AI for Predicting Solar Flare and study it's effects on earth's Temperature

*Abstract*—Solar flare one of the most discussing events in space science is intense bursts of electromagnetic radiations emitted from sun. This phenomena has significant impact on space weather and can influence various earths systems including atmospheric temperatures. Not only this solar radiations have severe impacts on satellite operations, communication system and power grids. This research paper aims to present novel approach for predicting solar flare using Recurrent Neural Network (RNN) architectures. In the paper we have proposed Long Short-Term Memory (LSTM) networks and Gated Recurrent Units (GRU) to forecast energy magnitude (keV). Our methodology includes hyper-parameter tuning and use of custom weighted loss function to enhance model accuracy and performance to 88.36%. The datasets used in the study is taken from SHARP summary parameters obtained form vector magnetograms captured by the HMI on the Solar Dynamics Observatory (SDO). This study consists of two modules, the first module is predicting solar flare energy magnitude and second module is to find study how these flare have impacts on temperature.

Keywords—**Solar flares, Recurrent Neural Network (RNN), Solar Dynamics Observatory (SDO), Energy magnitude, Earths atmospheric temperature**.