Deep learning for Hamitonian problemS and variational analysis

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ABSTRACT

In recent years, learning theory and deep neural networks have been widely developed. They have gained in accuracy and are now widely used in many application domains, in particular in ODEs or PDEs resolution and optimal control. This mini-symposium is focused on the interactions between deep learning algorithms and numerical methods for solving direct problems (ODEs, PDEs) or inverse ones. Two main aspects will be considered:

    1) how can deep learning be used to improve numerical strategies in ODEs/PDEs and variational methods from optimal control theory [1]?

    2) how can ODEs and PDEs, in particular Hamiltonians, lead to new learning of temporal processes [2] ? In general, focusing on Hamiltonian/Poisson structures generally ensures the stability properties of learning [3].

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