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Source detection and classification in the SKA precursor era with machine learning

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A new era in radio astronomy has begun as the Square Kilometer Array (SKA) precursors started their planned large area survey programs. Humongous datasets with thousands of sources per square degree are being delivered, requiring a high degree of automation and knowledge extraction to maximize the scientific return. This has fuelled a growing interest in Machine Learning (ML) techniques as a valuable means to deal with such a data deluge for various tasks, such as source detection, object or morphology classification, and anomaly detection. However, the application of these techniques to new generation radio data is not always straightforward and requires considerable efforts and special care, especially if the radio data is to be combined with supplementary multiwavelength information.

In this context, our group is investigating and evaluating the applicability of various state-of-the-art ML methodologies to SKA precursor surveys (ASKAP, MeerKAT), with a special emphasis on Galactic science objectives. In this talk, we will share the results achieved on different scientific use cases, highlighting the encountered challenges and limitations: (1) the search and characterization of radio sources with different morphologies, (2) the classification of Galactic and extragalactic compact sources with multiwavelength data from the near-infrared to the radio, and (3) the unsupervised classification of extended radio sources (supernova remnants, evolved stars).

Reasearch area

Our Galaxy

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