dim 8
dim 9
dim 10
dim 11
dim 12
dim 13
dim 14
dim 15

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