INTRODUCTION
Motivation
Prints astronomical surveys such as the Large Synoptic Survey Telescope (LSST) will produce unprecedented amounts of data. It leads to a demand of new algorithms and models to classify, detect, and analyze the sources in the image. A major challenge is deblending. The algorithm needs to separate overlapping elements. It can be done using a pixel level instance segmentation model.

Past Work
Previous research into the detection and segmentation tasks involved utilizing the Mask-RCNN instance segmentation model. The neural network segments astronomical sources in images and labels the image pixels corresponding to the sources as stars or galaxies. The model, Astro-RCNN, was trained on simulated Phosim 512x512 images meant to replicate the DECam CCD camera.

Goal
This project aims to transplant the past work onto the new detectron2 system. Detectron2 provides a clear interface to work with. It would also make it easier to extend the project in the future.

Data and Methodology
Training Data
It is hard to find sufficient uniform and unbiased astronomical training set. Therefore, the model was trained on simulated images. First, an image with realistic distribution of stars and galaxies is generated to simulate DECam images. Next, for each object in the image, an image with no background is generated as the training set of masks. The model can therefore be trained to differentiate overlapping objects.

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