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A data mining approach to recognizing source classes for unassociated gamma-ray sources

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The Fermi-LAT 3rd source catalog (3FGL) provides spatial, spectral, and temporal properties for 3033 gamma-ray sources. While 2041 sources in the 3FGL are associated with AGNs (58% of the total), pulsars (5%) and the other classes (4%), 992 sources (33%) remain as unassociated sources. In recognizing source classes for unassociated gamma-ray sources of the Fermi-LAT source catalogs, various data mining techniques have been applied, e.g. artificial neural network and classification tree. As a robust alternative to these data mining techniques, we present the Mahalanobis Taguchi (MT) method to recognize source classes. The MT method creates a multidimensional Mahalanobis space from characteristic variables of a normal class (e.g. AGN) to identify sources of the normal class from those of the other classes with Mahalanobis distances. In this paper, we present the results of the source classification for the unassociated gamma-ray sources in 3FGL by applying the MT method.

Collaboration

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