Mini Report: ML Classification and Generative AI Experiment

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1 ML Classification

Model Architecture and Hyperparameters

We used a simple 2-layer fully connected neural network in PyTorch:

- **Input:** 4 features
- **Hidden:** 16 ReLU units
- **Output:** 3 classes (CrossEntropyLoss)

Training Details:

- Optimizer: SGD, LR = 0.01
- Epochs: 50 Batch size: 150

Final Accuracy

- Training Accuracy: ∼31%
- Test Accuracy: ∼33%

The model underfit due to limited data (only 150 samples), restricting learning capability.

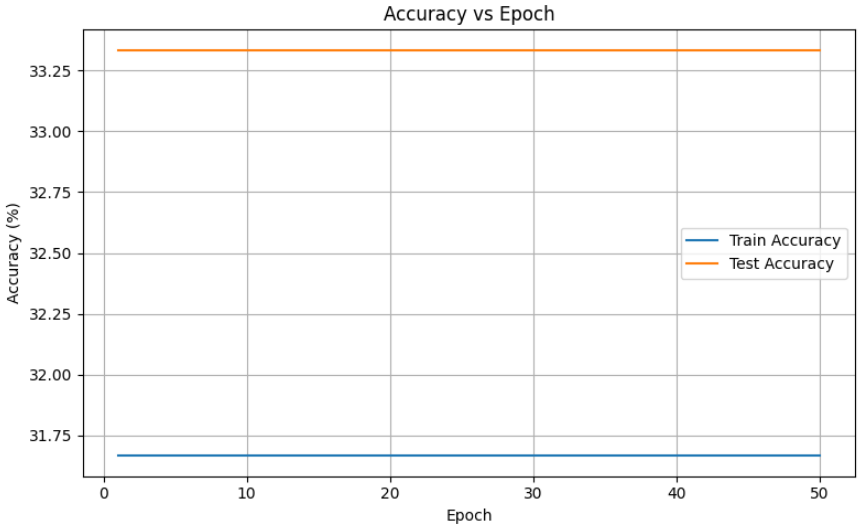

Figure 1: Training and Testing Accuracy vs Epoch

2 GenAI Experiment

We used the Hugging Face `transformers` library and a pre-trained `gpt2` model to generate text.

Prompt

```
Once upon a time
```

Generated Outputs

Temperature = 0.7

> Once upon a time, the Great One would have been in the form of an immortal being whose existence had already been established. But the great One would have been not a mortal. And so, in his own way, he would have been a mortal. The mortal man

Temperature = 1.0

> Once upon a time in the past, I was able to play an extremely rare match of it, a match that I would have almost never even seen.
> On the one hand, he had a really good team which I would never see back then, but was

Observations

- Temp 0.7: More coherent, safe, and structured.
- Temp 1.0: More creative and surprising, but less coherent.
- Trade-off: Predictability vs. novelty.

3 Key Learnings

ML Classification

- Deep models underperform with limited data.
- Data quality matters more than depth or epochs.

Generative AI

- Temperature controls creativity vs structure.
- GPT-2 outputs show sampling-based randomness.
- Simple prompts can yield diverse text outputs.