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Deconstructing the galaxy merger sequence with machine vision

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Galaxy mergers are unique in their ability to transform the morphological, kinematic, and intrinsic characteristics of galaxies on short timescales. The redistribution of angular momentum brought on by a merger can revive, enhance, or truncate star formation, trigger or boost the accretion rate of an AGN, and fundamentally alter the evolutionary trajectory of a galaxy.
These effects are well studied in spectroscopically distinct galaxy pairs, but less so in pre- and post-coalescence merger systems on account of their rarity, and complications surrounding their identification by traditional morphological metrics.
To overcome this obstacle, we use bespoke machine learning morphological classifications to search for merging and merged galaxies in two imaging surveys: the latest data release from the deep and high-resolution Canada France Imaging Survey (CFIS/UNIONS), and the Dark Energy Camera Legacy Survey (DECaLS). I will present the details of our machine learning methodology, and offer our work as a case study on the flexibility and utility of machine vision as a bridge between observations and simulations.
Thanks to new large datasets and methodological advantages ushered in by the popularization of machine learning in astronomy, I will present for the first time an updated, abundant, and pure sample of pre- and post-mergers, and show the results of a temporal study following the star formation and multi-wavelength AGN demographics of galaxy mergers all the way through to coalescence.

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