

Knowledge Discovery workflows for the classification of AGNs in multi-wavelength spaces: the Blazars case

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Abstract. The development of new AGNs selection techniques based on the massive multi-wavelength datasets that are becoming more and more frequent in astronomy is a crucial task to gather statistically significant samples and shed light on the physical nature of this diverse class of extragalactic sources. Novel characterizations of specific classes of sources from unexplored region of their spectrum and unusual combinations of the observational parameters can translate into new classification criteria. In this innovative data environment, the whole process ranging from the discovery of new patterns to the application of such patterns to the selection of new AGNs, has to be tackled using a Knowledge Discovery (KD) workflow. A KD workflow is a combination of different KD methods that automatically extract the more interesting patterns from data, reduce the complexity of the dataset and provide astronomers with the simplest possible amount of information to be interpreted. In this talk, I will describe an original KD workflow which, in one of its first applications, has led to the discovery of a previously unknown peculiar pattern followed by blazars in the mid-Infrared color space (the blazars WISE locus), and the development of a new classification criterion based on this pattern and useful to tackle different problems. The comprehensive KD workflow used to derive these results encompasses unsupervised methods for the exploration of the multi-dimensional observable spaces, and supervised method for the training and optimization of classifiers based on the patterns determined in the observable spaces. In particular, I will describe the new methods for the association of unidentified gamma-ray sources and the extraction of candidate blazars from mid-Infrared photometric catalog based on the WISE blazars locus.
