AI TOOLS ASSIGNMENT – MASTERING THE AI TOOLKIT

Part 1: Theoretical Understanding

Q1: TensorFlow vs PyTorch

TensorFlow is production-oriented and ideal for deployment, while PyTorch is research-friendly with dynamic computation graphs. Choose TensorFlow for scalable deployment and PyTorch for experimentation.

Q2: Use Cases for Jupyter Notebooks

- Interactive development for testing models.
- Reproducible documentation mixing code and text.

Q3: spaCy vs Basic String Operations

- ✓ spaCy provides tokenization, POS tagging and NER for structured text processing, outperforming simple string matching.

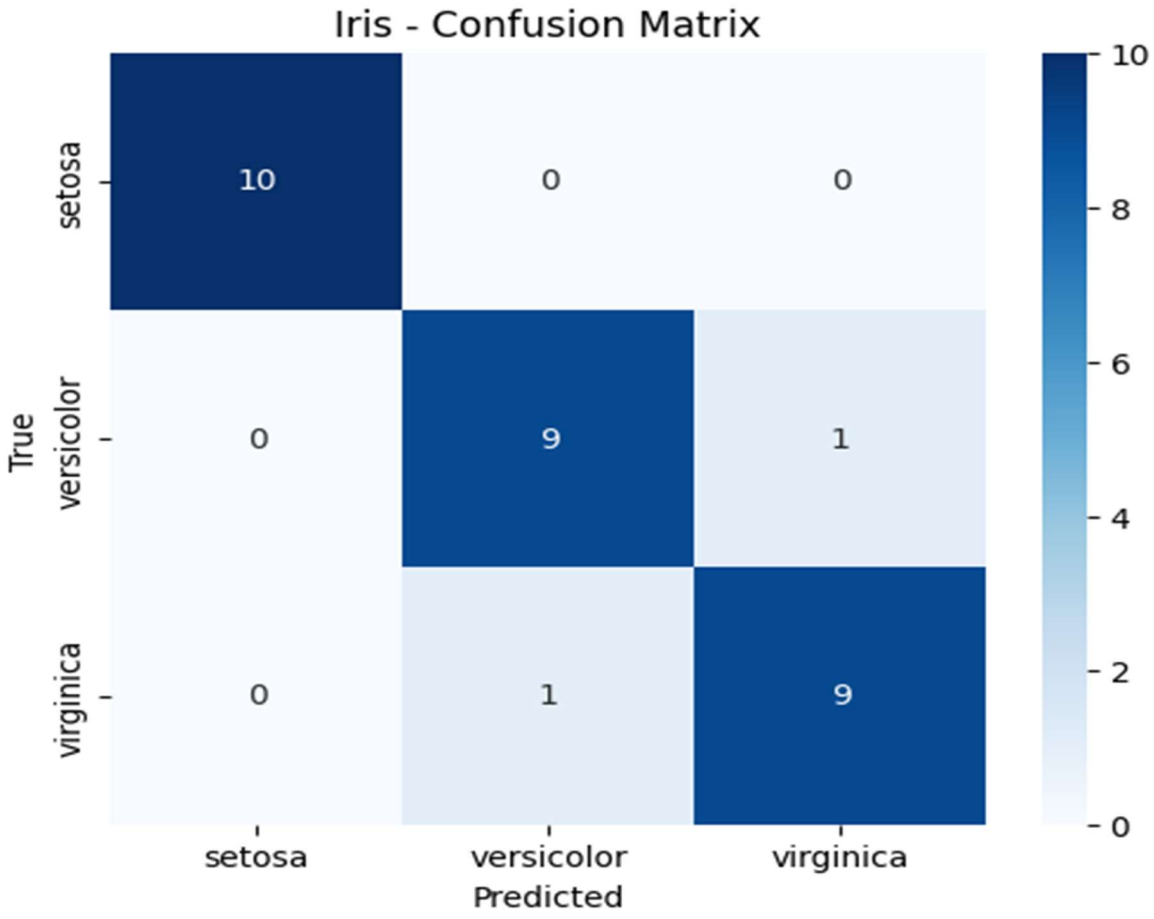
Comparative Analysis: Scikit-learn vs TensorFlow

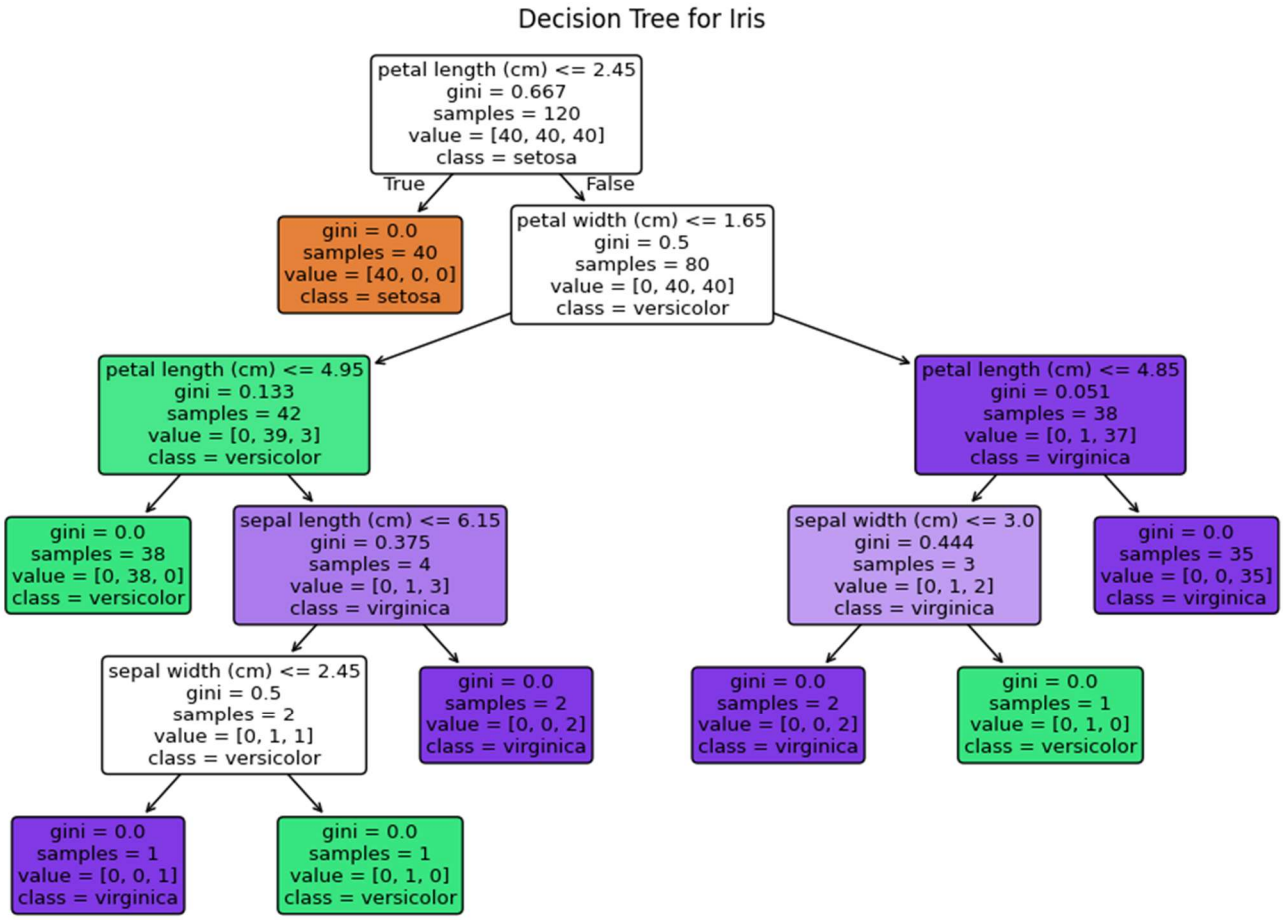
- ✓ Scikit-learn suits classical ML (SVM, trees) with simple APIs whilst TensorFlow suits deep learning and large-scale applications.

Part 2: Practical Implementation

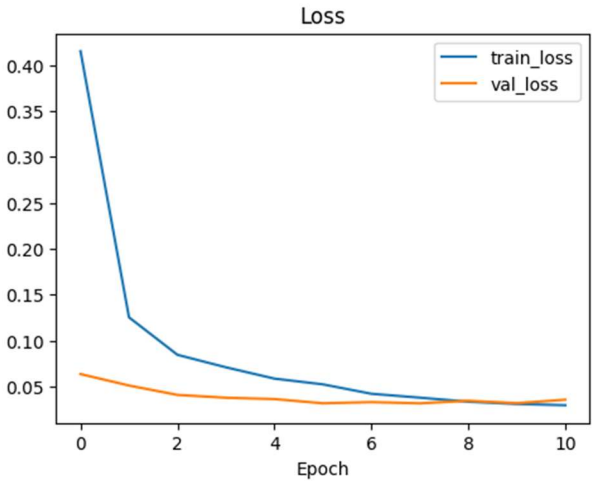
Screenshots.

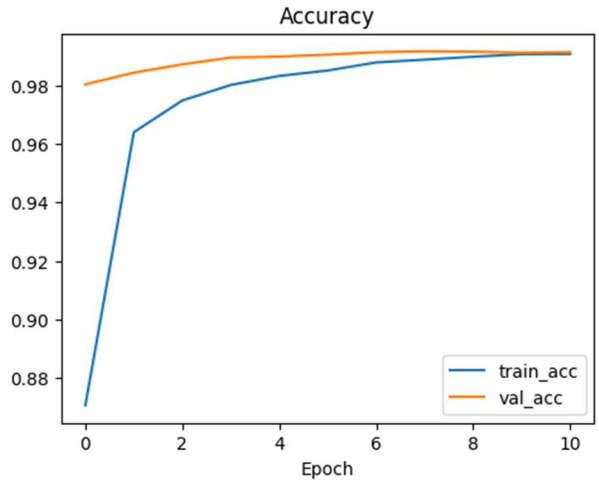
- Iris confusion matrix and tree

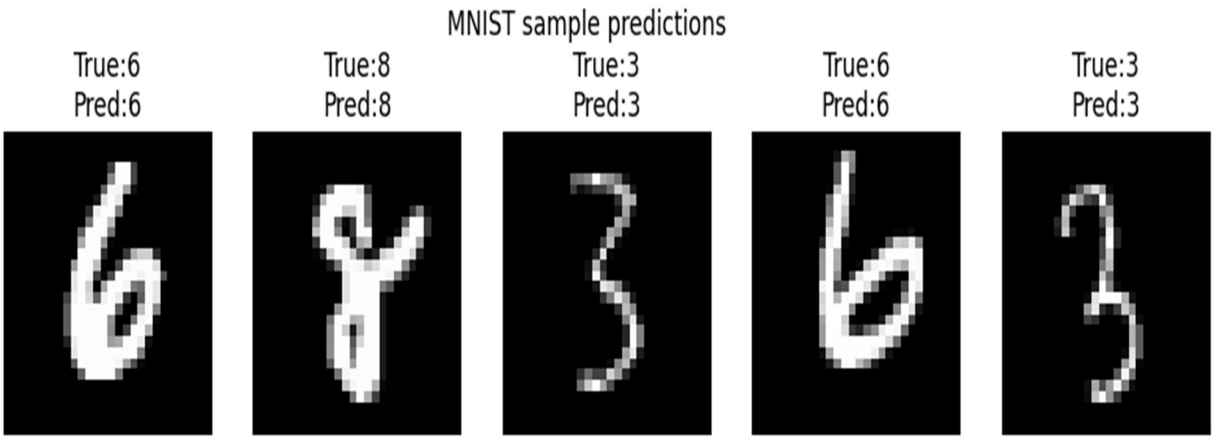




- MNIST results







- spaCy NER and sentiment.

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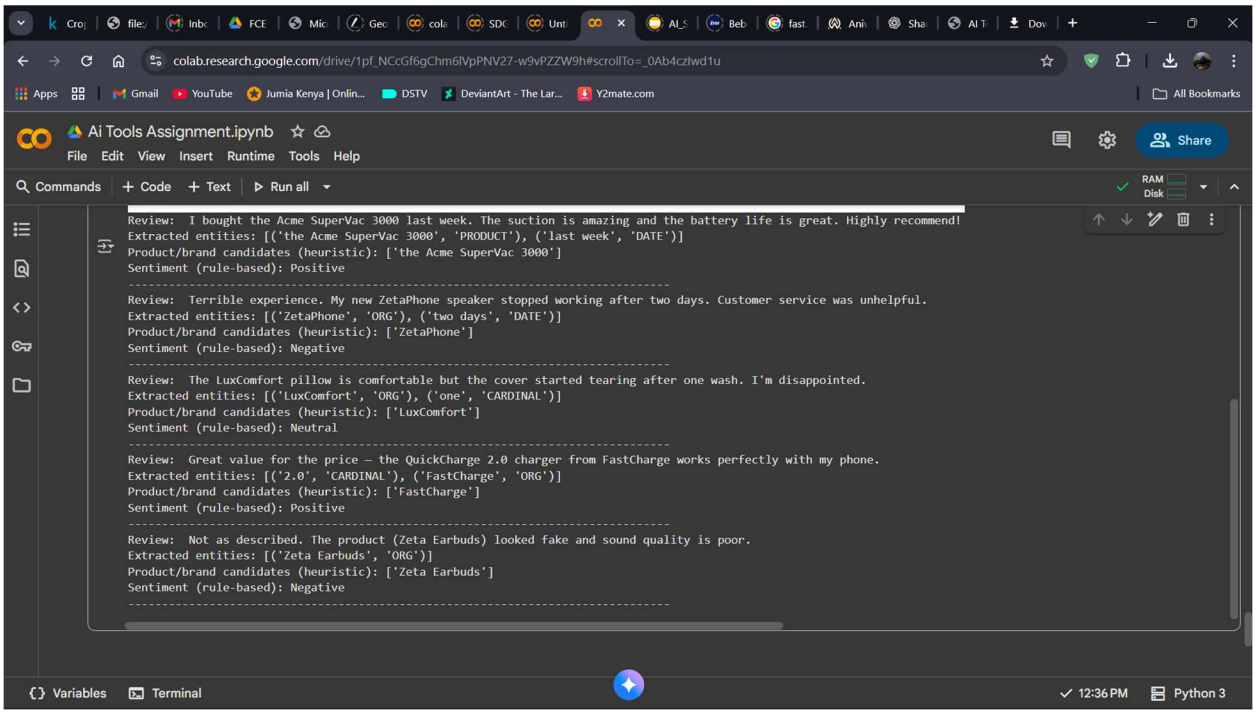

Part 3: Ethics and Optimization

Ethical Considerations

- Bias in MNIST handwriting and Amazon sentiment data. Mitigate using fairness metrics, diverse data, and robust NLP models.

Troubleshooting & Optimization

- Fixed tensor shape mismatches used appropriate loss functions, applied regularization and early stopping.

Conclusion

- Demonstrated AI proficiency with Scikit-learn, TensorFlow, and spaCy, emphasizing ethical awareness and model optimization.