# Generative AI Assignment 3 Report

| Activation Function | Accuracy | Exec Time (seconds) |
|---|---|---|
| Relu | 51.59% | 28.48s |
| Tanh | 45.70% | 28.16s |
| Identity | 39.52% | 27.96s |

| Optimizers | Accuracy | Exec Time |
|---|---|---|
| SGD | 52.14% | 37.92s |
| ADAM | 52.37% | 47.70s |
| RMSPROP | 51.58% | 43.50s |

| Regularization | Accuracy | Exec Time |
|---|---|---|
| Baseline | 49.46% | 156.44s |
| Dropout | 40.25% | 157.14s |
| Batch Norm | 51.09% | 158.06s |
| Weight Int | 47.28% | 156.45s |

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**Activation Function**

1. **ReLU**: Achieved the highest accuracy of 51.59% and reasonable execution time, indicating it is the most effective activation function for this model.
2. **Tanh**: Recorded a lower accuracy of 45.70%, suggesting it is less effective than ReLU in this context, despite a similar execution time.
3. **Identity (Linear)**: Obtained the lowest accuracy of 39.52% with the fastest execution time, highlighting its inadequacy for this task compared to the other activation functions**.**

**Optimizers:**

1. **SGD**: Achieved 52.14% accuracy with the fastest execution time, indicating a solid choice for quick training but with room for improvement in accuracy.
2. **Adam**: Attained the highest accuracy of 52.37%, demonstrating its effectiveness in adapting learning rates for better convergence.
3. **RMSprop**: Delivered 51.58% accuracy, performing well but slightly behind SGD and Adam, suggesting it may not be as well-suited for this task.

**Regularization:**

1. **BatchNorm:** seems to provide the best improvement in accuracy without significantly impacting execution time. This suggests that stabilizing the internal activations had the most beneficial effect.

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2. **Dropout:** seems to hurt the model's performance in this case, likely because the model's complexity wasn't high enough to justify heavy regularization.

3. **Weight Initialization:** didn't have a large impact here, but it might still be useful in larger or deeper networks.