A03 Neural Network Zoo - Team Cheetah

By: Ethan Phan, Elizabeth Martinez, Sydney Chilso

1. Introduction to Neural Networks

Neural networks are a fundamental component of deep learning, designed to mimic the human brain's way of processing information. They consist of interconnected layers of neurons that process data and make predictions. The key components of a neural network include:

- **Neuron (Perceptron):** The basic unit that receives input, processes it using a weighted sum and an activation function, and passes the output forward.
- **Layers:** Neural networks are organized into layers:
    - **Input Layer:** Receives raw data.
    - **Hidden Layers:** Perform computations and transformations.
    - **Output Layer:** Produces the final result or classification.
- **Weights and Biases:** Adjusted during training to improve performance.
- **Activation Functions:** Such as ReLU, Sigmoid, and Softmax, which determine the output of neurons.

2. The Zoo Concept

The "Neural Network Zoo" represents different types of neural networks as animals, making learning more engaging and memorable. Each neural network type has distinct characteristics suited for specific tasks. Some examples include:

Neural Network	Animal Representation	Characteristics
Convolutional Neural Network (CNN)	Cheetah	Fast and efficient in image recognition, pattern detection, and visual tasks.
Recurrent Neural Network (RNN)	Raccoon	Learns sequential data like speech and time-series predictions.
Long Short-Term Memory (LSTM)	Lemur	Specialized RNN that remembers long-term dependencies.
Generative Adversarial Network (GAN)	Gorilla	Creates new data similar to training data, used in deepfake generation.
Transformer	Owl	Used in NLP tasks like ChatGPT, BERT, and machine translation.

3. Interactive Group Activity

- Each group will pick a "neural network animal."
- Research the network type, its structure, how it functions, and its applications.

- Design a creative presentation (poster, digital illustration, or slides) to showcase their neural network.

4. Presentation and Zoo Tour

- Groups will upload their presentations to Canvas.
- A discussion forum will be open for Q&A and collaborative discussions.
- A "zoo tour" will be created to showcase all neural network animals and their roles in AI.

5. Reflection and Deeper Understanding

After the presentations, a discussion will take place to compare and contrast different neural networks. Key points of reflection include:

- How different networks are suited for different tasks.
- Similarities and differences in learning mechanisms.
- Real-world applications of each network type.