

Structure-preserving deep learning

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Over the recent years, deep learning became a topic of interest as a result of successes obtained in solving problems including computer vision, fraud detection, and natural language processing, to name a few. There are challenging mathematical problems involved in applying deep learning as most deep learning methods require the solution of hard optimization problems. Thus, a good understanding of the tradeoff between computational effort and model complexity is required to successfully design a deep learning approach for a given problem.

The structure-preserving deep learning is related to the neural network architecture, which is applicable to the training aspects of deep learning. The discussions consist of the suggested methods of designing the neural network which preserves certain types of structures in deep learning. An overview of the stability of neural networks, which is an important property of training the neural network, is then discussed as well as the structure-preserving numerical methods, which includes the desirable properties of training and how they relate to the structure of the neural network.

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