

Deep learning image-to-image translation for cosmological simulations and SKA mock observations

Friday, 2 June 2023 10:00 (15 minutes)

In the study of the Universe, particularly galactic dynamics, hydrodynamical simulations have played a critical role. Finely-tuned on a wide range of scales, recent large-scale simulation suites have produced mock observations that are nearly indistinguishable from actual observations.

In comparison to traditional machine learning techniques, the complexity of these models poses a substantial challenge. However, artificial neural networks have the ability to learn by transforming data iteratively into a more compressed and abstract representation. Once optimized, these networks can generalize to unseen data, which makes them more applicable in a “real-world” setting.

In this talk, we would like to provide a status update on the current effort at ZHAW to explore the mapping from cosmological simulations to mock images from simulated SKA visibilities (and vice versa), using deep learning techniques. We will present a comparison of the performance of two image-to-image translation conditional adversarial network models, pix2pix and CycleGAN, trained on a dataset of galaxies from the IllustrisTNG simulation suite.

Primary author: Dr DENZEL, Philipp (Centre for Artificial Intelligence, ZHAW)

Co-authors: Prof. SCHILLING, Frank-Peter (Centre for Artificial Intelligence, ZHAW); Dr GAVAGNIN, Elena (ZHAW)

Presenter: Dr DENZEL, Philipp (Centre for Artificial Intelligence, ZHAW)

Session Classification: Friday Morning