

DEEPMERGE: STUDYING DISTANT MERGING GALAXIES WITH DEEP NEURAL NETWORKS

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The task of distinguishing between merging and non-merging galaxies in simulated images can be well performed by convolutional neural networks (CNNs). We investigate this approach for the first time at high redshifts (i.e., $z=2$). For this task we use images from the Illustris-1 cosmological simulation and apply observational and experimental noise that mimics that from the Hubble Space Telescope.

The classification accuracy of our DeepMerge CNN is between 76-79% and it outperforms even a Random Forest classifier, which was shown to be superior to conventional statistical methods (Concentration, Asymmetry, the Gini, M_{20} statistics etc.). We also investigate the selection effects of the classifier with respect to merger state and star formation rate, and we extract Grad-CAMs to further understand the process of classification by DeepMerge CNN.

