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Galactic Component Mapping of Spiral Galaxies by Machine Learning Classification

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Geography and astronomy are separate fields with strong similarities. Through our research, we take advantage of this connection by applying geographical spatial analysis methods to astronomical digital imagery, such as the multispectral images from Hubble Space Telescope. Here we use machine learning to classify galactic components within nearby spiral galaxies by training the computer to identify specific areas within an image. These galaxies are particularly interesting as they have both spatial and temporal patterns of stellar populations and other phenomena, which are critical components in both astronomy and geography. By classifying galactic components in nearby spiral galaxies, we can apply our findings about the distribution of galactic components to more distant spiral galaxies that we cannot observe in detail, and for better understanding of the origin and evolution of the universe.