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EMU Pilot Survey - Redshifts Estimated using Machine Learning

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Measuring redshifts of radio sources is extremely important but extremely hard. I have been searching for the optimum machine learning algorithms to measure the redshifts of radio sources. One of the reasons that radio sources are visible at higher redshift is because of the active supermassive black hole at the centre of the galaxy. But this is also the reason a lot of traditional methods for estimating redshift fail. The emission from a black hole is difficult to separate from the emission from the stars forming inside the galaxy hosting that black hole, for example. My work compares simple, traditional machine learning algorithms like the k-Nearest Neighbours (kNN) and Random Forest algorithms, with much more complex algorithms based around Neural Networks and Gaussian Processes. We find that as long as the available model parameters are optimised, the simple kNN algorithm performs best for our use case, although it does have its limitations. Using this technique, I have estimated the redshift of 100,000 radio sources in the Evolutionary Map of the Universe Pilot Survey, many of which have never been seen before at radio wavelengths.

keywords

machine learning, redshift

In-person or online?

unsure

Career level

Student

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