
# Transfer Learning in Astronomy: Galaxy Morphology Classification and Anomaly Detection

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## Abstract

We explore the use of transfer learning in astronomy with two main applications: galaxy morphological classification and anomaly detection from disruptive astrophysical processes. For classification, we use Gradient Pattern Analysis (GPA) combined with CyMorph parameters to project galaxies into a two-dimensional morphological space. This framework, validated on SDSS data (e.g., Barchi et al., 10.1016/j.ascom.2019.100334 CrossrefSearch ADS ; Kolosnikov et al. https://doi.org/10.1093/mnras/stad3934 ), enables efficient classification across telescopes. For anomaly detection, we present a case study using 2D p-model-based learning to identify astrophysical anomalies, transients, or extreme events in imaging data, such as solar flares from SDO or supernovae from LSST. These approaches demonstrate how transferable features can bridge observational domains and improve automated analysis in large sky surveys.