Resources

1. [Nvidia](https://resources.nvidia.com/en-us-energy-surfaces/advancing-solar-irra)
2. [Alibaba](https://www.aibase.com/news/16779)

Dataset

1. <https://i4ds.github.io/SDOBenchmark/>
2. <https://www.kaggle.com/c/bigdata2020-flare-prediction/data>
3. archive.ics.uci.edu

GitHub Repos

1. [GitHub - ccsc-tools/FlareML: DeepSun open-source software](https://github.com/ccsc-tools/FlareML) (Flare classification - Predicting with other ML models) [2011-2016 data]
2. [Flare prediction with SMARP and SHARP](https://github.com/ZeyuSun/flare-prediction-smarp) (Draw Contour and Heatmaps)[SHARP Dataset]
3. <https://github.com/akash-r34/Solar-flare-prediction-using-machine-learning/tree/main> (LSTM & GRU, energy levels)[RHESSI]
4. [GitHub - doguilmak/Predicting-Solar-Flares: Multi-output and XGBoost models have been created which can estimate numbers of the solar flares production in specific region on sun in the following 24 hours.](https://github.com/doguilmak/Predicting-Solar-Flares) ✅[archive.ics.uci.edu dataset]
5. [Byte7/Solar-Flares-Prediction-RHESSI-Mission](https://github.com/Byte7/Solar-Flares-Prediction-RHESSI-Mission) ✅ ✅ ✅[RHESSI]

Outline

1. Data
   1. RHESSI Dataset
   2. NOAA dataset
2. Data Preparation
3. Test and Train data split
4. Exploratory data analysis

(5)

* 1. Relation between Flare duration, Peak count rate and Total count with respect to Energy
  2. Density plot to visualize the distribution of the Flare wrt. Energy
  3. Countplot to Visualize distribution of flares in the different energy ranges
  4. Distribution of flares over time duration (in seconds) wrt. Energies
  5. Sunspots - Mapping Flares on the Sun
  6. Flare position in the Sun arcsec from the center
  7. Yearly analysis of Flares
  8. Mapping solar flares intensity over the years

1. Flare class distribution
2. Captum - contour plot
3. Energy distribution +Correlation analysis
4. ML models
   1. LSTM+GRU
   2. XBoost + Multi output
   3. Linear
   4. Logistic
   5. Decision Tree
   6. Random Forest
   7. Gradient Boost
   8. KNN →uses RHESSI dataset(2002-2016)
5. Comparison with ML models

🟦→uses RHESSI dataset(2002-2016)

1. Statistical Modelling →Done
2. SARIMA → Done
3. XGBoost → Failed, ANN →
4. LSTM
5. N-Beats

<https://github.com/EliaTorre/SolarIrradiancePrediction-UZH/blob/main/Solar_Irradiance.ipynb>

25th Solar Cycle Prediction

1. N-beats - [paper](https://www.sciencedirect.com/science/article/pii/S009457652100415X), [github](https://github.com/stardust-r/deep-learning-space-weather-forecasting/blob/master/nbs/_plots_AA.ipynb)
2. LSTM - [paper](https://www.sciencedirect.com/science/article/pii/S0273117723000807)
   1. Sunspot Forecasting(R) - [github](https://github.com/gokcegok/Forecasting-SunSpots-with-LSTM/blob/main/forecasting-sunSpots-LSTM.R)
   2. SSN(Py) - [github](https://github.com/danielefranceschi/lstm-climatological-time-series/blob/master/LSTM-SSN.ipynb)
3. ANN - [github](https://www.kaggle.com/code/onurderya/time-series-forecasting-with-ann-lstm)