

DIP Homework 3

I decided to experiment with modularizing my convolutions. I defined a 'longblock' class as a container for my deep convolutions. 'Shortblock' is for shorter but wider convolutions (bigger kernel and less channels) . I optimized the model with SGD. I also implemented batch norm, dropout, and skip connections (only for long blocks).

I played around with different combinations of long & short blocks, but what got me the best accuracy was a 1 shortblock, 4 longblocks, 1 shortblock, 1 longblock. The full model printout is at the bottom

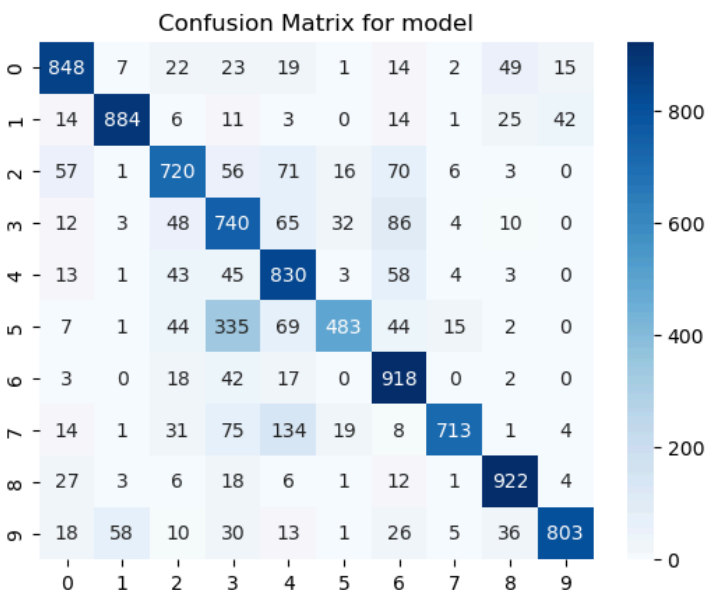
```
self.shortblock = Shortblock(3,128)
self.longblock1 = Longblock(128,128)
self.longblock2 = Longblock(128,256)
self.longblock3 = Longblock(256,512)
self.longblock4 = Longblock(512,256)
self.shortblock2 = Shortblock(256,128)
self.longblock5 = Longblock(128,64)

self.Linear1 = nn.Linear(576,100)
self.Linear2 = nn.Linear(100,500)
self.Linear3 = nn.Linear(500,10)
```

With this configuration, I managed to get 81% Accuracy on the Test set

```
Train Accuracy: 86.996
Validation Accuracy: 87.420
Time elapsed so far: 10.91 min
Total Train Time: 10.91 min
```

```
Test Accuracy: 81.000
```



Model(

(shortblock): Shortblock(

(conv1): Conv2d(3, 20, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3))

(conv2): Conv2d(20, 64, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3))

(conv3): Conv2d(64, 128, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3))

(bn1): BatchNorm2d(20, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)

(bn2): BatchNorm2d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)

(bn3): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,

track_running_stats=True)

(dropout): Dropout(p=0.2, inplace=False)

)

(longblock1): Longblock(

(conv1): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

(conv2): Conv2d(128, 160, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

(conv3): Conv2d(160, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

(bn1): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,

track_running_stats=True)

(bn2): BatchNorm2d(160, eps=1e-05, momentum=0.1, affine=True,

track_running_stats=True)

(adjust_channels): Conv2d(128, 128, kernel_size=(1, 1), stride=(1, 1))

(dropout): Dropout(p=0.2, inplace=False)

)

(longblock2): Longblock(

(conv1): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

(conv2): Conv2d(128, 160, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

(conv3): Conv2d(160, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

```

    (bn1): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
    (bn2): BatchNorm2d(160, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
    (adjust_channels): Conv2d(128, 256, kernel_size=(1, 1), stride=(1, 1))
    (dropout): Dropout(p=0.2, inplace=False)
)
(longblock3): Longblock(
  (conv1): Conv2d(256, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv2): Conv2d(128, 160, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv3): Conv2d(160, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (bn1): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
  (bn2): BatchNorm2d(160, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
  (adjust_channels): Conv2d(256, 512, kernel_size=(1, 1), stride=(1, 1))
  (dropout): Dropout(p=0.2, inplace=False)
)
(longblock4): Longblock(
  (conv1): Conv2d(512, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv2): Conv2d(128, 160, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv3): Conv2d(160, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (bn1): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
  (bn2): BatchNorm2d(160, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
  (adjust_channels): Conv2d(512, 256, kernel_size=(1, 1), stride=(1, 1))
  (dropout): Dropout(p=0.2, inplace=False)
)
(shortblock2): Shortblock(
  (conv1): Conv2d(256, 20, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3))
  (conv2): Conv2d(20, 64, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3))
  (conv3): Conv2d(64, 128, kernel_size=(7, 7), stride=(1, 1), padding=(3, 3))
  (bn1): BatchNorm2d(20, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
  (bn2): BatchNorm2d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
  (bn3): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
  (dropout): Dropout(p=0.2, inplace=False)
)
(longblock5): Longblock(
  (conv1): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv2): Conv2d(128, 160, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))
  (conv3): Conv2d(160, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1))

```

```
(bn1): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
(bn2): BatchNorm2d(160, eps=1e-05, momentum=0.1, affine=True,
track_running_stats=True)
(adjust_channels): Conv2d(128, 64, kernel_size=(1, 1), stride=(1, 1))
(dropout): Dropout(p=0.2, inplace=False)
)
(Linear1): Linear(in_features=576, out_features=100, bias=True)
(Linear2): Linear(in_features=100, out_features=500, bias=True)
(Linear3): Linear(in_features=500, out_features=10, bias=True)
)
```