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Deep learning to detect compact binary coalescences. A test with Einstein Telescope MDC.

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Data analysis of gravitational wave events will face many challenges in the ET era. The improvement of a factor 10 in the sensitivity translates to ~10^5 events/year while the broader sensitivity range at low frequencies will lead to longer-duration signals. A larger number of signals will lead to overlapping signals that will therefore amplify the computational burden, posing complex challenges for analysis pipelines.
Developing rapid detection and inference algorithms will be further crucial with the expected event rates detected by ET and for multimessenger follow-up observations.
We built a detection and early warning pipeline for CBC signals based on deep neural networks. Deep learning has been demonstrated to be a promising approach for the fast processing of gravitational wave data. The proposed architecture exploits the stacking of different neural networks to accomplish detection and parameter estimation with the possibility of early warning detection. In order to test this approach, we have applied our pipeline to the ET Mock Data Challenge.

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