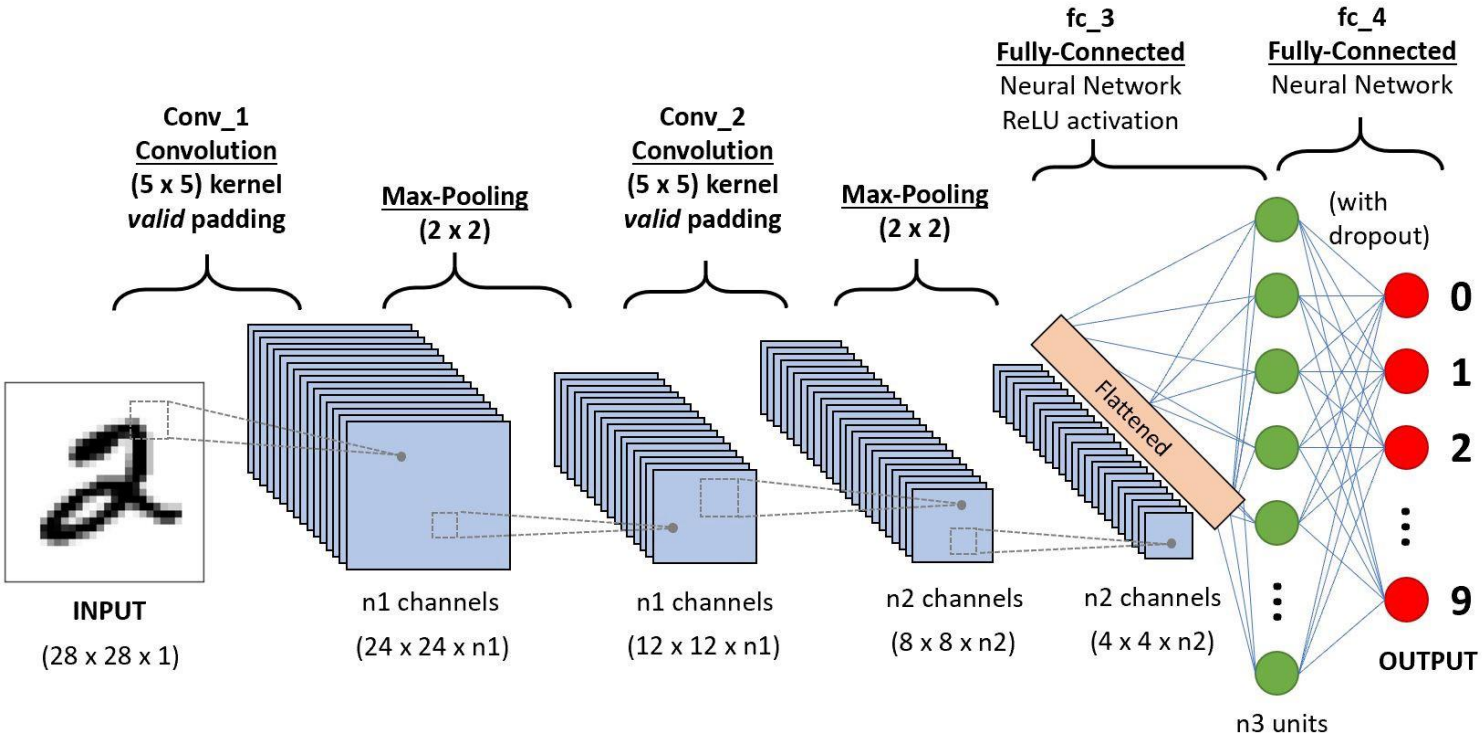
Comparing Pre-Trained Convolution Neural Networks on the CIFAR-10 Dataset

By: Arch Latham

Introduction

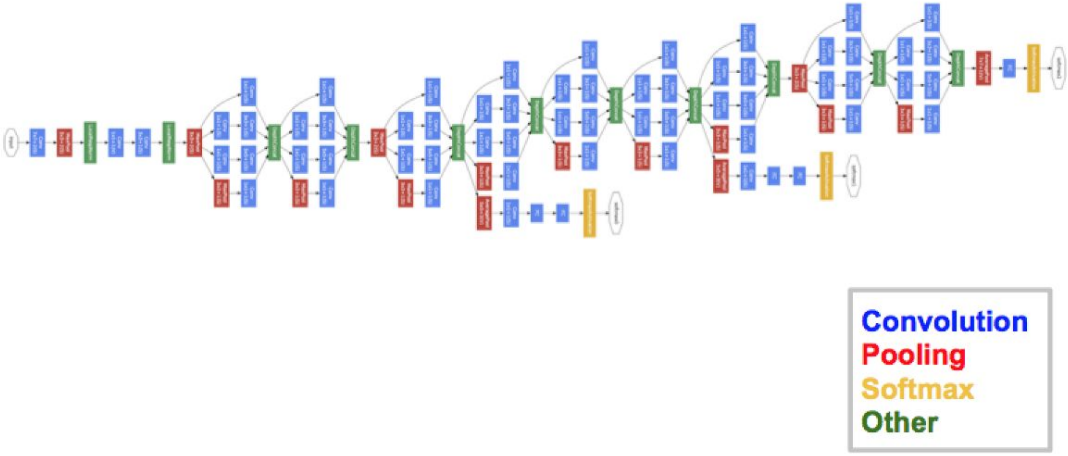
Convolution Neural Networks



Literature Review

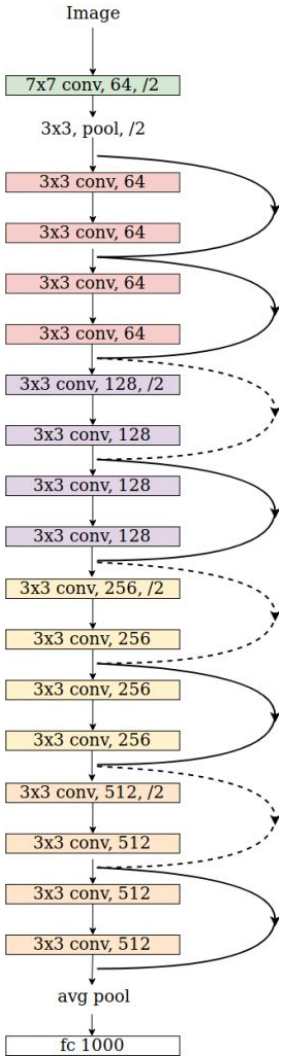
GoogLeNet (2014)

- Developed by Google
- Won ImageNet Large Scale Image Recognition Contest (ILSVRC)
- Based off of LeNet by Yann LeCun (1998)
- Inception v1, v2, v3, v4
- 22 Layers



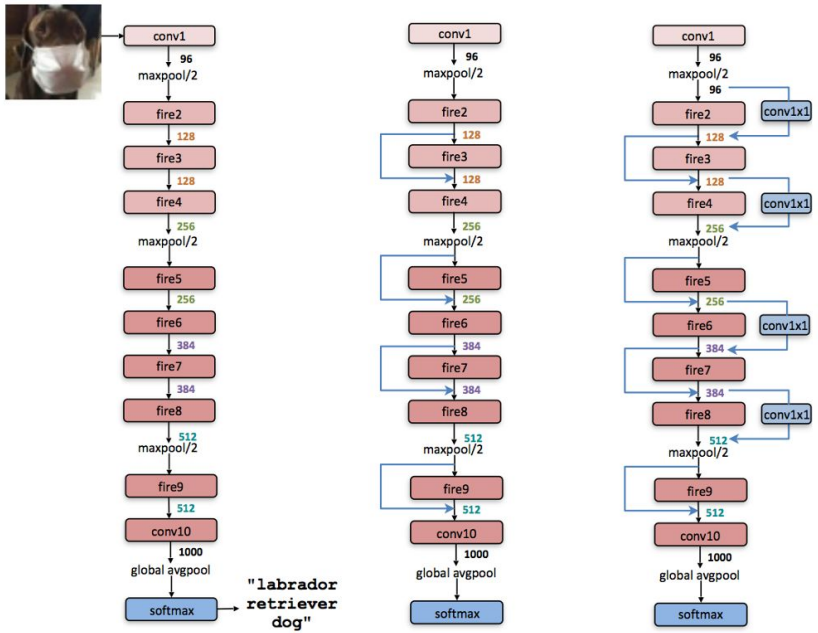
ResNet (2015)

- Developed by Microsoft and Facebook
- Won the ILSVRC
- Several Variations
  - 18
  - 34
  - 50
  - 101
  - 152



SqueezeNet (2016)

- Developed by DeepScale, UC Berkeley, Stanford
- Based off of AlexNet (2012)
  - Won the ILSVRC
- Smaller Package
  - 50x Fewer Parameters
  - 0.5 MB



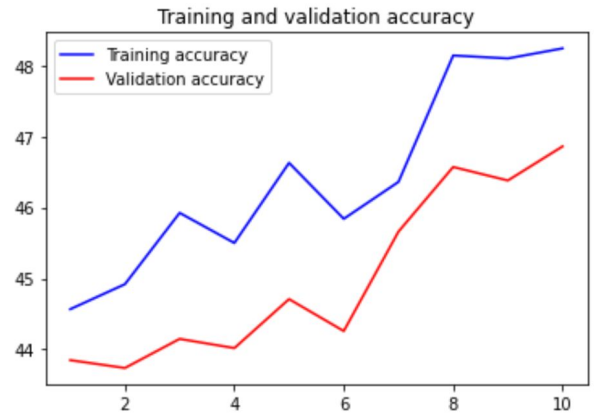
Method

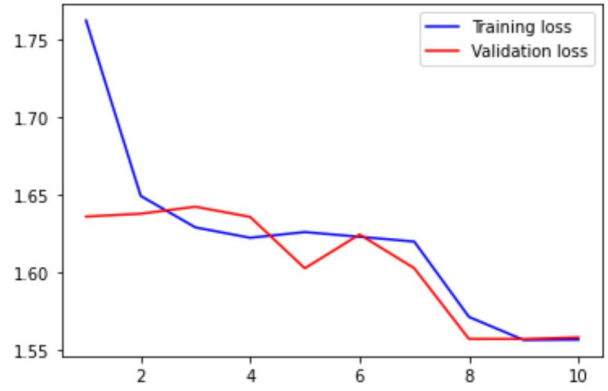
- Use CIFAR-10 Dataset
- Modified Open Source Code
  - Pytorch
  - CUDA
- Run each CNN for 10 Epochs
- Record
  - Training Accuracy
  - Training Loss
  - Test Accuracy
  - Test Loss

```
def validate(model, loss_fn, optimizer):

    model.eval()

    predictions = []

    with torch.no_grad():
        validation_batch_losses = []

        for batch, labels in valid_loader:
            batch = batch.to(cuda)
            labels = labels.to(cuda)

            labels_pred = model(batch)
            loss = loss_fn(labels_pred, labels)

            validation_batch_losses.append(float(loss))

            mean_loss = statistics.mean(validation_batch_losses)

    return mean_loss
```

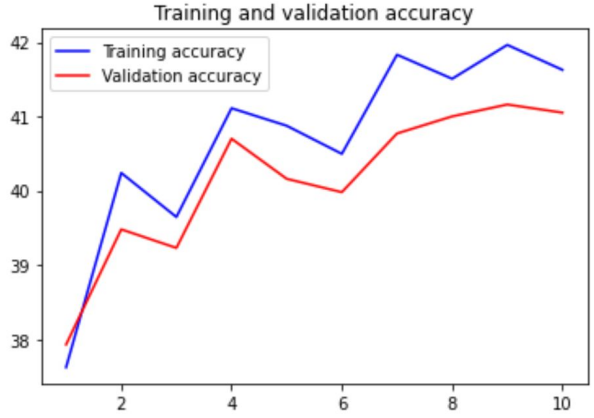
Results

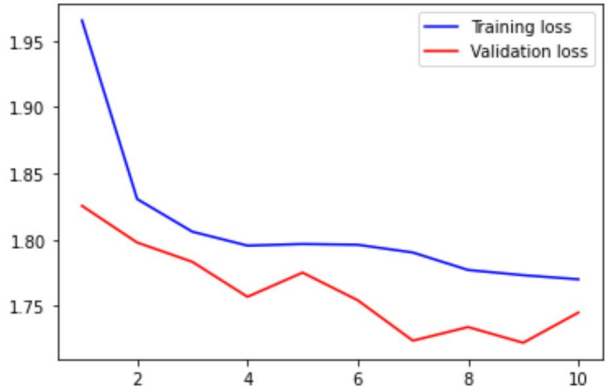
GoogLeNet



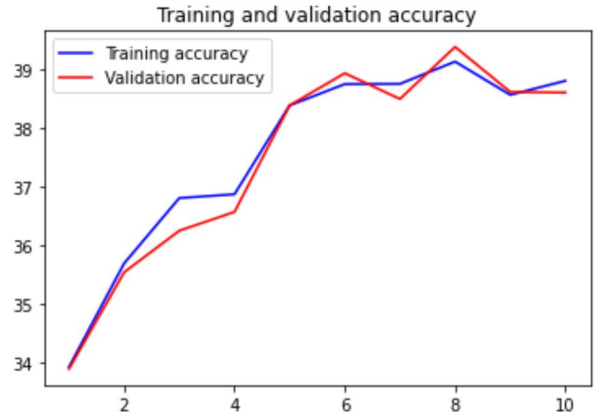


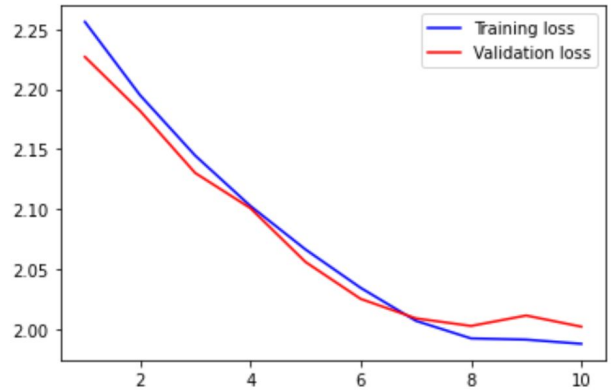
ResNet18





SqueezeNet





Conclusion

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Images

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Questions?