Summary of the Experience

Time and Effort

- **Part A**: Completed in approximately 10 hours.
- **Part B**: Required 20 hours or more due to its complexity.
- **Part C**: Took more than 10 hours, primarily due to the advanced tasks involved.
- The work was completed based on the available time rather than a strict schedule.

Challenges

- As beginners in deep learning, the complexity of the topics and the lack of beginnerfriendly resources posed significant challenges, especially since most available materials rely heavily on prebuilt libraries.
- Most difficulties were related to coding rather than theoretical understanding.

Key Achievements

- The most rewarding moment was successfully implementing and running the **MLP code in Part B**, as it marked a significant milestone in understanding and applying neural network concepts.

Skills Acquired

- Learned how to create a basic working environment for deep learning tasks.
- Gained a solid understanding of how models function, including their construction and training process.

Enjoyment and Overall Experience

- Enjoyment was higher during **Parts A and B**, as they offered more learning and handson coding opportunities.
- **Part C**, however, was described as more of a challenge, feeling like a prolonged struggle due to its demanding tasks.

Technical Difficulties

- Encountered numerous technical issues, such as coding errors and implementation challenges.
- Overcame these problems using resources like ChatGPT and GitHub, which proved to be invaluable tools for debugging and finding solutions.

Reflection and Future Vision

- This experience has built a strong foundation in deep learning and coding skills, making future projects less daunting.

- If given the opportunity to improve or redo the project, leveraging more advanced libraries (e.g., TensorFlow or PyTorch) and adopting a structured schedule would enhance both efficiency and learning outcomes.

Final Note

- For future assignments, we kindly request consideration of the limited time available, especially given the proximity of exams and other academic responsibilities.

Part A:

Task 1 (Linear Node):
Designing the linear node was challenging, particularly because we were unfamiliar with the original codebase. Being new to the topic, the most difficult part was implementing the backward pass.

Task 2 (Integrating Linear Node):
Replacing the previous nodes with the linear node was slightly challenging. However, the results and performance did not show any noticeable changes after the modification.

Task 3 (Batching):
Adding batch processing was very difficult, and I needed significant help from ChatGPT to implement it correctly. Once batching was integrated, there was a substantial improvement in results and performance.

Task 4 (Effect of Batch Size):
To visualize the effect of batch size, I used a loop to store the results of each batch. These results were then plotted at the end to observe the impact of different batch sizes.

Part B:

Task 1 (XOR Problem):
Creating the XOR problem dataset was straightforward. However, the performance of logistic regression on this dataset was poor, and the results were unsatisfactory.

Task 2 (Multi-Layer Perceptron):
The MLP design was based on the ideas from the course slides, and I utilized the previously developed linear node. There were no significant challenges in training the MLP on the XOR dataset.

Task 3 (Refactoring and Automation):
I automated parts of the code, but the process was extremely challenging and frustrating. At one point, I almost gave up. Eventually, I discovered a simple mistake where I had inverted the graph during setup. Fixing this issue resolved most of the challenges.

Task 4 (MNIST Simplified):
The experience of working with the simplified MNIST dataset was enjoyable and straightforward. It was similar to previous tasks, and the achieved accuracy ranged from the high 80s to the low 90s.

Part C:

Task 1 (Full MNIST):
Working on the full MNIST dataset was not overly difficult, as the code did not differ significantly from the simplified version. However, things became much more challenging afterward, and it felt like everything was achieved through sheer persistence and effort.