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DeepDISC: Deep Learning-Driven Deblending Using Overlapping Roman and Rubin LSST Data

Keywords: deep learning, deblending, source detection, joint-survey, instance segmentation, vision transformers, cosmology

Motivation

- **Blended sources** in ground-based surveys introduce major sources of systematic errors threatening LSST dark energy science
- Roman Space Telescope provides high-resolution data overlapping with LSST's wide-field observations
- Traditional detection algorithms miss blended galaxies, reducing catalog completeness for cosmology
- Leverage joint-survey data using strengths of space-based (high resolution) and ground-based (wide field) surveys to maximize scientific output

Data Science

- Deep learning models (***DeepDISC*** using `Detectron2`) trained on simulated LSST+Roman imaging data to classify, detect and deblend sources
- Annotations generated by simulating multi-band object profiles using GalSim and morphological parameters from truth catalogs
- Performance validation against truth catalogs shows **10% improvement in detection completeness**

More about Me!

- BS in CS + Astronomy using deep learning with next-generation massive surveys
- 2+ years research experience in computer vision and astronomical data processing, with focus on joint-survey data
- Applied ML background from web development and computer vision internships to current DeepDISC research improving deblending and source detection

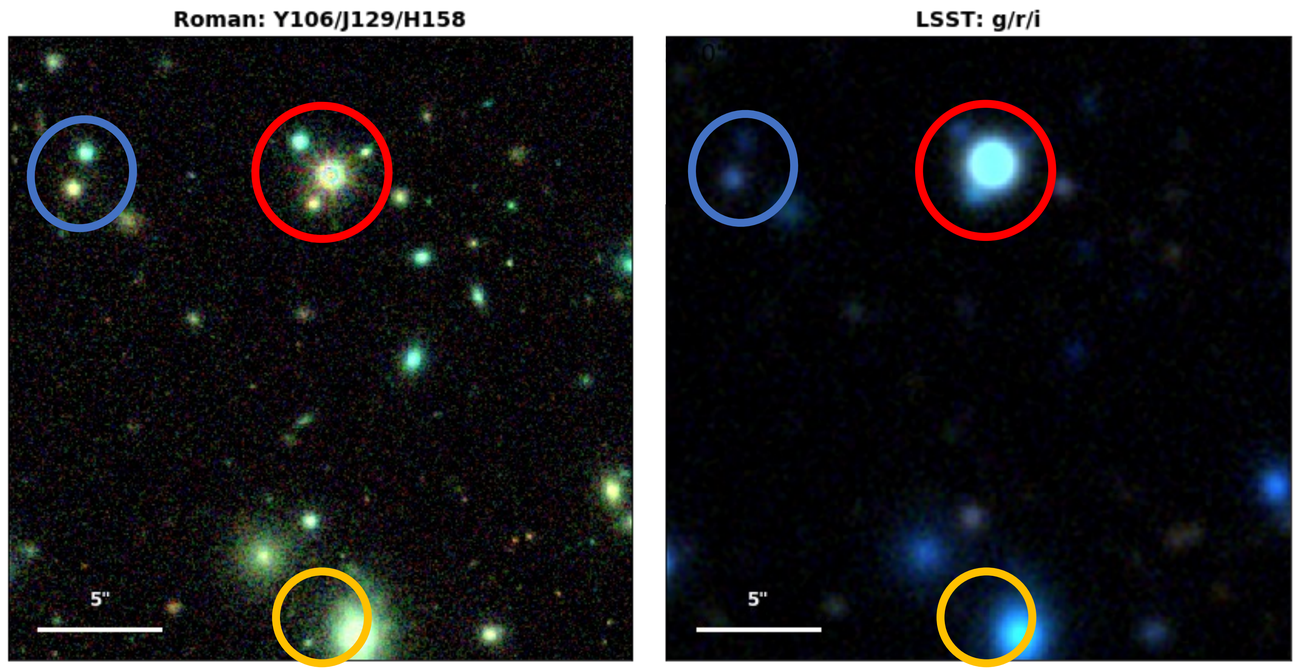
Stanford Data Science

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LSST DESC Dark Energy Science Collaboration

Roman Space-Based vs. LSST Ground-Based Imaging



DeepDISC Performance Comparison: Joint Roman-LSST Training Improves Unrecognized Blend Detection

