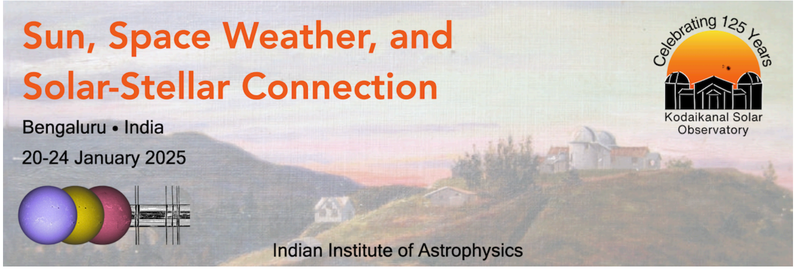

Contribution ID: **145** Type: **Poster**

Interpretable Deep Learning for Solar Flare predictions

In recent years, the development of machine learning (ML) models for solar flare prediction has primarily relied on magnetogram data. Traditionally, shallow and interpretable ML models have been used, employing various features derived from these magnetograms. These models often show comparable performance after optimization, likely due to the reliance on similar features from photospheric magnetograms. However, advances in using original magnetogram data or coronal imaging for flare prediction have been limited by the complexity of the data and the lack of suitable computational methods. Deep learning (DL) models present a new opportunity to utilize multi-wavelength data for predicting solar flares. In this study, we aim to understand the intensity measurements on the Sun that lead to flare events. We develop a DL model trained to classify data cubes from the AIA Active Region into flaring and non-flaring classes. We interpret the model's decisions by applying Grad-CAM, Shapley values, and Integrated Gradients to identify the most critical features for this classification. By opening the "black box" of DL models, we gain insights into the physical processes that trigger solar flares, enhancing our understanding and prediction capabilities. We also compare the results of the model interpretation technique on two different models, a relatively simple CNN architecture and a state-of-the-art attention based model.

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Theme

Energetic Phenomena

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