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Task 5.2: CNN Model for Digit Recognition on Permuted MNIST

This report presents the results of an experiment involving the recognition and classification of digits in the Permuted MNIST dataset using a Convolutional Neural Network (CNN) model. In Permuted MNIST, the spatial relationships between pixels are destroyed as each image's pixels are randomly permuted, making it a challenging task. The objective is to design and train a CNN model capable of recognizing digits in these permuted images.

Anushka Agrawal

Implementation:

A CNN model was designed and trained for the Permuted MNIST dataset. The architecture includes convolutional layers, pooling layers, fully connected layers, and output layers. The following hyperparameters were adjusted to optimize the model's performance:

- Learning rates
- Kernel sizes
- Dropout rates
- batch size

Graphical Analysis:
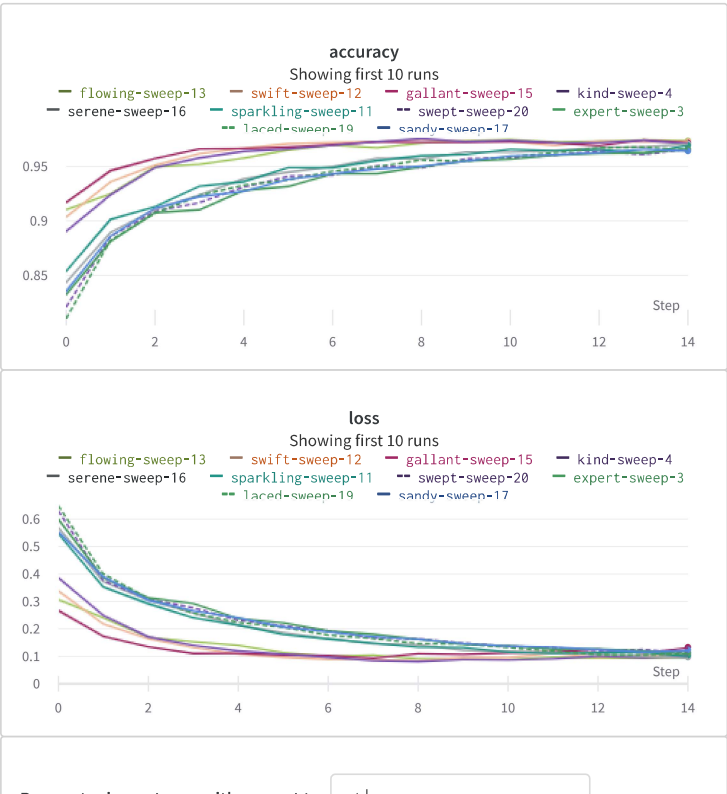
Parameter importance with respect to   ılıl   accuracy   ⌄

🔍 Search   Parameters   ⚡   1-5 ▾   of 5   ‹   ›

Config parameter	Importance ⓘ ↓	Correlation
kernel_size		
batch_size		
learning_rate		
Runtime		
dropout_rate		

✓

Run set 20   ⋮

Analysis:

- batch size: low batch of 32-128 helps the model to converge faster.
- learning rate: experimented with different learning rates and low learning rate of 0.0001 works the best
- dropout rate: moderate dropout rate of 0.25-0.5 prevents overfitting of the model
- kernel size: kernel size of 3-5 works best in extracting patterns in the image

The best set of hyperparameters for this model:

- batch size: 32
- dropout rate: 0.25
- kernel size: 3
- learning rate: 0.0001

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https://wandb.ai/anushka-agrawal/5.2-CNN-classification/reports/Task-5-2-CNN-Model-for-Digit-Recognition-on-Permuted-MNIST--Vmlldzo1NzUyMTI4