



## Asteroid taxonomy using neural networks

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We explore the performance of neural networks in automatically classifying asteroids into their taxonomic spectral classes. We particularly focus on what the methodology could offer the ESA Gaia mission. We constructed an asteroid dataset that can be limited to simulating Gaia samples. The samples were fed into a custom-designed neural network that learns how to predict the samples' spectral classes and produces the success rate of the predictions. The performance of the neural network is also evaluated using three real preliminary Gaia asteroid spectra.

The overall results show that the neural network can identify taxonomic classes of asteroids in a robust manner. The success in classification is evaluated for spectra from the nominal 0.45–2.45  $\mu\text{m}$  wavelength range used in the Bus-DeMeo taxonomy, and from a limited range of 0.45–1.05  $\mu\text{m}$  following the joint wavelength range of Gaia observations and the Bus-DeMeo taxonomic system. The obtained results indicate that using neural networks to execute automated classification is an appealing solution for maintaining asteroid taxonomies, especially as the size of the available datasets grows larger with missions like Gaia.