

LADDER: Revisiting the Cosmic Distance Ladder with Deep Learning Approaches and Exploring its Applications

Tuesday 15 October 2024 14:30 (15 minutes)

I'll present the prospect of reconstructing the "cosmic distance ladder" of the Universe using our novel deep learning framework called LADDER - Learning Algorithm for Deep Distance Estimation and Reconstruction. LADDER was trained on the apparent magnitude data from the Pantheon Type Ia supernovae compilation, incorporating the full covariance information among data points, to produce predictions along with corresponding errors. After employing several validation tests with several deep learning models, LADDER was picked as the best-performing one. I'll demonstrate some applications of this framework in the cosmological context, which include serving as a model-independent tool for consistency checks for other datasets like baryon acoustic oscillations, calibration of high-redshift datasets such as gamma-ray bursts, use as a model-independent mock catalogue generator for future probes, etc. Our analysis advocates for interesting yet cautious consideration of machine learning applications in these contexts. This would be based on the work presented in <https://www.arxiv.org/abs/2401.17029>.

Track type

Cosmology

Author: MUKHERJEE, Purba (Indian Statistical Institute, Kolkata)

Presenter: MUKHERJEE, Purba (Indian Statistical Institute, Kolkata)

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