Ass3: Q4.3, 4.4

4.3
Hyperparameter Tuning and Evaluation [20 marks]
1. Use W&B to facilitate hyperparameter tuning. Experiment with various architectures and hyperparameters: learning rate, batch size, kernel sizes (filter size), strides, number of epochs, and dropout rates.
2. Compare the effect of using and not using dropout layers.
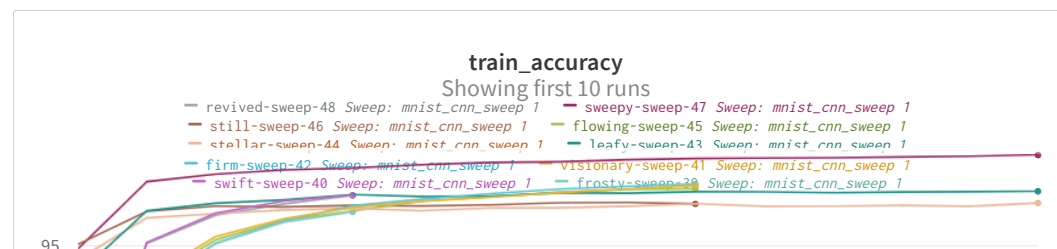3. Log training/validation loss and accuracy, confusion matrices, and class-specific metrics using W&B.
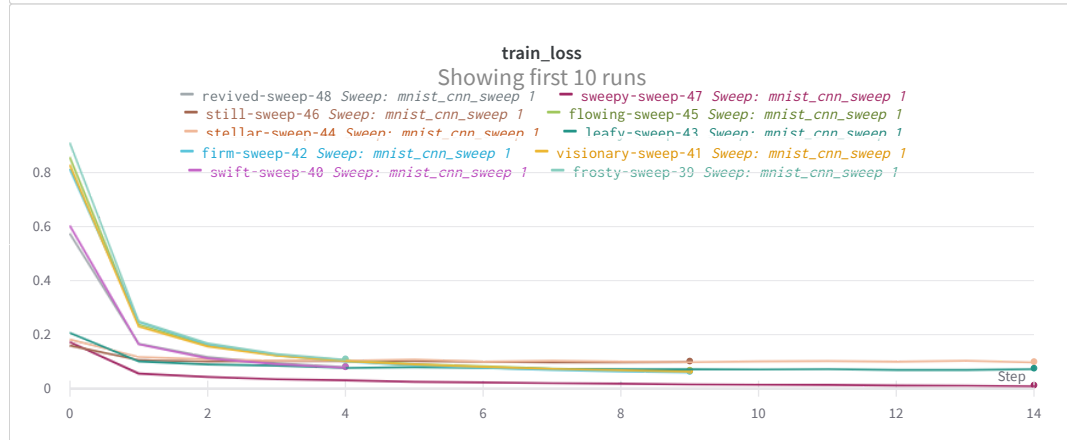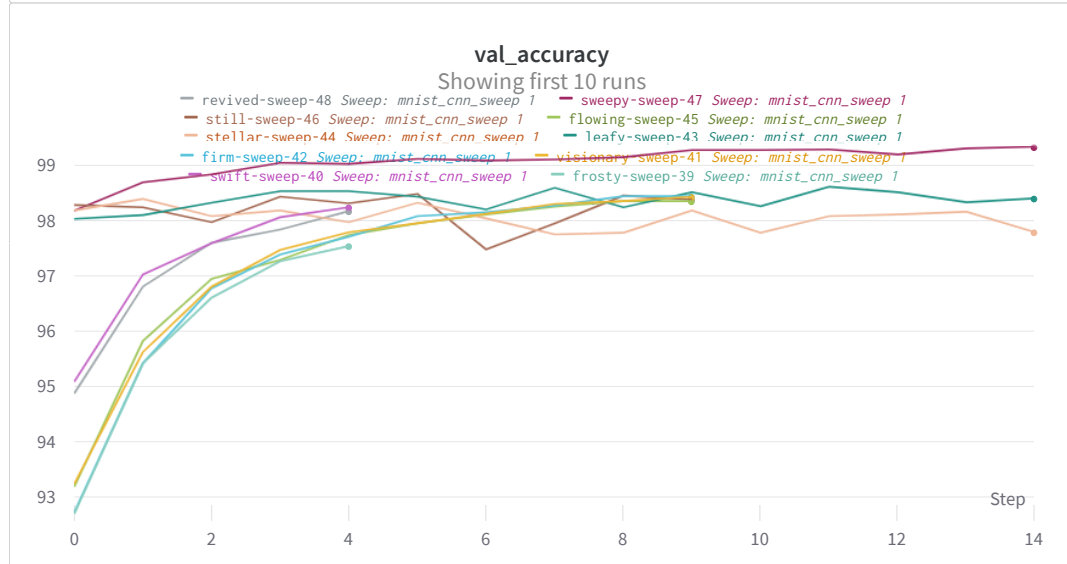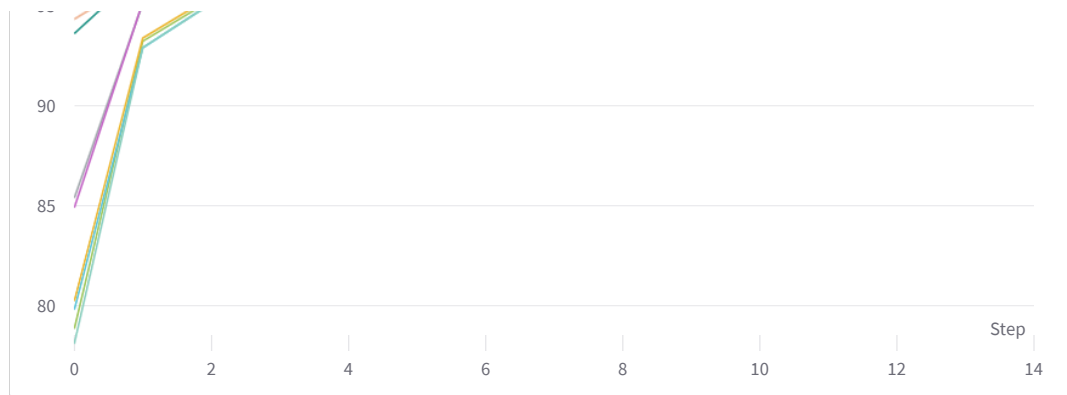
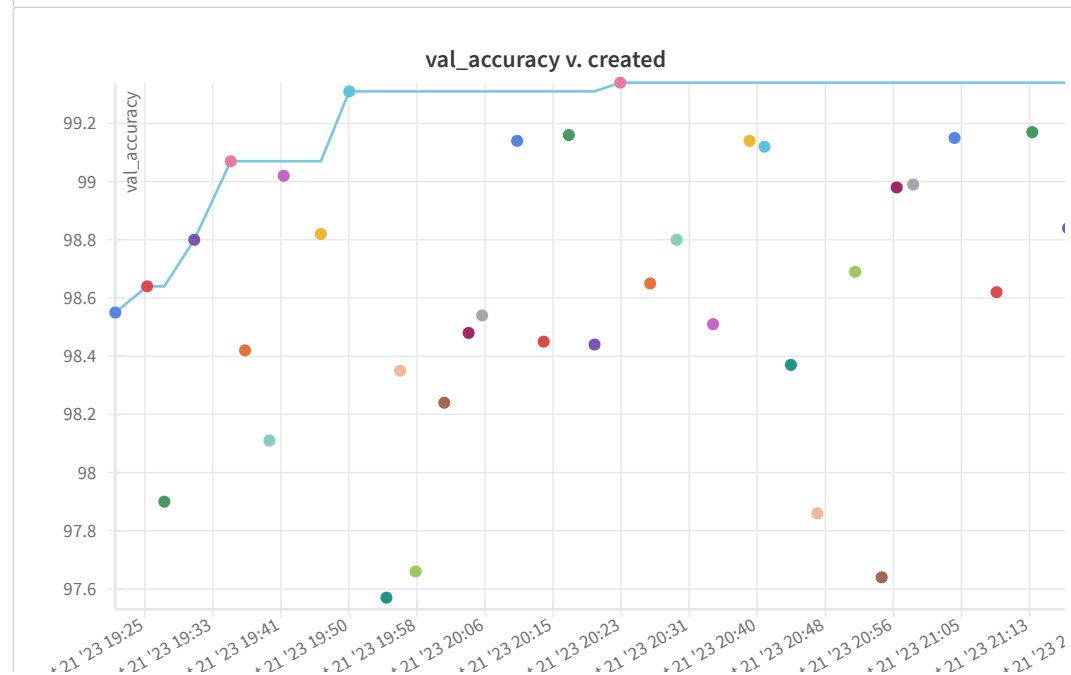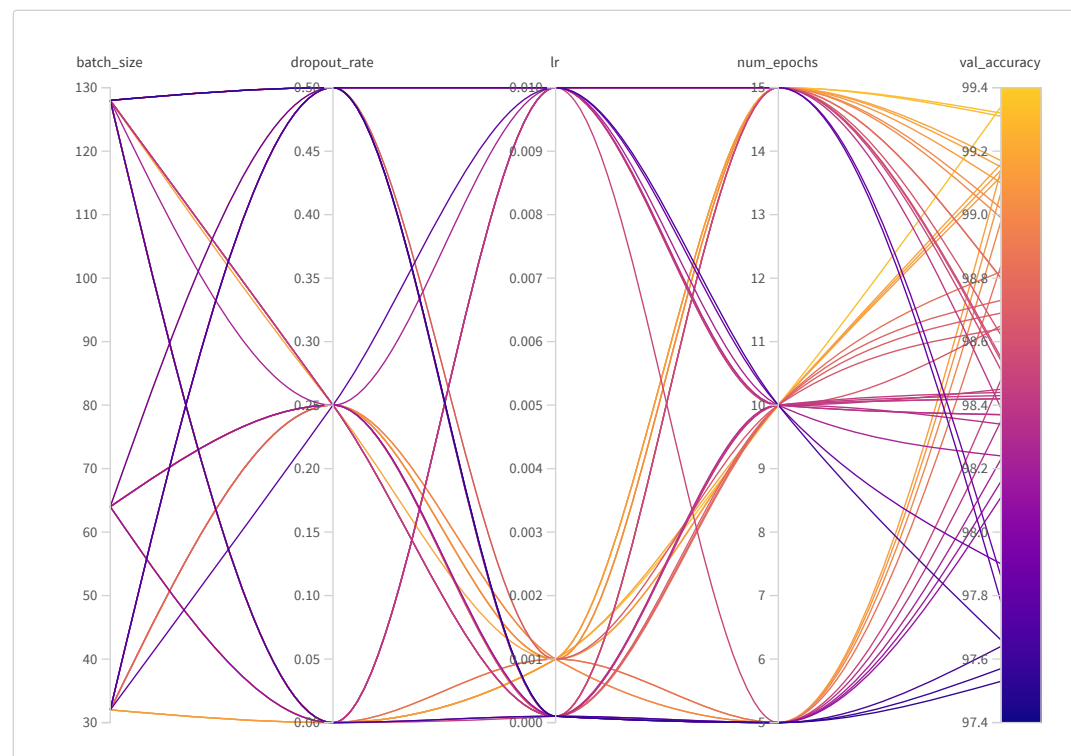Arya Marda

▼ Hyperparameter tuning:

```python
sweep_config = {
    'method': 'random',   # You can choose different sweep methods (grid, random, etc.)
    'name': 'mnist_cnn_sweep',
    'metric': {'goal': 'maximize', 'name': 'val_accuracy'},
    'parameters': {
        'lr': {'values': [0.001, 0.01, 0.0001]},   # Learning rate values to experiment with
        'batch_size': {'values': [32, 64, 128]},   # Batch size values to experiment with
        'num_epochs': {'values': [5, 10, 15]},   # Number of epochs to experiment with
        'dropout_rate': {'values': [0.0, 0.25, 0.5]},   # Dropout rates to experiment with
    }
}
```

▼ Note:

- For confusion matrix, and classification report please visit:
- https://wandb.ai/aryamarda/Ass3-4/sweeps/nflwrhs0?workspace=user-aryamarda000

train_accuracy
Showing first 10 runs
— revived-sweep-48 *Sweep: mnist_cnn_sweep 1*   — sweepy-sweep-47 *Sweep: mnist_cnn_sweep 1*
— still-sweep-46 *Sweep: mnist_cnn_sweep 1*   — flowing-sweep-45 *Sweep: mnist_cnn_sweep 1*
— stellar-sweep-44 *Sweep: mnist_cnn_sweep 1*   — leafy-sweep-43 *Sweep: mnist_cnn_sweep 1*
— firm-sweep-42 *Sweep: mnist_cnn_sweep 1*   — visionary-sweep-41 *Sweep: mnist_cnn_sweep 1*
— swift-sweep-40 *Sweep: mnist_cnn_sweep 1*   — frosty-sweep-39 *Sweep: mnist_cnn_sweep 1*

95

90

85

80

Step

0   2   4   6   8   10   12   14

val_accuracy

Showing first 10 runs

— revived-sweep-48 *Sweep: mnist_cnn_sweep 1*   — sweepy-sweep-47 *Sweep: mnist_cnn_sweep 1*
— still-sweep-46 *Sweep: mnist_cnn_sweep 1*   — flowing-sweep-45 *Sweep: mnist_cnn_sweep 1*
— stellar-sweep-44 *Sweep: mnist_cnn_sweep 1*   — leafy-sweep-43 *Sweep: mnist_cnn_sweep 1*
— firm-sweep-42 *Sweep: mnist_cnn_sweep 1*   — visionary-sweep-41 *Sweep: mnist_cnn_sweep 1*
— swift-sweep-40 *Sweep: mnist_cnn_sweep 1*   — frosty-sweep-39 *Sweep: mnist_cnn_sweep 1*

99

98

97

96

95

94

93

Step

0   2   4   6   8   10   12   14

train_loss

Showing first 10 runs

— revived-sweep-48 *Sweep: mnist_cnn_sweep 1*   — sweepy-sweep-47 *Sweep: mnist_cnn_sweep 1*
— still-sweep-46 *Sweep: mnist_cnn_sweep 1*   — flowing-sweep-45 *Sweep: mnist_cnn_sweep 1*
— stellar-sweep-44 *Sweep: mnist_cnn_sweep 1*   — leafy-sweep-43 *Sweep: mnist_cnn_sweep 1*
— firm-sweep-42 *Sweep: mnist_cnn_sweep 1*   — visionary-sweep-41 *Sweep: mnist_cnn_sweep 1*
— swift-sweep-40 *Sweep: mnist_cnn_sweep 1*   — frosty-sweep-39 *Sweep: mnist_cnn_sweep 1*

0.8

0.6

0.4

0.2

0

Step

0   2   4   6   8   10   12   14

val_accuracy v. created

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