**MACHINE VISION AND PATTERN RECOGNITION**

Batch Size: 125, Epochs: 50

1. **OPTIMIZER: Adam**

| | |
|---|---|
| **Training Set Run-Time (seconds)** | 82.6451s |
| **Training Set First Epoch Loss** | 2.1231 |
| **Training Set First Epoch Accuracy** | 0.1982 |
| **Training Set Last Epoch Loss** | 1.8654 |
| **Training Set Last Epoch Accuracy** | 0.3106 |
| **Test Set Run-Time (seconds)** | 1s |
| **Test Set Loss** | 1.8676 |
| **Test Set Accuracy** | 0.3503 |

2. **OPTIMIZER: SGD**

| | |
|---|---|
| **Training Set Run-Time (seconds)** | 54.1935s |
| **Training Set First Epoch Loss** | 2.1573 |
| **Training Set First Epoch Accuracy** | 0.2031 |
| **Training Set Last Epoch Loss** | 1.4443 |
| **Training Set Last Epoch Accuracy** | 0.4859 |
| **Test Set Run-Time (seconds)** | 1s |
| **Test Set Loss** | 1.3707 |
| **Test Set Accuracy** | 0.5077 |

3. **OPTIMIZER: ADADELTA**

| | |
|---|---|
| **Training Set Run-Time (seconds)** | 82.5962s |
| **Training Set First Epoch Loss** | 2.5543 |
| **Training Set First Epoch Accuracy** | 0.1031 |
| **Training Set Last Epoch Loss** | 1.9518 |
| **Training Set Last Epoch Accuracy** | 0.2952 |
| **Test Set Run-Time (seconds)** | 1s |
| **Test Set Loss** | 1.8635 |
| **Test Set Accuracy** | 0.3619 |

4. **OPTIMIZER: RMSprop**

| | |
|---|---|
| **Training Set Run-Time (seconds)** | 82.7943s |
| **Training Set First Epoch Loss** | 2.1963 |
| **Training Set First Epoch Accuracy** | 0.1956 |
| **Training Set Last Epoch Loss** | 1.8154 |
| **Training Set Last Epoch Accuracy** | 0.3444 |
| **Test Set Run-Time (seconds)** | 1s |
| **Test Set Loss** | 1.7847 |
| **Test Set Accuracy** | 0.3943 |

**Summarizing Results:**

By trying out several optimizers for the CIFAR10 Dataset it can be observed that the Test Set Accuracy (50%)  for SGD is better than the other optimizers. Also, SGD has the lowest test set loss (1.3707). The training set run time for Optimizer SGD is the lowest ( approx. 54 seconds).

Best Optimizer: SGD ( Highest Accuracy)

Faster Convergence: SGD ( Least Loss)

Optimizer with the best runtime: SGD (Least Run time)