

# 3FGLzoo. Classifying unassociated sources in 3FGL Catalog by Artificial Neural Networks

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In the Fermi LAT 4-Year Point Source Catalog (3FGL) about 52% of the Fermi LAT sources are still not completely classified, including the unassociated sources and the blazars of uncertain type. Learning machine techniques are an interesting approach for screening and ranking sources, according with their predicted source class. This study is a part of a wider analysis of unclassified sources in the 3FGL catalog, as described in Saz Parkinson et al (2016), <http://adsabs.harvard.edu/abs/2016ApJ...820....8S>, ( *Paper1* ) and Chiaro et al. (2016) <http://adsabs.harvard.edu/abs/2016MNRAS.462.3180C> ( *Paper2* ). The basic concept is to apply the Artificial Neural Network approach of *Paper2* to the unassociated sources flagged as likely AGN by *Paper1*. The final result of this study suggests a new zoo for 3FGL sources where the percentage of uncertain sources drops from 52% to 10% and opens new opportunities for multiwavelength observational campaigns.

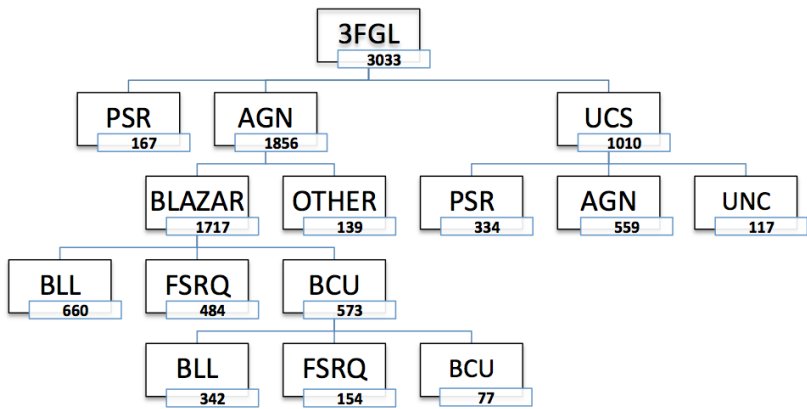


Fig. 1 3FGL including classification as in *Paper1* and *Paper2* before this study.

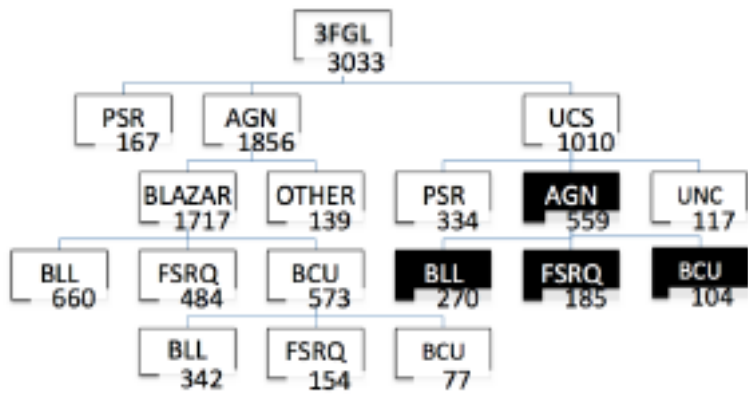


Fig.2 3FGLzoo with the results of this study in black.

We looked into the literature and BZCat in order to obtain a validation of our statistic by optical spectra.

We found very high consistency of our statistic prevision with the optical spectra published in:

Alvarez Crespo, N., et al. 2016a, ApSS, 361, 316

Alvarez Crespo, N., et al. 2016b, AJ,151,32

Alvarez Crespo, N., et al. 2016c, AJ,151,95

Landoni M. et al., 2015, Aj, 149, 163

Massaro E. et al., 2015, ASS, 357, 75

Massaro F. et al., 2014, AJ, 148, 112

Massaro F. et al., 2015a, ApJS, 217, 2

Massaro F. et al., 2015b, AA, 575, 124

Ricci F. et al., 2015, AJ, 149, 160

**Paper is in progress**

Here we enclose

- a) BCUs Classification List
- b) UCS/AGNs Classification List



UCS\_classList.pdf



3FGL\_BFLAP\_classLIST\_.pdf

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