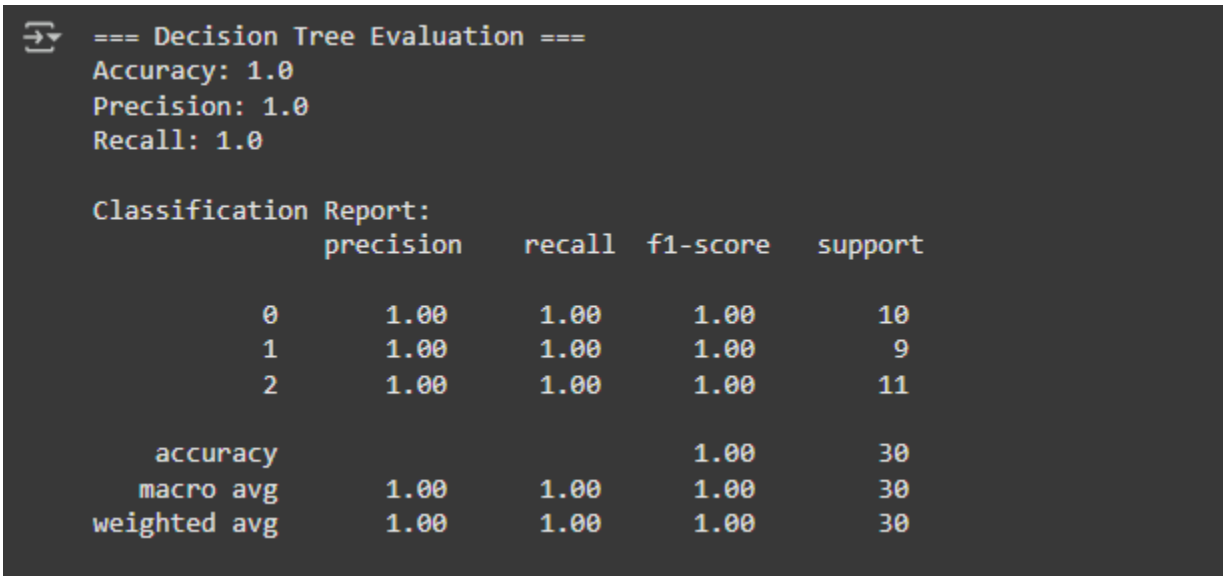
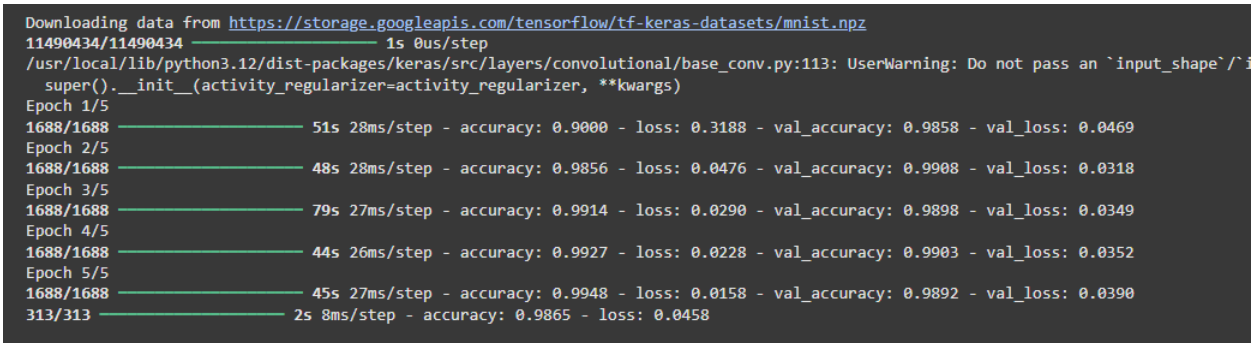
Screenshots Section Introduction

The following screenshots showcase the implementation and output results of the AI tools used in this assignment. They include visual evidence of model training, evaluation metrics, and data processing stages across different frameworks—**Scikit-learn** for classical machine learning, **TensorFlow/PyTorch** for deep learning, and **spaCy** for natural language processing. These images demonstrate the workflow, accuracy results, and successful execution of each task, reinforcing the theoretical understanding with practical evidence.

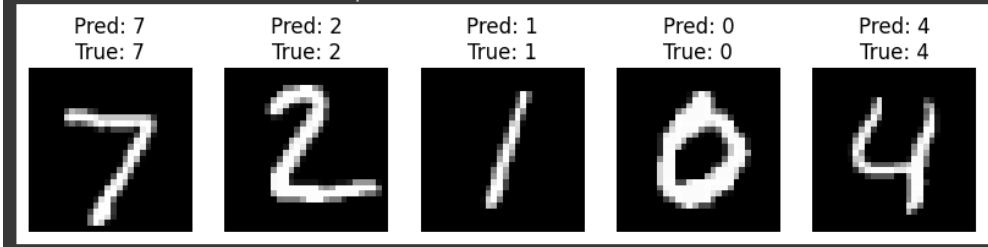


```
=== Decision Tree Evaluation ===
Accuracy: 1.0
Precision: 1.0
Recall: 1.0

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        10
           1       1.00      1.00      1.00         9
           2       1.00      1.00      1.00        11

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30
```



```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
11490434/11490434 ━━━━━━━━━━━━━━━━━━━━ 1s 0us/step
/usr/local/lib/python3.12/dist-packages/keras/src/layers/convolutional/base_conv.py:113: UserWarning: Do not pass an `input_shape`/`i
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
Epoch 1/5
1688/1688 ━━━━━━━━━━━━━━━━━━━━ 51s 28ms/step - accuracy: 0.9000 - loss: 0.3188 - val_accuracy: 0.9858 - val_loss: 0.0469
Epoch 2/5
1688/1688 ━━━━━━━━━━━━━━━━━━━━ 48s 28ms/step - accuracy: 0.9856 - loss: 0.0476 - val_accuracy: 0.9908 - val_loss: 0.0318
Epoch 3/5
1688/1688 ━━━━━━━━━━━━━━━━━━━━ 79s 27ms/step - accuracy: 0.9914 - loss: 0.0290 - val_accuracy: 0.9898 - val_loss: 0.0349
Epoch 4/5
1688/1688 ━━━━━━━━━━━━━━━━━━━━ 44s 26ms/step - accuracy: 0.9927 - loss: 0.0228 - val_accuracy: 0.9903 - val_loss: 0.0352
Epoch 5/5
1688/1688 ━━━━━━━━━━━━━━━━━━━━ 45s 27ms/step - accuracy: 0.9948 - loss: 0.0158 - val_accuracy: 0.9892 - val_loss: 0.0390
313/313 ━━━━━━━━━━━━━━━━━━━━ 2s 8ms/step - accuracy: 0.9865 - loss: 0.0458
```

```
=== CNN Model Evaluation ===
Test Accuracy: 0.9884999990463257
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 91ms/step
```




```
=== Named Entity Recognition & Sentiment Analysis ===

Review: I love the new Apple iPhone! The camera quality is amazing.
Entities:
 - Apple (ORG)
Sentiment: Positive

Review: The Samsung Galaxy is too expensive for the features it offers.
Entities:
Sentiment: Negative

Review: I bought a Dell laptop and it works perfectly.
Entities:
 - Dell (ORG)
Sentiment: Positive
```