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Statistical and Computational Methods for Astronomy (ASTR 513)

Homework 5

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1. **Lastly, I'd like you to find a paper that's close to your research area that uses Vision transformers (submit link to paper via d2l and write short paragraph on a new or related research idea that you have in using Vision transformers).**

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https://ui.adsabs.harvard.edu/abs/2023arXiv231013543T/abstract

This paper uses vision transformers to analyze and detect low surface brightness galaxies in the upcoming LSST data. They train the transformer ensemble on DES data, and have an identification accuracy of 94%. They test both a traditional transformer and a vision transformer for identifying LSBG, and find the combination of the two results in the most accurate classification.

One other application of vision transformers slightly more applicable to my work is "goodness" ratings of calibration images. Most observers manually inspect calibration images to selectively remove contaminated images. However, a vision transformer could easily be trained with the thousands or tens of thousands of known good calibration images from any major observatory. This transformer would then provide a rating describing how good the images are, and apply an automatic cutoff, resulting in only quality calibration images being given to an observer. The same could easily be applied to CCD characterization, and warnings could be thrown whenever bad images appear.