

Artificial Neural Network Classification of the Fermi-LAT Catalog Blazars of Unknown Type and Unidentified Sources

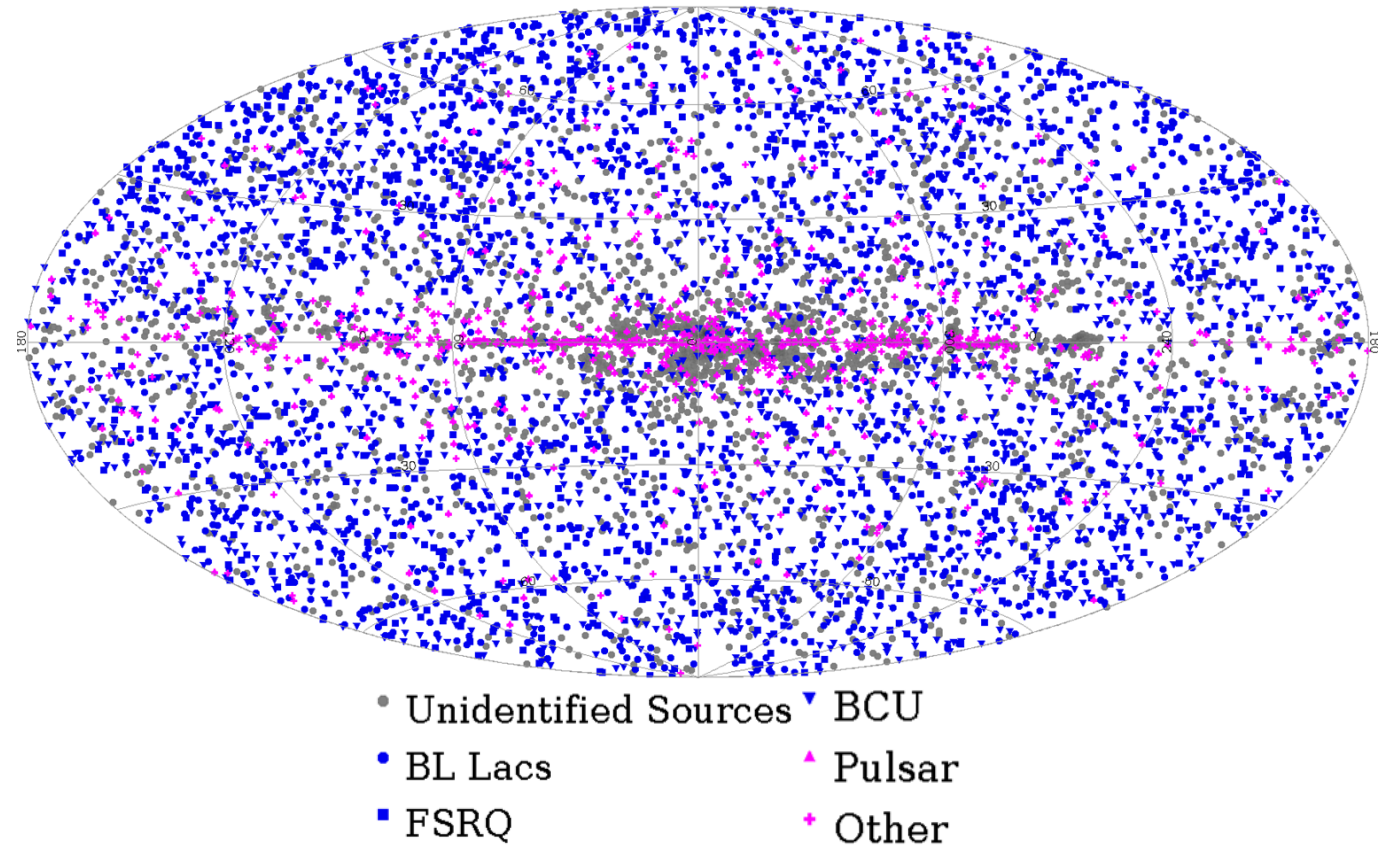
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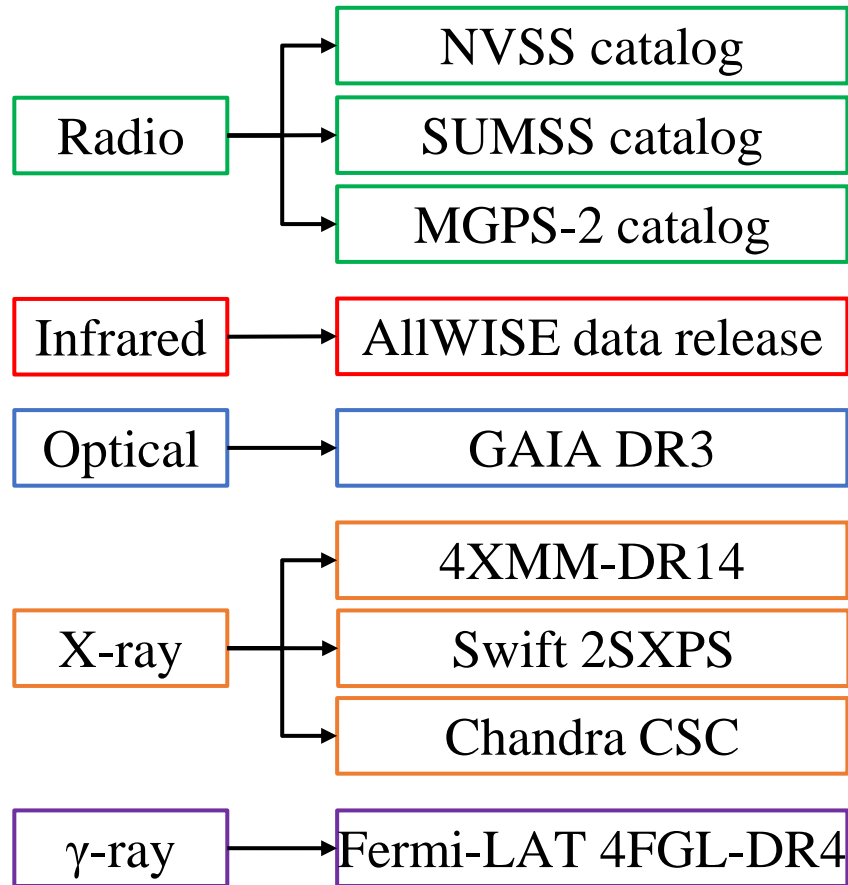
Fermi-LAT 4FGL-DR4 Catalog

Class	Designator	Number
Blazar Candidate of Uncertain Type	BCU	1624
Binary	BIN	10
BL Lacertae type blazar	BLL	1490
Compact Steep Spectrum Quasar	CSS	6
Flat Spectrum Radio Quasar	FSRQ	820
Normal Galaxy (or part)	GAL	6
Globular Cluster	GLC	34
High-Mass Binary	HMB	11
Low-Mass Binary	LMB	9
Millisecond Pulsar	MSP	179
Narrow-line Seyfert 1	NLSY1	8
Nova	NOV	8
Pulsar	PSR	141
Pulsar Wind Nebula	PWN	22
Radio Galaxy	RDG	54
Starburst Galaxy	SBG	8
Seyfert Galaxy	SEY	3
Star-Forming Region	SFR	6
Supernova Remnant	SNR	45
Special Case	SPP	124
Steep Spectrum Radio Quasar	SSRQ	2
Unknown	UNK	147
Unassociated		2430

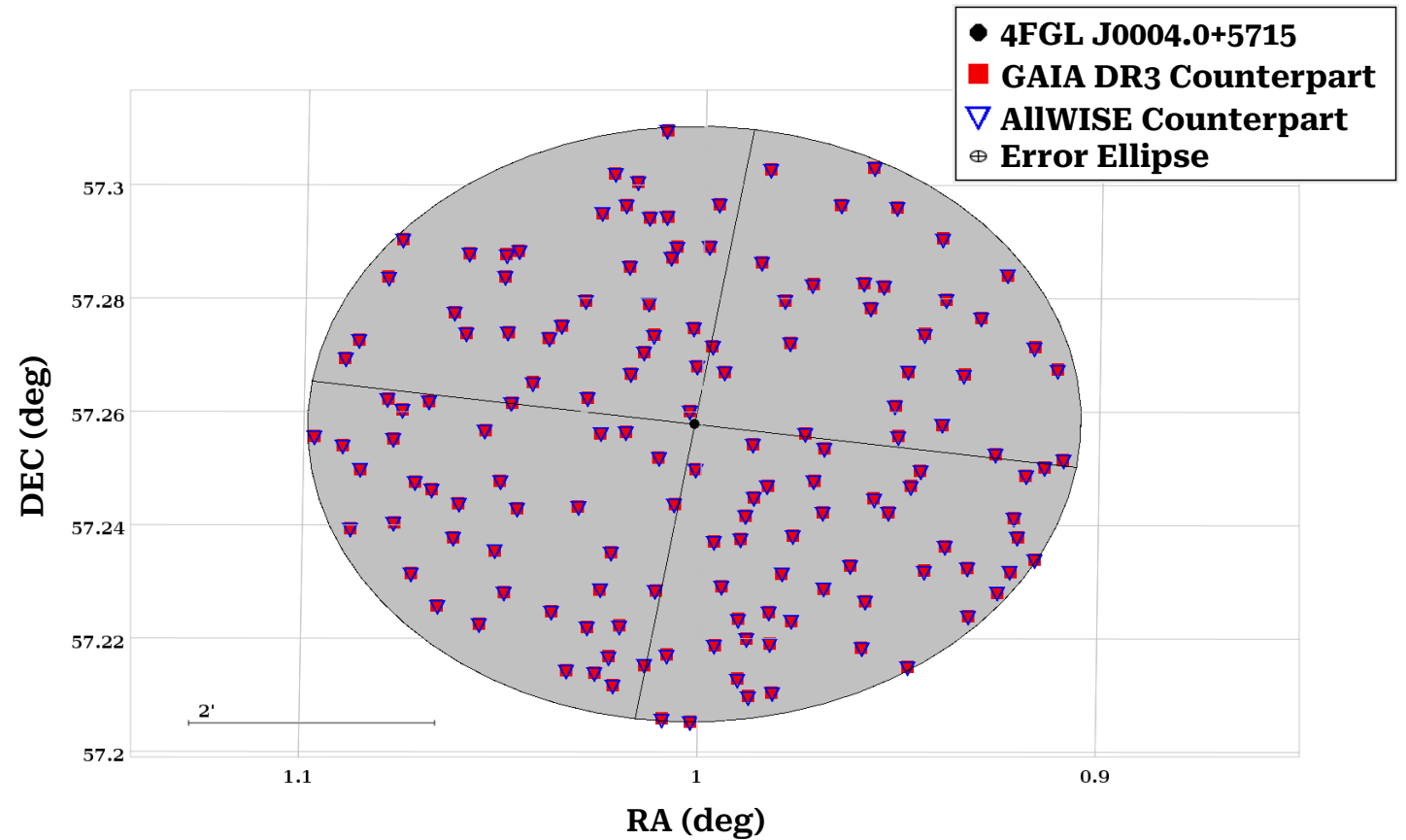


Counterpart selection of *Fermi*-LAT sources

Multi-Wavelength Catalogs

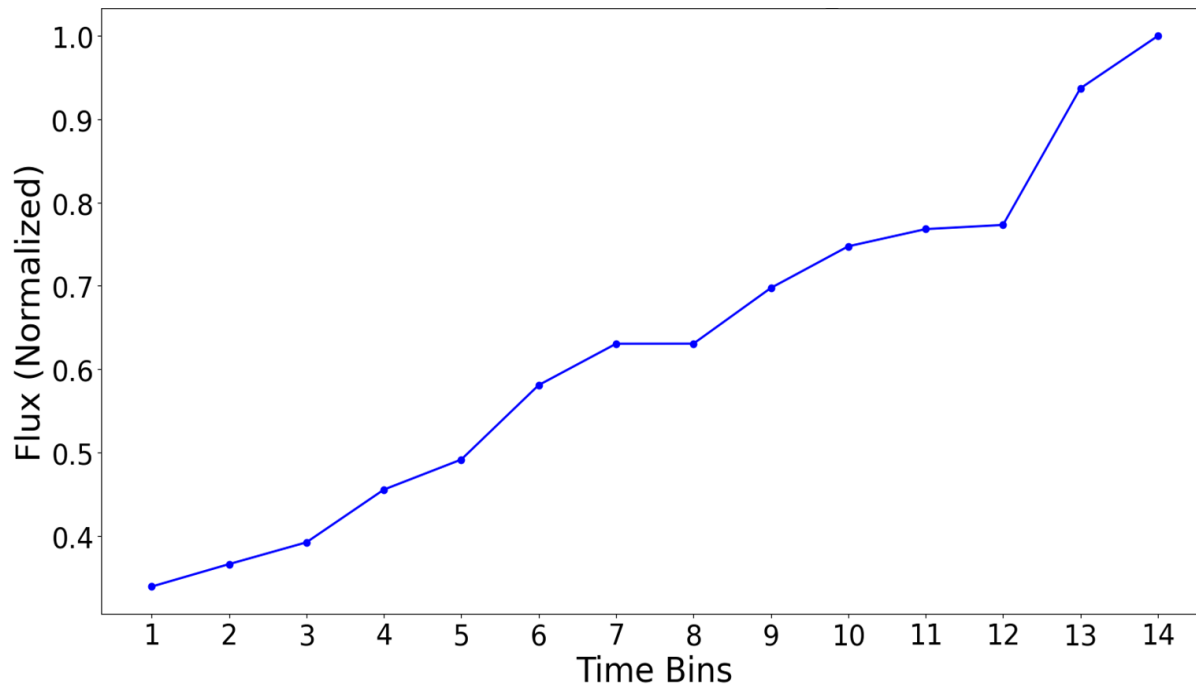


Unidentified Sources Counterpart selection



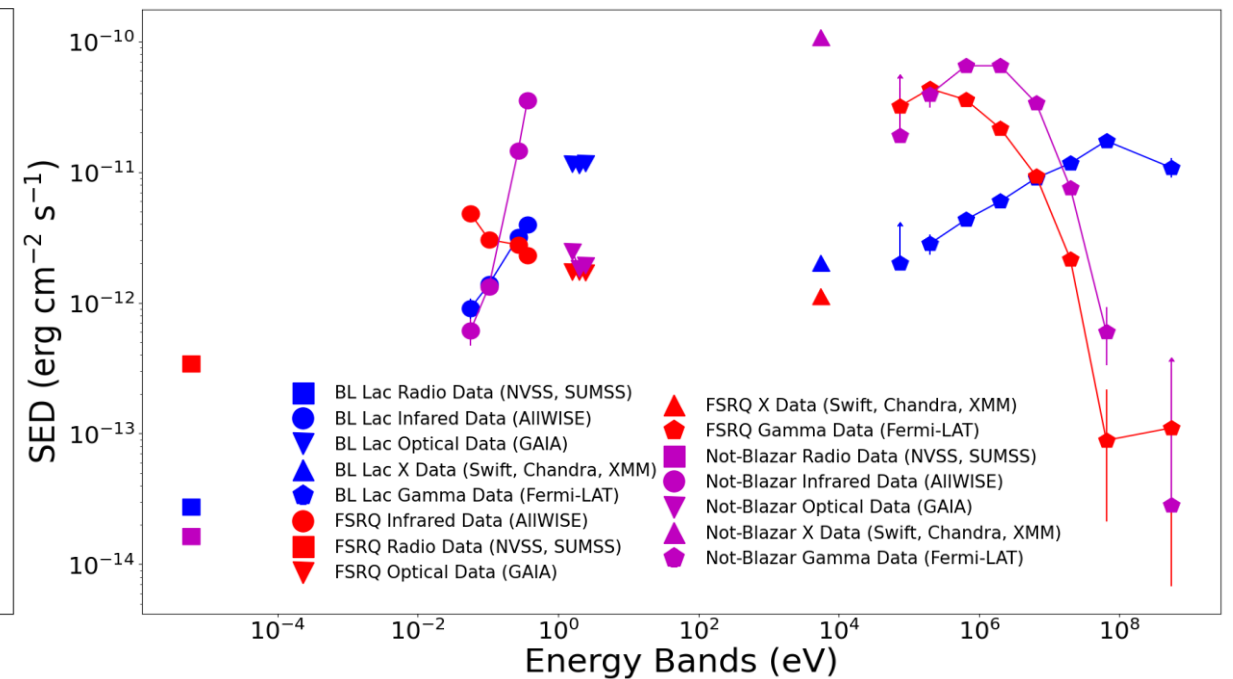
Neural Network Data Selection

Sorted and normalized Light Curve



Example of a γ -ray light curve with sorted flux values

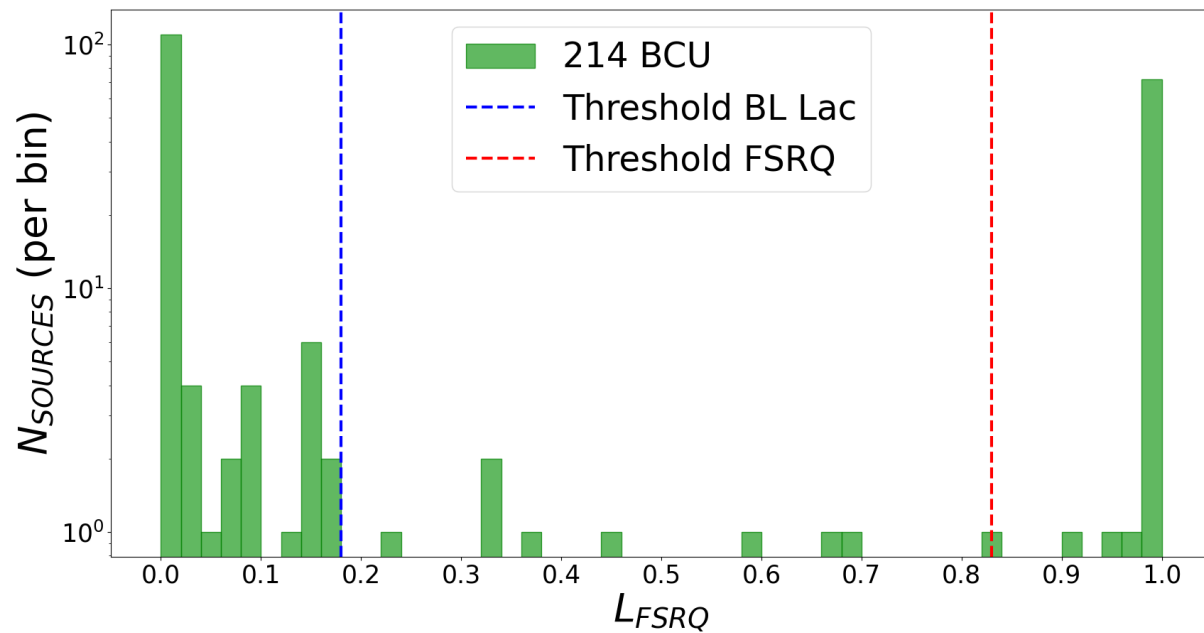
Spectral Energy Distribution



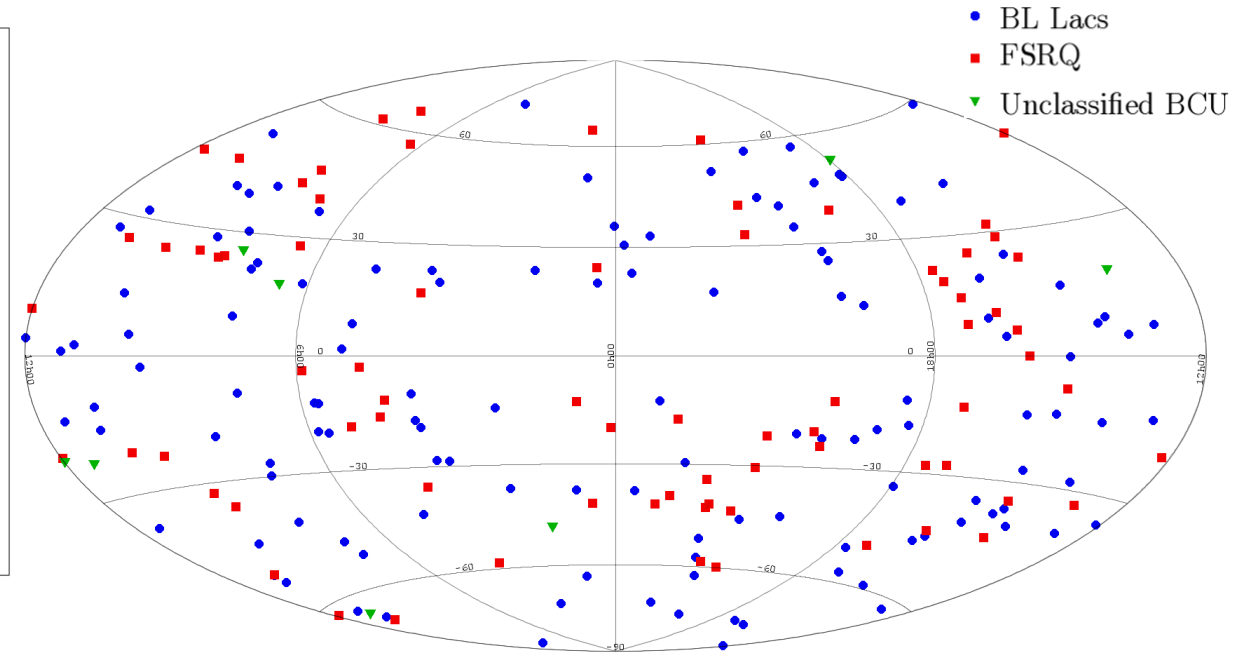
Example of SED for FSRQ, BL Lacs and Not-Blazar

Neural Network classification of BCUs

BCU classification



Classified BCU distribution



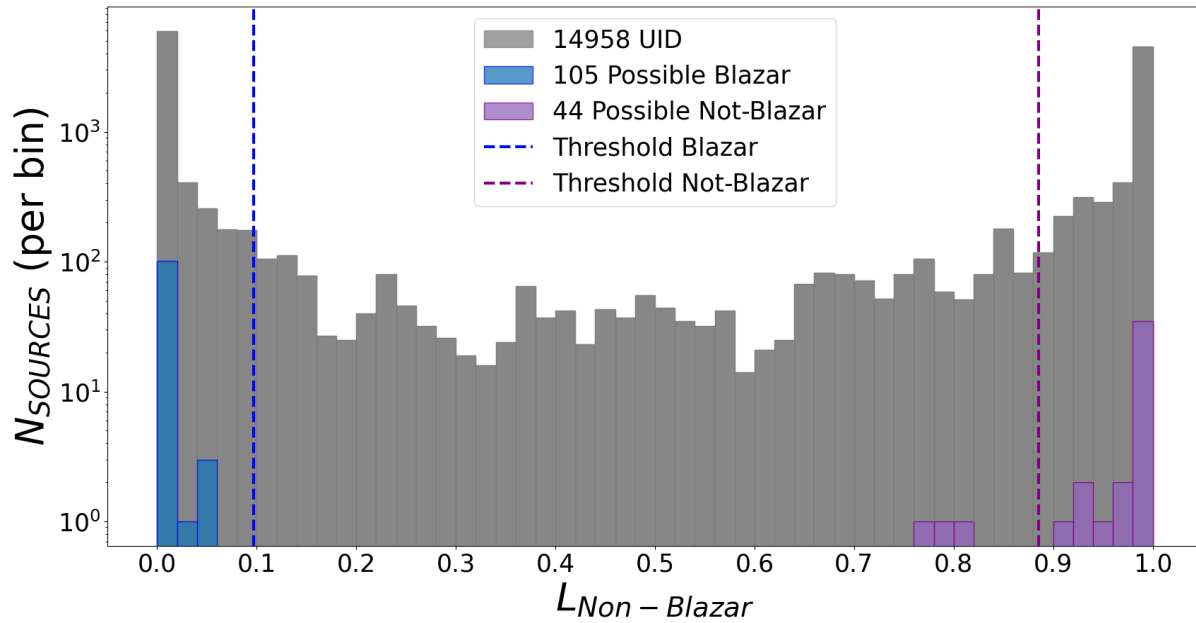
130 BCUs classified as BL Lacs

76 BCUs classified as FSRQs

8 remain unclassified

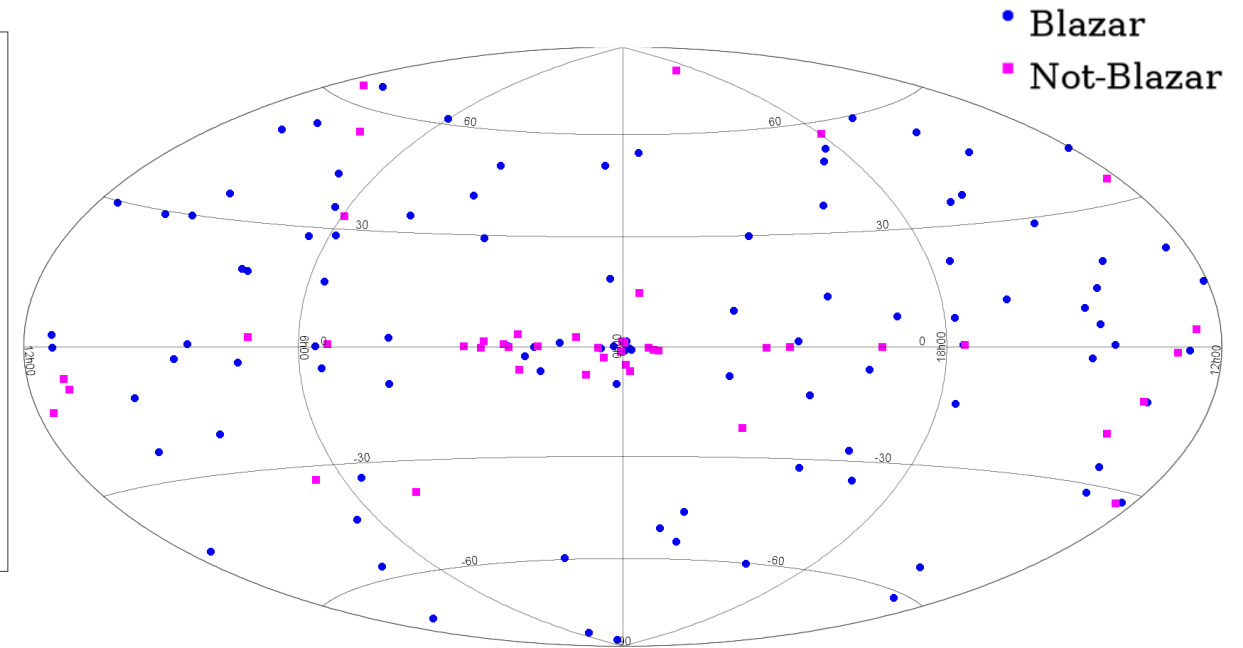
Neural Network classification of UIDs

UID counterparts classification



14958 UIDs' counterparts for 152 UIDs

Classified UID counterparts distribution



105 UIDs classified as Blazars
44 UIDs classified as Not-Blazars
3 remain unclassified

Conclusions and future improvements

Work in progress...