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Identification of anomalous epochs in Astronomical Time Series through Transfer Learning

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We present a novel method for detecting outliers in astronomical time series based on the combination of a deep neural network and a k-nearest neighbor algorithm. We use an EfficientNet network pre-trained on ImageNet as a feature extractor, and then perform a k-nearest neighbor search in the resulting feature space to measure the distance from the first neighbor for each image. If the distance is above the one obtained for a stacked image, we flag the image as a potential outlier. We apply our method to the VST time series, which are obtained from the VLT Survey Telescope (VST), a 2.6-meter optical telescope located at Paranal Observatory in Chile. We show that our method can effectively identify and remove artifacts from the VST time series, and improve the quality and reliability of the data. This method can be very useful in sight of the Vera C. Rubin Legacy Survey of Space and Time. We also discuss the advantages and limitations of our method, and suggest possible directions for future work.

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