

Class materials and assignments: Simple Neural Networks

Objective:

To deepen understanding of neural networks by implementing one from scratch in Python, using the concepts covered in the provided video, slides, and GitHub code sample.

Resources:

1. [Video Lecture](#)
2. Attached slides. [NN week4.pdf]
3. [GitHub Code Sample](#)
4. [Article: How Do Neural Networks Really Work?](#)

Tasks:

1. **Understanding the Basics:**
 - Watch the provided video and review the slides and the article to understand the foundational concepts of neural networks, including forward and backward propagation, activation functions, and loss functions.
2. **Code Analysis:**
 - Examine the [ann.py](#) and [layers.py](#) files from the GitHub repository. Understand how different layers are implemented and how the network is trained.
3. **Implementation Challenge:**
 - Using the concepts and code samples as a guide, implement your own neural network in Python. Your network should include:
 - At least one hidden layer.
 - An activation function of your choice (e.g., ReLU, Sigmoid, Tanh).
 - A loss function (e.g., Mean Squared Error, Binary Cross-Entropy).
 - Document your code thoroughly to explain your implementation choices.
4. **Experimentation:**
 - Train your neural network on a simple dataset (e.g., XOR problem, MNIST digits).
 - Experiment with different configurations (e.g., number of layers, types of activation functions, learning rates) and observe how they affect the performance of your network.
5. **Report:** [100-200 words]
 - Write a report summarizing your findings. Include:
 - An overview of the neural network architecture you implemented.
 - Details of your experimentation process and results.
 - Insights and learnings from the implementation and experimentation phases.
6. **Reflection:** [50-150 words]
 - Reflect on the challenges you faced during this assignment and how you overcame them.
 - Discuss how the theoretical concepts from the video and slides were applied in your practical implementation.

Submission:

Submit your Python notebook your model's implementation, experimentations, report and reflection.