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Task 4: CNN MNIST image classification

In this report, we present the results of an experiment where we evaluated the impact of different hyperparameter combinations on the performance of a Convolutional Neural Network (CNN) model for MNIST image classification. The primary objective was to understand how variations in hyperparameters affect the model's loss and accuracy.

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Set Up:

- Model: Convolutional Neural Network (CNN)
- Dataset: MNIST dataset
- Optimizer: Adam
- Hyperparameters:

1. `Batch size`
2. `Dropout rate`
3. `Number of epochs`
4. `Learning rate`
5. `Kernel size`
6. `Stride`

Graphical Analysis:
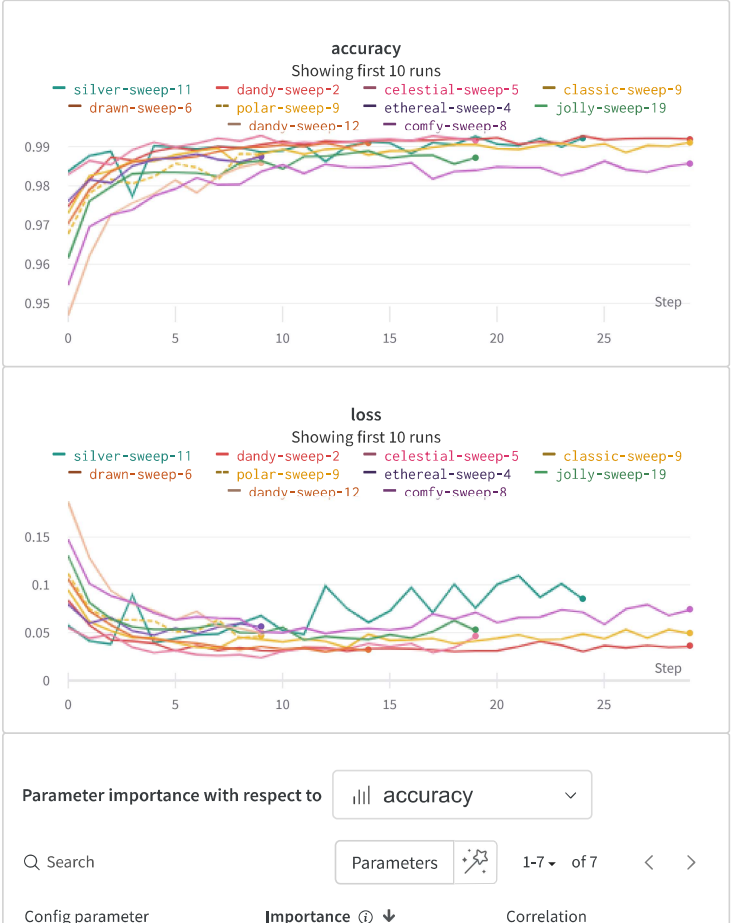
kernel_size

strides

lr

batch_size

epochs

Runtime

dropout_rate

☑

Run set 31 ⋮

Analysis:

- Learning Rate: Increasing the learning rate improved accuracy but also increased loss due to overshooting the optimal weights.
- Epochs: increasing no of epochs can cause overfitting of data.
- Batch Size: A moderate size batch of 32-128 works best, leading to faster convergence.
- Dropout Rate: A good dropout rate of (0.5-0.75) performed best, preventing overfitting while retaining good accuracy.

The best set of hyperparameters we get is:

- batch size: 128
- dropout_rate: 0.75
- epochs: 25
- kernel size: 7
- learning rate = 0.0005
- strides = 1

This set of hyperparameters gives an accuracy of 99.19 and loss of 0.0365

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https://wandb.ai/anushka-agrawal/4.3-CNN-classification/reports/Task-4-CNN-MNIST-image-classification--Vmlldzo1NzUxNjMy