

Hunting Unicorns: Model-Free Detection of Time Series Anomalies in GW Detector Data

Monday 23 August 2021 12:00 (15 minutes)

The data from current gravitational wave detectors, including Advanced LIGO and Advanced Virgo, contains a high rate of “glitches”: transient noise that can obscure true detections of gravitational wave events. I propose a novel method for identifying and characterizing these noise events by leveraging the Temporal Outlier Factor (TOF): a technique that uses higher-dimensional embedding to recreate the dynamical phase space of a time series, then correlates spatial and temporal clustering to find unique anomalies in the data. I present preliminary results demonstrating TOF’s efficacy in detecting known glitch classes in Advanced LIGO detector data, then discuss potential applications for detecting unknown glitch types.

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Session Classification: Session 1