Deep Learning and Numerical Analysis: Mutual Applications and Synergies

Habib Izadkhah

Abstract:

In this workshop, I intend to discuss the application of deep learning in numerical analysis and the utilization of numerical analysis concepts in deep learning. Deep learning, as an advanced approach in the field of artificial intelligence, excels at extracting complex patterns from large datasets. On the other hand, numerical analysis is a classical method used for solving mathematical and scientific problems through numerical and approximation techniques.

During this workshop, I will first introduce the fundamental concepts of deep learning and numerical analysis. Then, I will explore the applications of deep learning in numerical analysis and demonstrate how this approach can enhance numerical methods and improve the accuracy of scientific problem-solving.

Furthermore, I will delve into the utilization of numerical analysis concepts in deep learning. Concepts such as function approximation, optimization methods, and numerical solutions for differential equations will be examined in the context of deep learning. I will illustrate how incorporating these concepts can improve the responsiveness and performance of neural networks.

Finally, I will provide practical examples showcasing the convergence of deep learning and numerical analysis involving numerical analysis in deep learning and deep learning for numerical analysis.