

USING MACHINE LEARNING TO REVEAL THE FRACTAL NATURE OF YOUNG POPULATIONS IN NEARBY GALAXIES

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Abstract / Star formation proceeds in a hierarchical way as is revealed by the presence of several length scales of the young stellar structures. They range from large stellar complexes and aggregates to small associations and clusters. The analysis of these structures shows that they exhibit self similar and fractal properties. Additionally, these features are found in the structures formed by the interstellar medium (ISM). The study and parametrization of these properties could clarify the link between the young stellar populations and the molecular clouds, which are in turn associated with turbulence and self gravity. In this work, we used unsupervised machine learning (ML) methods over multi-band HST/ACS data of nearby galaxies. These methods included clustering and kernel density estimation algorithms that allowed to systematically recognize patterns over the data. Then, we characterized the fractal behaviour of the young upper and blue main sequence populations. Thus we build the corresponding dendrograms and minimum spanning trees, and we estimated the fractal dimensions and the Q parameters.

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