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Application of machine learning methods to multiwavelength photometric catalogs

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"The aim of this presentation is to show how machine learning techniques can be used
for the task of object selection in multiwavelength photometric data. Here, I present a model for automatic active galactic nuclei (AGN) selection in the combined optical and near-IR photometric catalog based on the data from the deep sky survey in the AKARI NEP-Wide field. Specific construction of the classification model shows it is possible to create a method which will be able to mimic mid-IR based photometric AGN selection using only optical and near-IR broadband photometry. The described model can preserve efficiency similar to mid-IR techniques. However, it allows one to obtain much larger catalogs due to the lack of mid-IR detection conditions.
Methods developed in this work overcome detector limitations and allow one to precisely control the quality of the final source catalog. Moreover, a user of this method can identify different sources of catalog contamination. These properties were achieved by a combination of specific construction of the training sample, which allowed us to indirectly impose information about the mid-IR selection into the structure of the ML model, avoidance of extrapolation risk during classification of unlabeled objects and application of unsupervised learning methods to identify sources of catalog contamination.
Presented techniques allow one to match catalog properties to specific scientific needs, making them an effective and versatile tool for modern astrophysics."

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