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Machine Learning for transient noise event classification in LIGO and Virgo

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Noise of non-astrophysical origin contaminates science data taken by the Advanced Laser Interferometer Gravitational-wave Observatory and Advanced Virgo gravitational-wave detectors. Characterization of instrumental and environmental noise transients has proven critical in identifying false positives in the first observing runs. Machine-Learning techniques have, in recent years, become more and more reliable and can be efficiently applied to our problems.

Different teams in LIGO/Virgo have applied machine-learning and deep-Learning methods to different aims, from control-lock acquisition, to GW-Signal detection, to noise-Event classification.

After a general introduction to the LIGO and Virgo detectors and the Data-Analysis framework, I will describe how machine learning methods are used in Transient-Signal classification. Following an introduction to the problem, I will go through the main algorithms and the technical solutions which we have efficiently used up to now and how we plan to develop the idea in the future.

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