

Model independent search for transient multimessenger events with AMON using outlier detection methods

Timothée Grégoire

July 2, 2021

The Astrophysical Multimessenger Observatory Network (AMON) receives subthreshold data from multiple observatories in order to look for coincidences. Combining more than two datasets at the same time is challenging because of the range of possible signals (time windows, energies, number of events...). However, outlier detection methods can circumvent this issue by identifying any signal divergent from the background (e.g. scrambled data).

We propose to use these methods to make a model independent combination of the subthreshold data of neutrino and gamma ray experiments. Using the python outlier detection (PyOD) package, it allows us to test several methods from a simple “k-nearest neighbours” algorithm to a more sophisticated Generative Adversarial Active Learning neural networks which generates data points to better discriminate inliers from outliers.