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End-to-end acceleration of machine learning in gravitational wave physics

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While applications of deep learning (DL) to gravitational wave (GW) physics are becoming increasingly common, very few have reached the maturity to be deployed in truly automated services. This is symptomatic of a larger gap between the existing tool sets for both GW physics and DL, neither of which has historically been developed or optimized for use with the other. This has led to suboptimal training code which is forced to tradeoff between speed and data robustness, divergent methods for analyzing the efficacy of trained models, and difficulties in deploying and distributing models within the traditional GW computing environment. Taken together, these challenges combine to create experimental pipelines which take longer to iterate upon and which produce results that are both less conclusive and less reproducible. We present here a set of libraries, ml4gw and hermes, aimed at bridging some of these gaps and allowing for the development of DL-powered GW physics applications which are faster, more intuitive, and better able to leverage the powerful modeling techniques available in the GW literature.

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