Neural Networks Assignment

Sections in the code

- Preparation of Data

- Network Architecture

- Learning rate

- Dropout rate

Preparation of Data

- Import CIFAR10 (60,000 32x32 pixel colour images)
- Split into training and test data
  - Array of integers (32x32x3 per image)
  - Each image has a corresponding label

- Experiment 1:
  - 2/3 images for training, 1/3 images for testing

- Experiment 2:
  - ½ images for training, ½ images for testing

Network Architecture
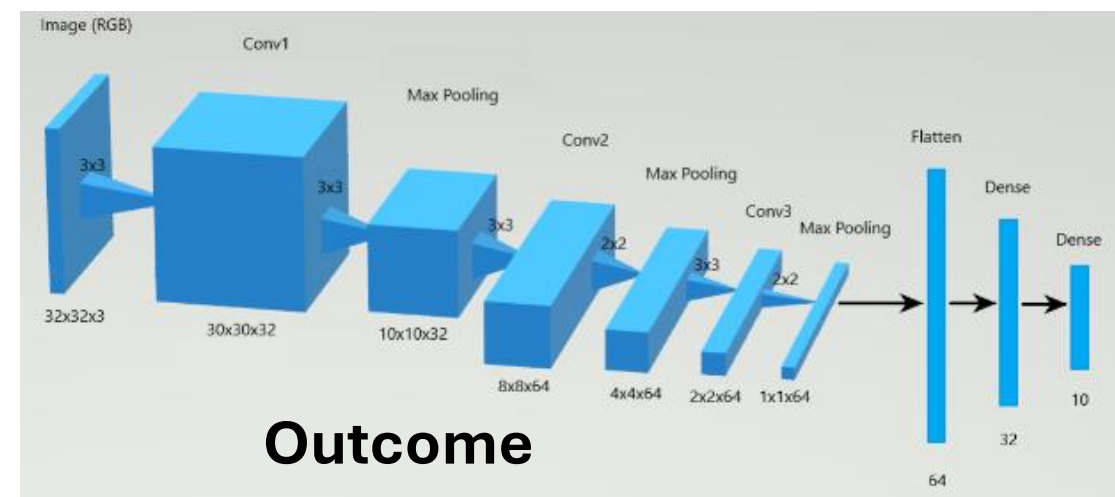

Brief

- 3 Convolutional layers
- 2 Fully connected layers

Testing

- Max Pooling layers
- Flattening layer
- Activation functions
  - ReLU   (0+)
  - Softmax   (0 – 1)
- Optimisation functions
  - Adam
  - SGD

Outcome

- 3 Convolutional layers
  - A Max Pooling layer after each
- A Flattening layer
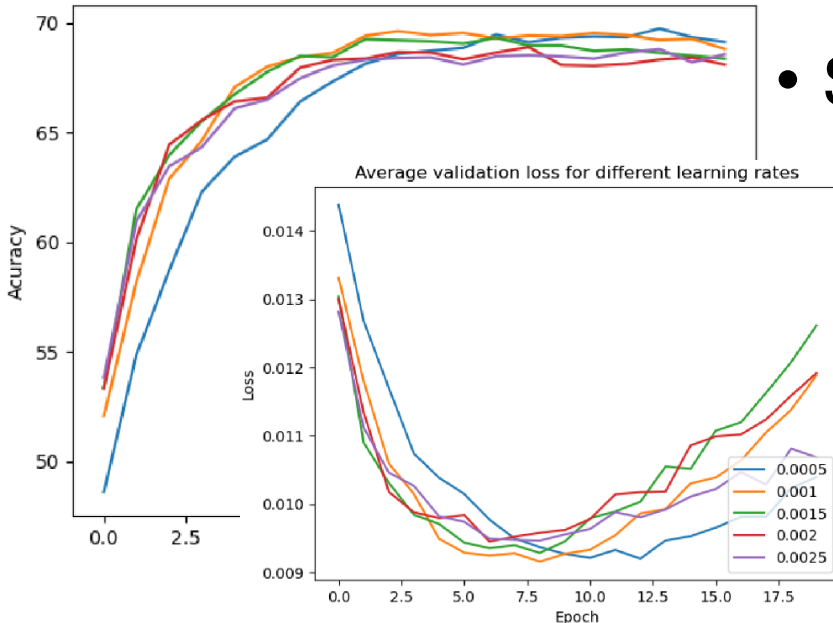- 2 Fully Connected layers
- Adam
- ReLU

Experiment 1 – Learning Rate

Brief

Compare networks with a set learning rate to ones using a Scheduler

Testing

- Learning Rates
  - 0.0005, 0.001, 0.0015, 0.002, 0.0025
  - Compared Results

- Scheduler
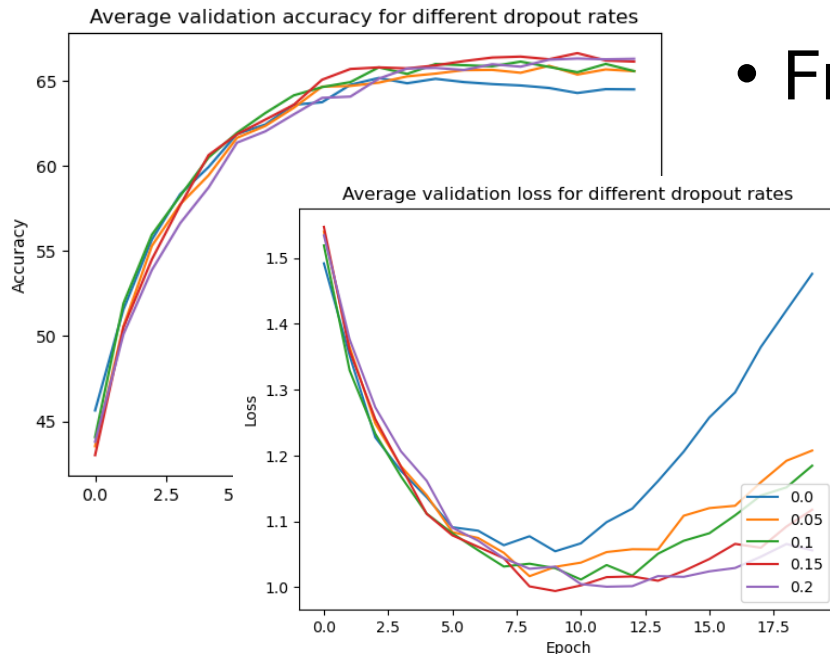 - Various learning rate combinations

Outcome

- 0.0005 had highest accuracy and least overfitting
  - took longer

- Scheduler was
  - More consistent between trials
  - Higher loss over 20 epochs

Experiment 2 – Dropout Rate

Brief

Investigate how dropout can affect a neural network

Testing

- Dropout Rates
  - 0, 0.05, 0.1, 0.15, 0.2
  - Compared Results

- Freezing layers

Outcome

- 0.2 dropout had highest accuracy and lowest loss

- 0 dropout was led to a more accurate network