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

Contribution ID: **176** Type: **not specified**

[INVITED] Expediting the discovery process: Application of unsupervised machine learning algorithms to multi-wavelength astronomical datasets

Monday, 8 July 2024 09:20 (40 minutes)

Throughout history, new observations of the night sky have led to new discoveries, often leading to paradigm shifts in astronomy. These have been made possible by observing new wavelength ranges; mapping smaller scales with an increasing spatial resolution; or peering deeper into the more distant universe; to name a few. Over the past decades, astronomy has been going through a data revolution, with numerous surveys mapping astronomical sources from radio to X-ray, and in some wavebands, also as a function of time. Although the discovery space has increased exponentially, trends and groups of interest may be more challenging to uncover due to the increased data complexity. However, such information-rich datasets offer a new opportunity: to use the data itself to form novel hypotheses, a core approach in the field of data science. This talk will focus on one particular type of complex astronomical datasets —multi-wavelength datasets fused from different large-scale surveys. I will start the talk by describing the major transformation astronomy has undergone in that respect, highlighting the challenges astronomers face when analyzing these heterogeneous and high-dimensional datasets. I will then describe how unsupervised machine learning algorithms can be used to reduce the dimensionality and visualize the data; identify simple trends or groups that extend throughout the different survey observables; and detect outliers that may represent completely new types of objects; and by that, expedite the discovery process.

Presenter: BARON, Dalya

Session Classification: Past and future multiwavelength all-sky surveys