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Investigating machine learning approaches for differentiating MGFs and SGRBs

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Magnetar giant flares (MGFs) and short $\gamma-$ray bursts (SGRBs) are short $\gamma-$ray transients (SGRTs) with overlapping temporal and spectral characteristics, making them challenging to distinguish, especially when their redshift is unknown. In this study, we apply supervised machine learning to classify MGFs and SGRBs in an SGRT sample of unknown redshift. Temporal parameters (including pulse rise times from Norris function fits) and spectral features (derived from Comptonized model fits over the 10 keV–40 MeV range) are extracted as input features for classification. Classifier performance is assessed using cross-validation, with preliminary results suggesting that some separation between MGFs and SGRBs is possible. This work highlights the potential and challenges of incorporating machine learning into the automated classification of $\gamma-$ray transients.

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