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Galaxy Merger identification using the effect of low-surface-brightness features on the sky background measurement

One of the main ongoing intersections of machine learning and astronomy is the classification of galaxy types such as merging galaxies in large-scale surveys. In this work, we built a class-balanced training dataset using SDSS DR6 galaxies classified in Galaxy Zoo DR1, where the mergers were visually confirmed galaxy pairs from Darg et al (2010). We wanted to test the potential of training a Neural Network (NN) using only photometric information, which led us to discover that the SDSS DR6 sky background error could provide a NN model with an accuracy of 92.64 ± 0.15 % in training and 92.36 ± 0.21 % in test. Moreover, we found out that this parameter could suffice to separate mergers by simply drawing a decision boundary in the g - r bands plane, obtaining a 91.59 % using all our data. We consider that this sky background error is sensitive to the low-surface-birghtness tidally-stripped material surrounding the merging sources. Present work is focused on applying this knowledge that was found with the aid of the NN, both to data outside of the training sample but also in SDSS DR6 + GZ DR1, and to a sample in the Subaru/HSC North Ecliptic Pole.

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