

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.

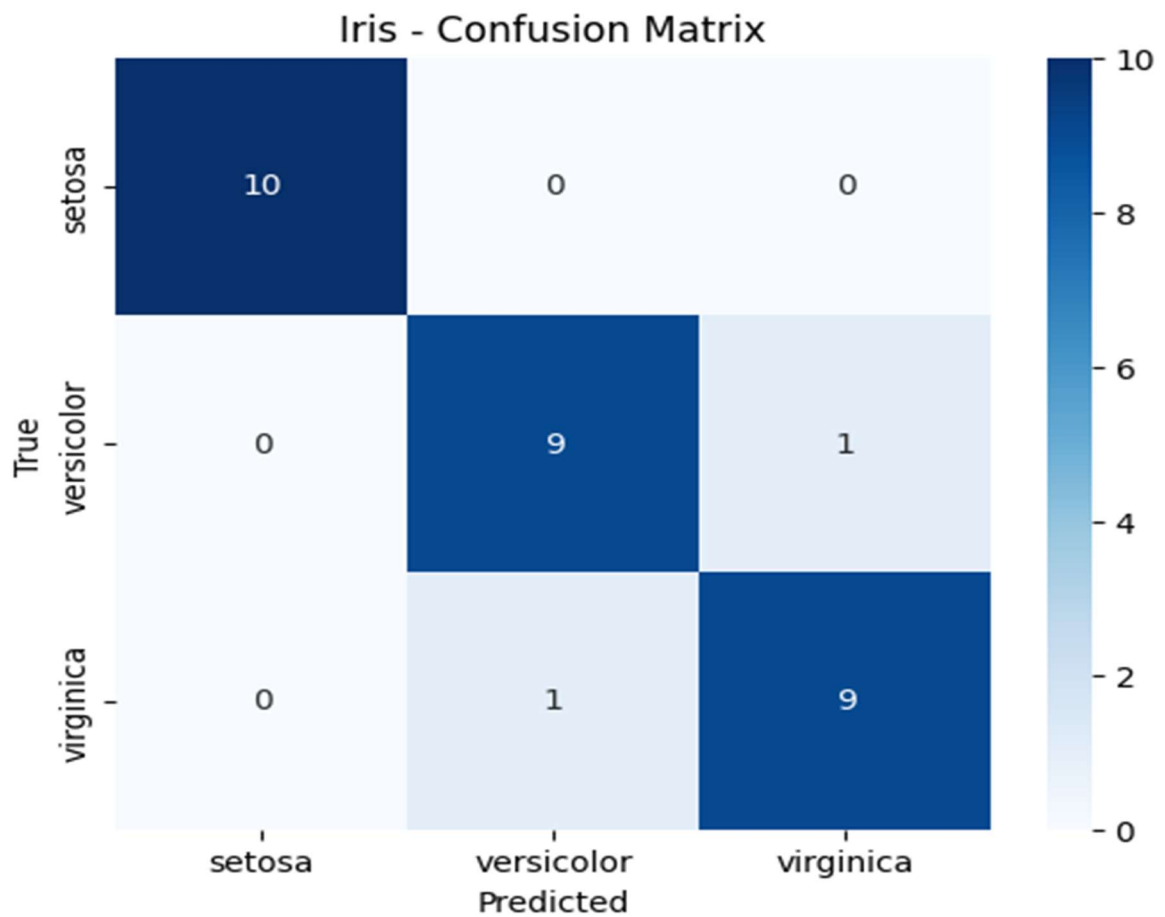
Comparative Analysis: Scikit-learn vs TensorFlow

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

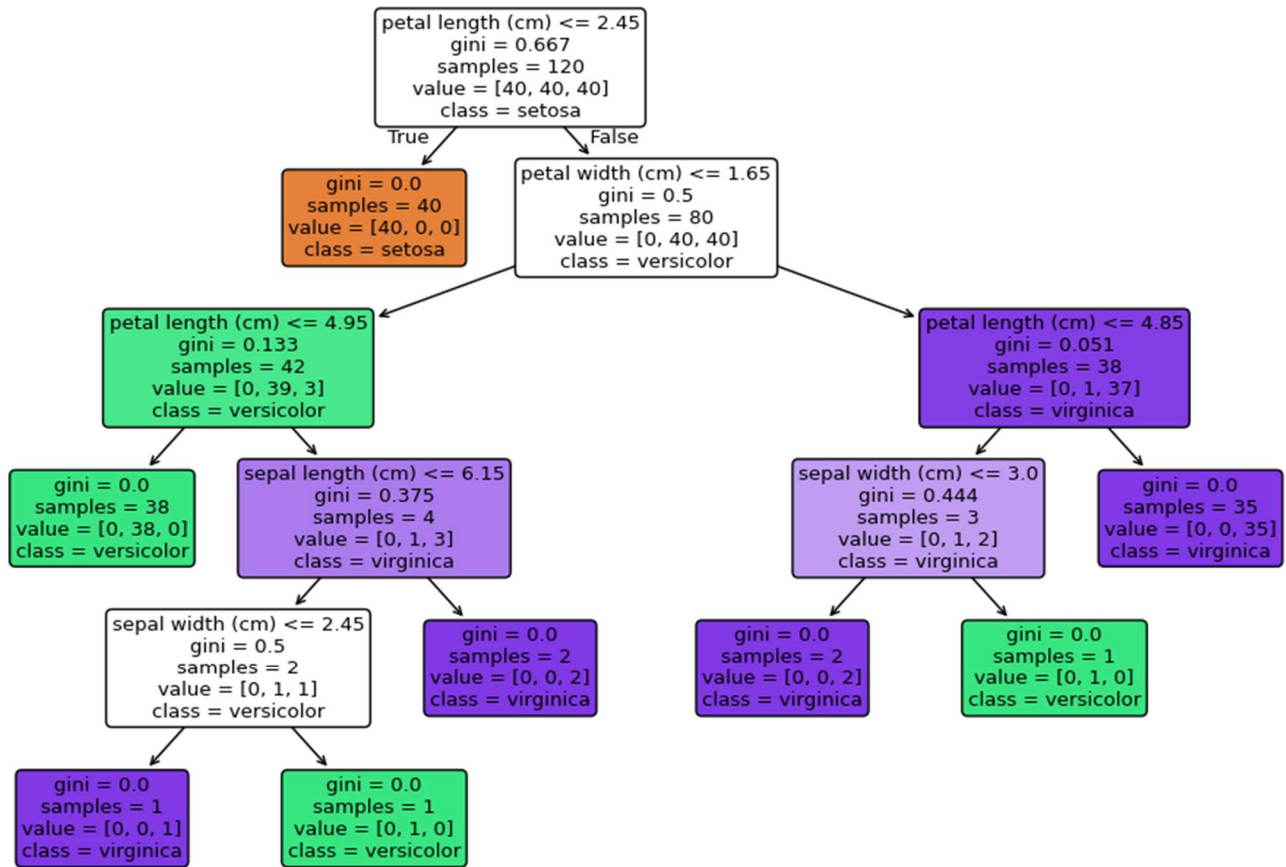
Part 2: Practical Implementation

Screenshots.

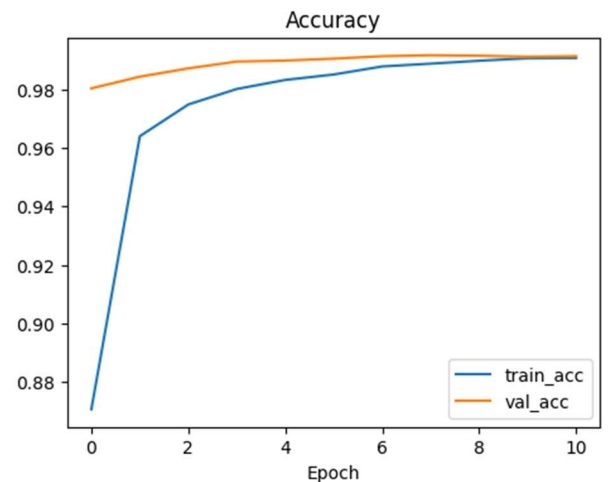
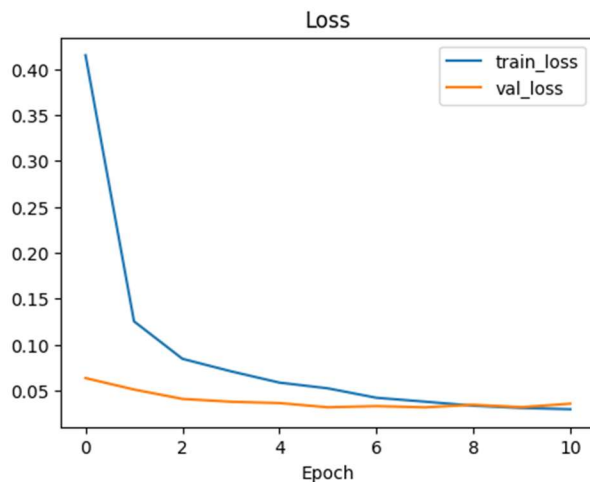
- Iris confusion matrix and tree

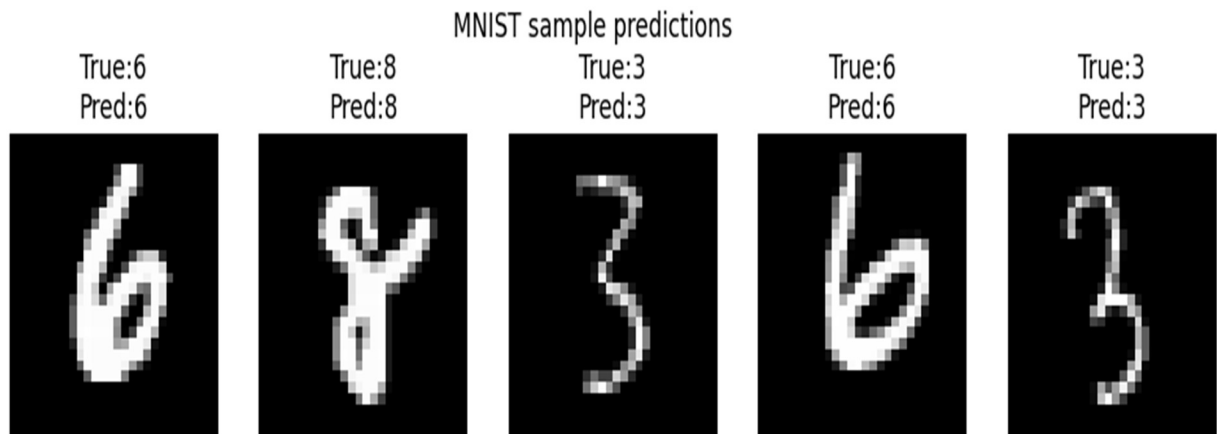


Decision Tree for Iris



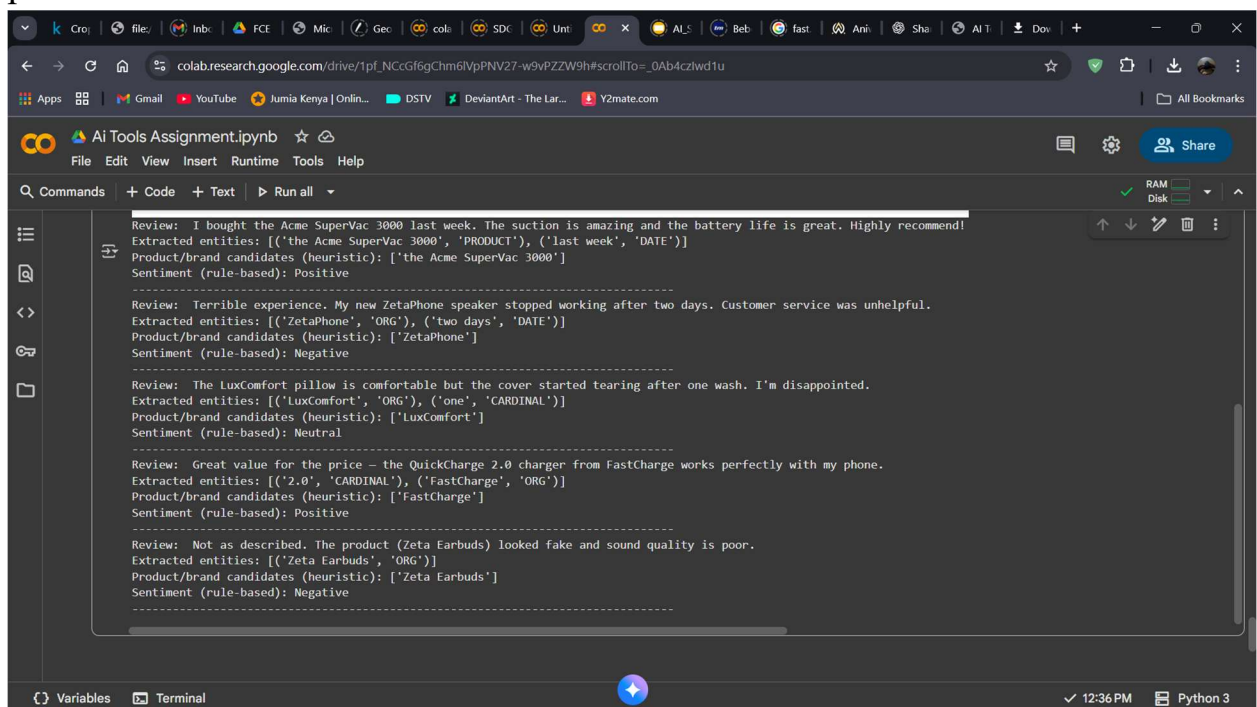
➤ MNIST results





➤ spaCy NER and sentiment.

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Review: I bought the Acme SuperVac 3000 last week. The suction is amazing and the battery life is great. Highly recommend!
Extracted entities: [('the Acme SuperVac 3000', 'PRODUCT'), ('last week', 'DATE')]
Product/brand candidates (heuristic): ['the Acme SuperVac 3000']
Sentiment (rule-based): Positive

Review: Terrible experience. My new ZetaPhone speaker stopped working after two days. Customer service was unhelpful.
Extracted entities: [('ZetaPhone', 'ORG'), ('two days', 'DATE')]
Product/brand candidates (heuristic): ['ZetaPhone']
Sentiment (rule-based): Negative

Review: The LuxComfort pillow is comfortable but the cover started tearing after one wash. I'm disappointed.
Extracted entities: [('LuxComfort', 'ORG'), ('one', 'CARDINAL')]
Product/brand candidates (heuristic): ['LuxComfort']
Sentiment (rule-based): Neutral

Review: Great value for the price – the QuickCharge 2.0 charger from FastCharge works perfectly with my phone.
Extracted entities: [('2.0', 'CARDINAL'), ('FastCharge', 'ORG')]
Product/brand candidates (heuristic): ['FastCharge']
Sentiment (rule-based): Positive

Review: Not as described. The product (Zeta Earbuds) looked fake and sound quality is poor.
Extracted entities: [('Zeta Earbuds', 'ORG')]
Product/brand candidates (heuristic): ['Zeta Earbuds']
Sentiment (rule-based): Negative
  
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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.