Preparing for the future gravitational wave burst searches with machine learning techniques

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Generic searches for gravitational wave bursts are a powerful discovery tool and in the near future they are expected to unveil new phenomena. The coherentWaveBurst (cWB) pipeline is a state-of-the-art burst search pipeline, and it has been used to analyze the data from the latest observing runs of the LIGO/Virgo detectors. In preparation for the next observing run, which will include KAGRA detector, we are investigating several improvements involving also the application of cutting edge machine learning techniques. A decision tree algorithm will address the post production analysis of the candidate events, upgrading the selection criteria and ranking procedures applied so far. Moreover, an autoencoder neural network will pinpoint morphologies associated to well known noise transients, mitigating their impact.

We show that both these procedures are robust and do not limit the general character of the search. We present preliminary results on public LIGO-Virgo data for widely different burst morphologies, ranging from extreme ad-hoc signals to more astrophysically inspired gravitational-wave transients.

Reference to paper (DOI or arXiv)

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