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Finding strong lens by combining DenseLens and segmentation

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Detecting strong lenses in a large dataset such as Euclid is very challenging due to the unbalanced nature of dataset. Existing CNN models are producing large amount of false positives, for example one strong lens candidate will be accompanied by 100's of false positives in the final sample. To over come this challenge, we have developed a novel ML pipeline called DenseLens, which consists of three components namely Classification ensemble, Regression ensemble and Segmentation. Classification ensemble is an ensemble of DenseNet-CNNs which provides predictions in range [0,1] and Regression ensemble rank-orders strong lenses based on Information Content i.e., higher the rank, the candidate has more visually convincing features. Finally we use the segmentation model to predict the source pixels of the rank-ordered image. We use this additional information from this predicted source pixels to classify whether the candidate is a strong lens or not. We applied this the novel approach of combing different ML models to the Kilo Degree Survey (KiDS) data and we reduced the false positives by an enormous factor.

Brainstorming idea [title]

What are the techniques that can be combined with traditional CNNs to find strong lens. Can the segmentation model be used to find strong lens?

Brainstorming idea [abstract]

Usually, CNNs are generally used to find strong lenses in the astronomical datasets. However, CNNs produce large false positives owing to the visual similarity of false positives to the mock lenses. We propose that segmentation map of source pixels can also be used as an additional evidence in classifying strong lenses. So we propose, brainstorming other models (such as segmentation) in addition to traditional CNNs to classify strong lenses without compromising false positives.

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