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Practitioners and students will learn about advances in automatic differentiation techniques and strategies for the implementation of robust and powerful tools. Computational scientists and engineers will benefit from the discussion of applications, which provide insight into effective strategies for using automatic differentiation for design optimization, sensitivity analysis, and uncertainty quantification.

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Automatic Differentiation Applications Theory And ...

Automatic Differentiable Monte Carlo: Theory and Application Shi-Xin Zhang, Zhou-Quan Wan, Hong Yao (Submitted on 20 Nov 2019) Differentiable programming has emerged as a key programming paradigm empowering rapid developments of deep learning while its applications to important computational methods such as Monte Carlo remain largely unexplored.

Automatic Differentiable Monte Carlo: Theory and Application

Automatic differentiation is distinct from symbolic differentiation and numerical differentiation (the method of finite differences). Symbolic differentiation can lead to inefficient code and faces the difficulty of converting a computer program into a single expression, while numerical differentiation can introduce round-off errors in the discretization process and cancellation.

Automatic differentiation - Wikipedia

Automatic differentiation (AD, also called "algorithmic" or "computational" differentiation) is a set of techniques to calculate exact derivatives of functions or programs in an automatic way. It is neither symbolic differentiation, nor something like finite differences (although it is very close to the "complex step differentiation" method).

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Automatic differentiation : applications, theory and ...

Automatic Differentiation (AD) is a collection of techniques to obtain analytical derivatives of differentiable functions, in the case where these functions are provided in the form of a computer program.

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Automatic differentiation of algorithms : theory ...

Automatic differentiation (AD) can be applied straightforwardly to obtain all necessary partial derivatives (usually first and, possibly, second derivatives) regardless of a code s complexity. However, the space and time efficiency of AD can be dramatically improved - sometimes transforming a problem from intractable to highly feasible - if inherent problem structure is used to apply AD in a judicious manner.

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differentiation (AD) is a powerful tool that allows calculating derivatives of implemented algorithms with respect to all of their parameters up to machine precision, without the need to explicitly add any additional functions. Thus, AD has great potential in quantum

Automatic Differentiation in Quantum Chemistry with ...

Adjoint algorithmic differentiation (AAD) enables automated computation of gradients of such cost functions implemented as computer programs. To backpropagate adjoint derivatives, excessive memory is potentially required to store the intermediate partial derivatives on a dedicated data structure, referred to as the "tape".

GPU-Accelerated Adjoint Algorithmic Differentiation

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