Contribution ID: **153** Type: **Flashtalk with Poster**

Unsupervised Classification of Radio Sources Through Self-Supervised Representation Learning

Wednesday, 1 May 2024 16:00 (3 minutes)

Foundation models are increasingly prominent in various physics subfields. Moreover, the application of supervised machine learning methods in astronomy suffers from scarce training data. We explore computer vision foundation models, focusing on their application to radio astronomical image data.
Specifically, we explore the unsupervised, morphological classification of radio sources through self-supervised representation learning. Our proposed three-step pipeline involves extracting image representations, identifying morphological clusters in the representation space, and ultimately classifying all data. To ensure morphological relevance in the obtained representations, we make use of saliency maps and employing tailored random augmentations.
Commencing with FRI and FRII radio sources, we uncover seven pre-existing subclasses. It is crucial to emphasize that our classification procedure, including the identification of subclasses, is entirely unsupervised.
In conclusion, we present a novel data-driven classification scheme for radio sources and highlight that utilizing pre-trained supervised classifier weights can obscure the detection of these subclasses.

Primary author: BARON PEREZ, Nicolas (Universität Hamburg)

Presenter: BARON PEREZ, Nicolas (Universität Hamburg)

Session Classification: 4.3 Physics-informed AI, Foundation models and related techniques

Track Classification: Session B