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Glitch Classification and Clustering for LIGO with Deep Transfer Learning[1] HONGYU SHEN, DANIEL GEORGE, Univ of Illinois - Urbana, ELIU HUERTA, National Center for Supercomputing Applications, GRAVITY GROUP/ LIGO TEAM — The detection of gravitational waves with LIGO/Virgo requires a detailed understanding of the response of these instruments in the presence of environmental and instrumental noise. Of particular interest is the study of anomalous non-Gaussian noise transients known as glitches, since their high occurrence rate in LIGO data can obscure or mimic true signals. Successfully identifying these glitches is of utmost importance to detect and characterize gravitational waves. Here, we present the first application of Deep Learning with Transfer Learning for glitch classification with real data from LIGO labeled by Gravity Spy, showing that knowledge from pre-trained models for real-world object recognition can be transferred for classifying glitches. We demonstrate that this enables the optimal use of deep convolutional neural networks for glitch classification given small unbalanced training datasets, significantly reduces the training time, and achieves state-of-the-art accuracy above 98.8

[1]See Special Instructions

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