Lab4-2

1. Introduction (20%)

In the lab we need to train the model of ResNet18 and ResNet50 by using the dataset of diabetic retinopathy like the following picture.

And classify them with 5 level.

2. Experiment setups (30%)

A. The details of your model (ResNet)

In pytorch, we can easy to load the famous model with functions. Also, we can even use the pretrain model. Like:

model = models.resnet50(pretrained=True)

The we change the default output (1000 to 5), the we can use the model with train parameters.

model.fc = nn.Linear(in_features=model.fc.in_features, out_features=5)

Because the "fc" layer is in the default model, so we can easy transform the model we need.

In the similar way, we can produce the 4 model this project we need.

B. The details of your Dataloader

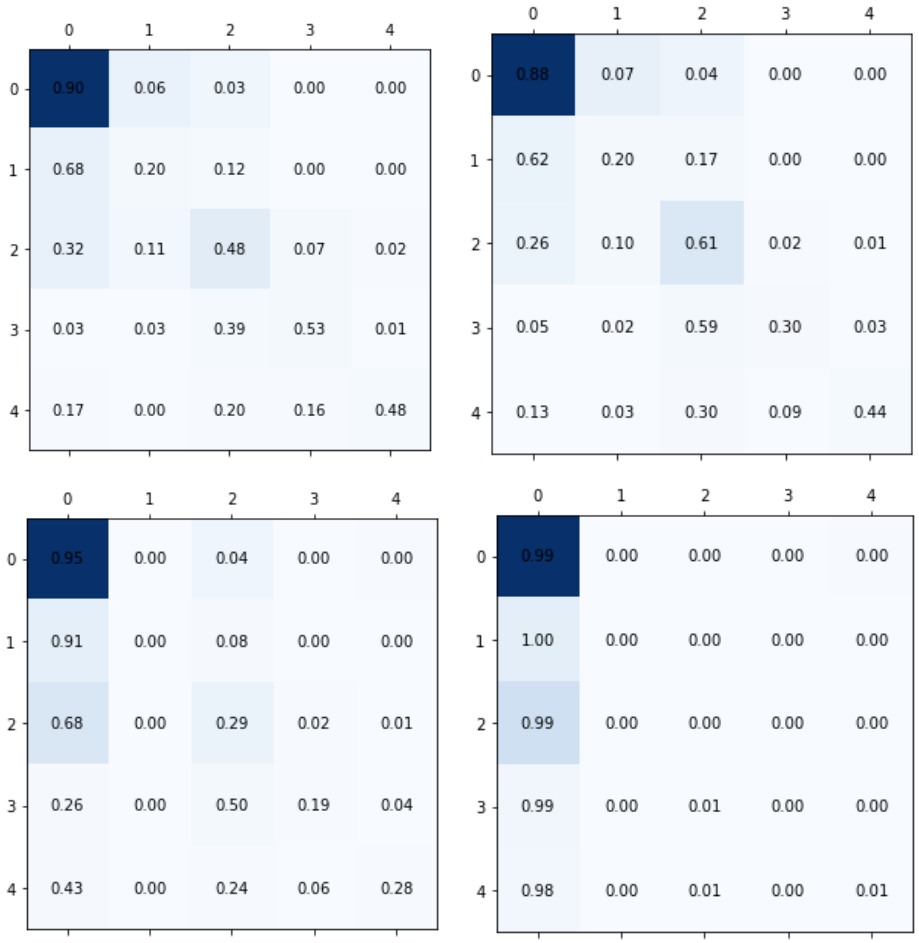
To achieve the information of TA's loader, the two part:

"Convert the pixel value to [0, 1]", can be finished by normalize function. And there are many legal function but it don't effect the result obviously. In my Lab, because the pretrained model is from ImageNet, I also use the same normal function.

transforms.Normalize((0.485, 0.456, 0.406), (0.229, 0.224, 0.225))

"Transpose the image shape from [H, W, C] to [C, H, W]", can be finish by To_Tensor() in torch.transform. Also, it can transform to tensor type.

C. Describing your evaluation through the confusion matrix



The left part is ResNet18 and the right part is ResNet50.
The upper part is pretrained and the lower part is not.

In the confusion matrix, the value on diagonal line can show the performance of the model, we can find that pretrain ResNet18 have the best performance.

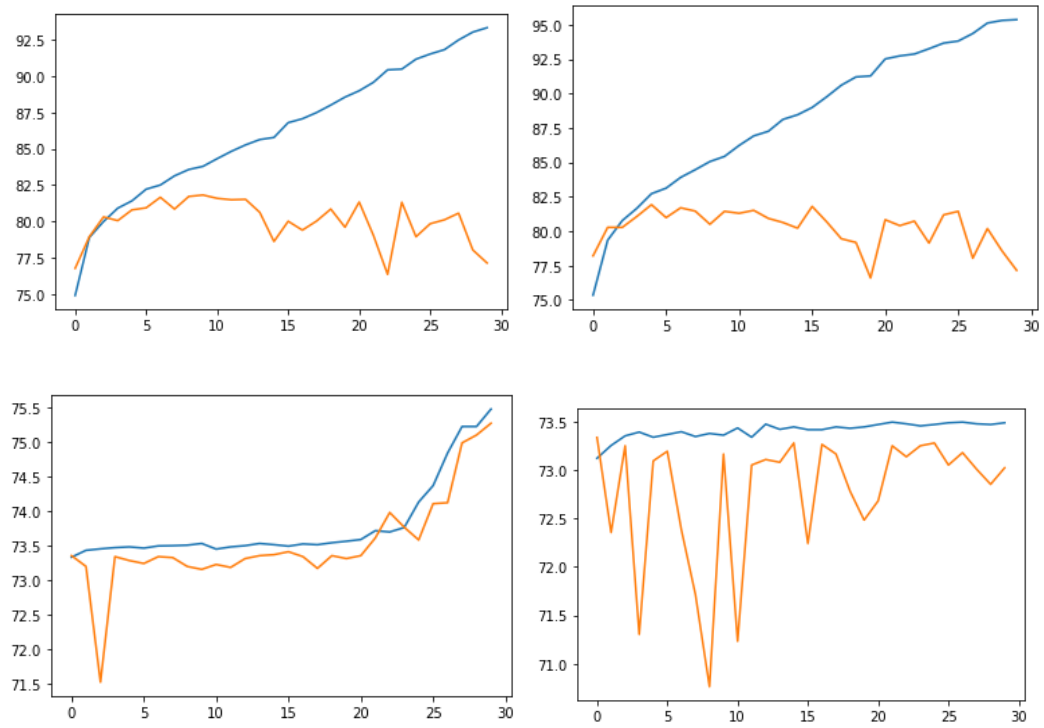
The accuracy can find in 3.B figure, we can find that the ResNet50 not learn very well. However, the dataset has too much class 1 image in dataset, so the non-pretrain ResNet50 class even all image to class 1, it still have 70+% accuracy.

3. Experimental results (30%)

A. The highest testing accuracy

B. Comparison figures

- Screenshot



The left part is ResNet18 and the right part is ResNet50.

The upper part is pretrained and the lower part is not.

The row is the number of epoch, the col is the accuracy.

As the 2.C answer, the accuracy in ResNet18 and ResNet50 have better performance (in some epoch, the). However, if we have enough time, the non-pretrained model may converge to higher position.

In the pretrain models, the accuracy falling at last, I think it is overfitting due to the accuracy of test data still rising.

To get the 82% model should need much good parameter and luck.

4. Discussion (20%)

A. Anything you want to share

The mechanism of the pretrain model work is about transfer learning (refer to Lab5), in the case, the learned features can easy to transfer to other model with same structure.