

Machine Learning for Scientific Discovery

Our ability to capture and store data is increasing, so is the information we are capturing. With the petabytes of data being captured and to be captured in the future with SKA, analysing this data and extracting information from them in the traditional way will not suffice. It is inevitable, to use machine learning to understand the underlying information captured in the data. These algorithms will play an important role in making scientific discoveries from the data being collected.

In this talk, we present ways of discovering physical phenomenon by using machine learning algorithms on data collected through radio telescopes. We will discuss the use of supervised machine learning algorithms to predict the free parameters of star formation histories and also better understand the relations between the different input and output parameters. We made use of deep learning to capture the non-linearity in the parameters. Our models are able to predict with low error rates and gives the advantage of predicting in real time once the model has been trained.

The other class of machine learning algorithms viz. unsupervised learning prove to be very useful to uncover patterns in the data. We explore how we used such unsupervised techniques on solar radio telescope data from MWA which is precursor to SKA, to identify patterns and anomalies and also link such findings to theories, which help to better understand the nature of the elements being studied. We highlight the challenges faced in terms of data size, availability, features, processing ability and importantly, the interpretability of results.

Suggested duration

20 mins

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