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Using Self-Organising Maps to Identify and Classify Complex Radio Sources in Next Generation Surveys

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Radio galaxies often have complex morphologies that are difficult to identify using traditional source finders, necessitating visual inspection of radio maps. The large data volumes of the current generation of radio continuum surveys makes such visual inspection impractical. The objective of my PhD is to identify a more efficient method to identify and classify complex radio sources.

I'm using an unsupervised machine learning method, specifically a 10x10 Self-Organising Map (SOM), which is trained on 251259 sources from the Rapid ASKAP Continuum Survey (RACS). Approximately 90% of these sources were well-matched with the corresponding best-matching neurons in the SOM, which demonstrates its reliability in identifying the different types of radio sources in the dataset. The sources were tagged based on their morphology, including compact, extended, double and triple sources, with approximately 132,050 identified as double sources.

The trained SOM can then be used to predict whether new radio galaxy images can be classified as complex sources or not. This project has the potential to improve the classification of complex radio sources, including those with rare or unusual morphologies, in future surveys. I will discuss the results in this talk.

keywords

machine learning, radio galaxies

In-person or online?

in-person

Career level

Student

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