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An artificial Neural Network to quickly classify transients in the era of LSST

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With the commissioning of the Vera C. Rubin Observatory, a new era in transient astronomy is starting. The Legacy Survey of Space and Time (LSST) is expected to deliver 500 petabytes of information during it's 10 year survey mission. In order to facilitate the rapid follow-up observations, we developed an Artificial Neural Network to rapidly classify transient events detected by LSST. The network was designed to rapidly classify transients while they are being observed, with a nominal classification time of 7 days after initial detection, with each subsequent observation updating the source classification. Training was done on a custom lightcurve model database based on The Photometric LSST Astronomical Time-Series Classification Challenge (PLAsTiCC) dataset's models developed to test classification algorithms for LSST observations. We sampled a selection of supernova, RR Lyrae and Cepheid models to the LSST cadence in order to test the network. The training dataset has a 90% accuracy. The network's accuracy was tested on sources detected by the MeerLICHT telescope, based at Sutherland, South Africa, which is performing mini-surveys on the 47 Tucanae and Omega Centauri globular clusters. No transient events were detected in this region, but a number of non transient RR Lyrae and Cepheids were correctly classified from the data. This result demonstrates that the network is able to classify real sources, and will be able to detect transient events, should they be observed by either MeerLICHT or the LSST, when it stats observations.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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