Introduction to Deep Learning (CS474)

Lecture 19

Rupam

Outline

- **Module 2**
  - Examples related to Classic Networks in Computer Vision

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Recap

- In the last lecture, we have seen a *convnet* and its training procedure!
- But it would be good to make it a bit faster.
- It is no surprise by now that we do so by moving our training onto the GPU.

```
device = (torch.device('cuda') if torch.cuda.is_available()
          else torch.device('cpu'))
print(f"Training on device {device}.")
```

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Recap

```
import datetime

def training_loop(n_epochs, optimizer, model, loss_fn, train_loader):
    for epoch in range(1, n_epochs + 1):
        loss_train = 0.0
        for imgs, labels in train_loader:
            imgs = imgs.to(device=device)  # <1>
            labels = labels.to(device=device)
            outputs = model(imgs)
            loss = loss_fn(outputs, labels)

            optimizer.zero_grad()
            loss.backward()
            optimizer.step()

            loss_train += loss.item()

        if epoch == 1 or epoch % 10 == 0:
            print('{} Epoch {}, Training loss {}'.format(
                datetime.datetime.now(), epoch,
                loss_train / len(train_loader)))
```

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Recap

```
train_loader = torch.utils.data.DataLoader(cifar2, batch_size=64,
                                           shuffle=True)

model = Net().to(device=device)  # <1>
optimizer = optim.SGD(model.parameters(), lr=1e-2)
loss_fn = nn.CrossEntropyLoss()

training_loop(
    n_epochs = 100,
    optimizer = optimizer,
    model = model,
    loss_fn = loss_fn,
    train_loader = train_loader,
)
```

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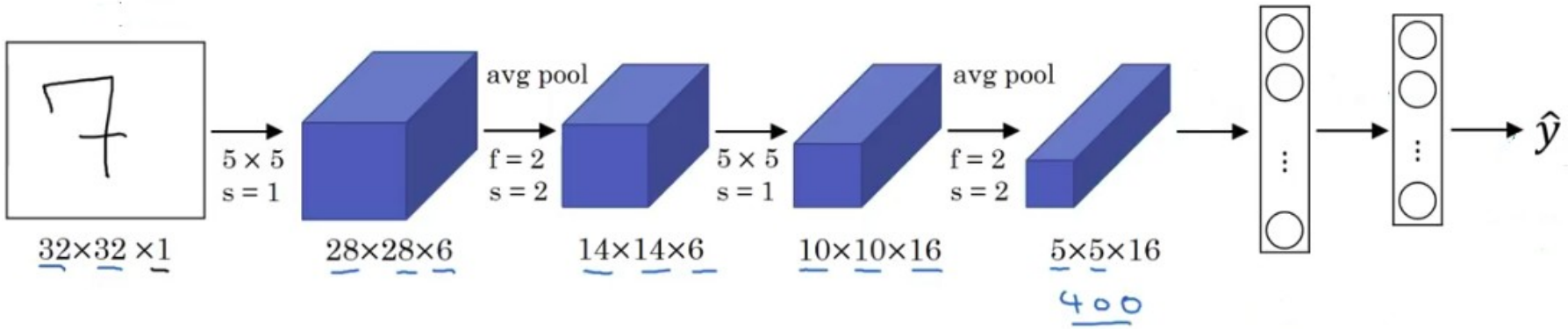
LeNet [1]



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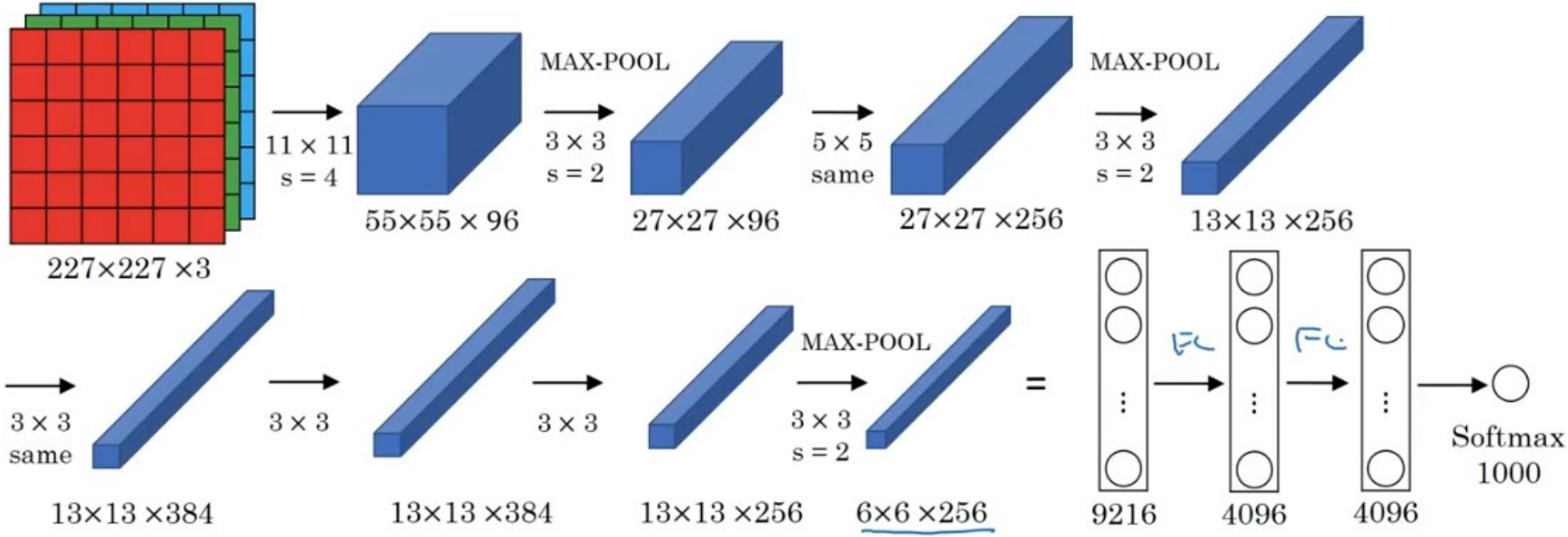
AlexNet [2]



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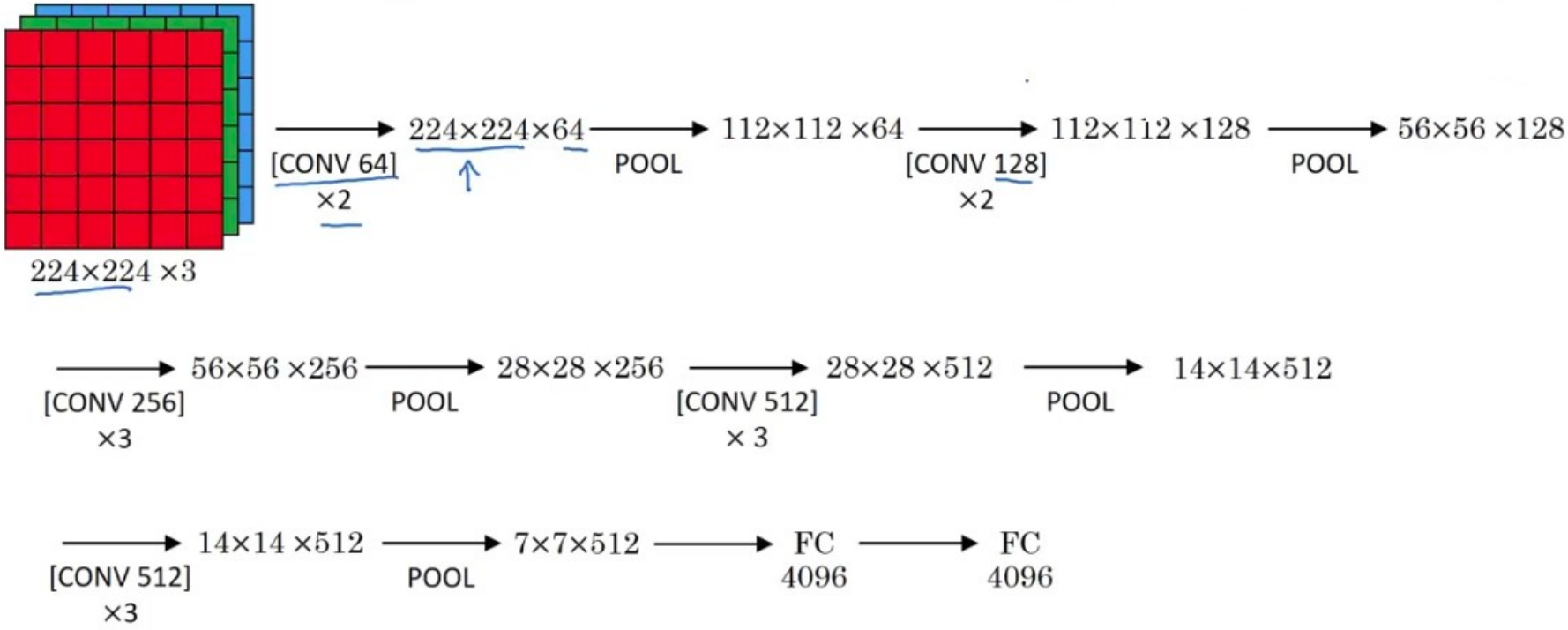
VGG-16 [3]



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References

- All the contents present in the slides are taken from various online resources. Due credit is given in the respective slides.These slides are used for *academic* purposes only.

[1] LeCun, Yann, et al. "Gradient-based learning applied to document recognition." Proceedings of the IEEE 86.11 (1998): 2278-2324.

[2] Krizhevsky, Alex, Ilya Sutskever, and Geoffrey E. Hinton. "Imagenet classification with deep convolutional neural networks." *Advances in neural information processing systems*. 2012.

[3] Simonyan, Karen, and Andrew Zisserman. "Very deep convolutional networks for large-scale image recognition." arXiv preprint arXiv:1409.1556 (2014).

[4] He, Kaiming, et al. "Deep residual learning for image recognition." Proceedings of the IEEE conference on computer vision and pattern recognition. 2016.