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Finding Strong Gravitational Lenses with Self-Attention

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The upcoming large-scale surveys like LSST are expected to find approximately 10^5 strong gravitational lenses by analysing data of many orders of magnitude larger than those in contemporary astronomical surveys. In this scenario, non-automated techniques will be highly challenging and time-consuming, even if they are possible at all. We propose a new automated architecture based on the principle of self-attention to find strong gravitational lenses and its advantages over convolution neural networks are investigated. From our study, we showed that self-attention-based models have clear advantages compared to simpler CNNs. They have highly competing performance in comparison to the current state-of-art CNN models. Moreover, introducing the encoder layers can also tackle the over-fitting problem present in the CNNs by acting as effective filters. In addition, we have also identified some new strong lens candidates from the Kilo Degree Survey (KiDS) using this new architecture.

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