

Supervised Machine Learning for Analysing Spectra of Exoplanetary Atmospheres

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I am a first year PhD student in the group of Kevin Heng at the University of Bern. We have been collaborating with two computer scientists from the Biomedical Engineering department in Bern to develop a machine learning based technique for atmospheric retrieval. We have adapted the 'random forest' method of supervised machine learning, trained on a precomputed grid of atmospheric models, which retrieves full posterior distributions of the abundances of molecules and the cloud opacity. The use of a pre-computed grid allows a large part of the computational burden to be shifted offline. We demonstrate our technique on a transmission spectrum of the hot gas-giant exoplanet WASP-12b using a five-parameter model. We obtain results consistent with the standard nested-sampling retrieval method. Additionally, we can estimate the sensitivity of the measured spectrum to constraining the model parameters and we can quantify the information content of the spectrum.

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