Weekly Report (April 14, 2025 - April 20, 2025)

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***Abstract*—This week, I focused on strengthening my foundational knowledge of machine learning and practical frameworks.**

***Index Terms*—Machine Learning, Tensor, Codebase**

I. Machine Learning Fundamentals:

I explored the core ideas and concepts behind supervised learning, unsupervised learning, and reinforcement learning, distinguishing their objectives and use cases. Additionally, I deepened my understanding of essential elements such as models, objective functions, optimization algorithms, regression, and classification. Concepts like the broadcasting mechanism (for efficient tensor operations) and backpropagation (for gradient computation in neural networks) were also introduced and studied.

II. PyTorch Tensors

I delved into PyTorch's tensor representation, which serves as the backbone for numerical computations in the framework. Specifically, I learned how to create tensors, manipulate their dimensions via reshaping and slicing, and utilize built-in functions for mathematical operations. I also practiced managing tensor attributes like data type (dtype) and device placement (CPU/GPU).

III. Conclusions and Plan for the Next Week

With guidance from Senior Cai, I successfully set up a development environment (including CUDA for GPU acceleration) and reviewed a visual recognition codebase. In the coming week, I aim to thoroughly analyze the visual recognition code line by line to understand every component.