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AGN selection with machine learning

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The upcoming Rubin/LSST survey will uncover millions of previously unknown AGN. However, due to the massive amount of data collected each night, it is essential to develop reliable tools that can efficiently identify quasars among billions of stars and inactive galaxies.
I will discuss the results of different machine-learning based selection algorithms, including probabilistic random forests, gradient boosting, convolutional neural networks (CNN) and recursive neural Networks (RNN) applied to photometry, images and light curves.
We employed both real (e.g. AGN data challenge sample and multi-wavelength samples assembled starting from X-ray surveys) and simulated datasets (i.e. the mock catalog which we are deriving as part of the Italian in-kind contribution) .
I will discuss how the number of features available affects the accuracy of the results and how including data from other surveys will help improve both the purity and the completeness of the selection.
I will specifically focus on the selection of luminous and high-redshift (z > 2.5) QSOs. Given the low space density of these sources, it is critical to have a selection rate as complete as possible, to better constrain the high-z luminosity function and, in the case of the even rarer z>6 QSOs, to estimate their contribution to reionization.

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