MACHINE LEARNING FOR ASTROPHYSICS
2ND EDITION CATANIA, 8-12 JULY, 2024

Contribution ID: **256** Type: **not specified**

Predicting AGN Obscuration with Machine Learning

Wednesday, 10 July 2024 12:15 (5 minutes)

I present a new method for predicting the line-of-sight column density (NH) values of Active Galactic Nuclei (AGN) based on mid-infrared (MIR), soft X-ray, and hard X-ray data.
We developed a multiple linear regression machine learning algorithm trained with WISE colors, Swift-BAT count rates, soft X-ray hardness ratios, and an MIR-soft X-ray flux ratio. The algorithm was trained off 451 AGN from the Swift-BAT sample with known NH and has the ability to accurately predict NH values for AGN of all levels of obscuration, as evidenced by its Spearman correlation coefficient value of 0.86 and its 75% classification accuracy. Our algorithm significantly reduces the misclassification of unobscured sources (NH<22.5) as heavily obscured or even Compton-thick, compared to previous methods. We applied the algorithm to 487 AGN from the BAT 150 Month catalog with no previously measured NH values. This algorithm will continue to contribute significantly to calculations of NH for large samples of sources, as well as to finding Compton-thick (CT) AGN (NH ≥ 10^24 cm^-2), thus enabling us to determine the true intrinsic fraction of CT-AGN in the local Universe and their contribution to the cosmic X-ray background.

Presenter: SILVER, Ross

Session Classification: FlashTalks