

## **Differential Machine Learning**

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Differential machine learning (ML) extends supervised learning, with models trained on examples of not only inputs and labels, but also differentials of labels to inputs. Differential ML is applicable in all situations where high quality first order derivatives wrt training inputs are available. In the context of financial derivatives risk management, pathwise differentials are efficiently computed with automatic adjoint differentiation (AAD). Differential ML, combined with AAD, provides extremely effective pricing and risk approximations. We can produce fast pricing analytics in models too complex for closed form solutions, extract the risk factors of complex transactions and trading books, and effectively compute risk management metrics like reports across a large number of scenarios, backtesting and simulation of hedge strategies, or capital regulations.