Mini Report:

Task 1: ML Classification using PyTorch(Iris dataset)

We built a simple two-layer neural network from scratch using PyTorch to classify the famous Iris dataset into three flower species: Setosa, Versicolor, and Virginica.

Model Architecture

- Input Layer: 4 neurons (features)
- Hidden Layer: 10 neurons, ReLU activation
- Output Layer: 3 neurons (classes)

Training Details

- Optimizer: Stochastic Gradient Descent (SGD)
- Loss Function: CrossEntropyLoss
- Epochs: 50
- Train/Test Split: 80/20
- Feature Scaling: Standardized using StandardScaler

Results

- Final Train Accuracy: ~100%
- Final Test Accuracy: ~96% (varies slightly by run)
- The model achieved high accuracy on both train and test data, indicating good generalization.

Accuracy vs Epoch Plot

- Train and test accuracy steadily increased and stabilized by epoch 30–40, showing successful learning without overfitting.

Task 2: Generative AI using

We used Hugging Face's GPT-2 (small) model to explore the effect of temperature on text creativity. The prompt used was:

> "Once upon a time"

Generation Parameters

- Model: GPT-2 (117M)
- Top-k: 50
- Max Tokens: 50
- Temperatures: 0.7 and 1.0

Output Comparison

- Temperature = 0.7
  Once upon a time, the sun was shining behind the clouds, rising and falling like a stream of water, and the sun was descending...
  Output is more coherent, logical, and grammatically correct.
- Temperature = 1.0
  Once upon a time this game was about something bigger than itself. The player has to take a game to the next level...
  Output is more creative, with abstract or surprising sentences.

Key Insight

- Lower temperature (0.7) results in focused, sensible text.
- Higher temperature (1.0) increases creativity but may reduce coherence.

Key Learnings :-

1. What was challenging for me :-
   - When I had to write the full training loop myself and understand how data is passed, how loss is calculated, and how the model learns.
   - It was also tricky to set the right training settings like learning rate and number of neurons. But after trying a few times, I got good accuracy.
2. What was interesting for me :-
   - The most interesting part was generating text using GPT-2. I liked how changing the temperature made the text either more focused or more creative.
   - Using Hugging Face was also fun because it made working with a powerful AI model very easy with just a few lines of code.

Conclusion

This assessment successfully covered both supervised ML using PyTorch and generative text using transformers. It provided hands-on experience with foundational AI concepts and helped us appreciate both predictive accuracy and creative diversity in modern models.