Vision, Optimization and Learning Group
Institute of Computer Graphics and Vision (ICG)
*Graz University of Technology*

Solar Flare Prediction

Master Thesis

Description

Solar flares are explosive events in the atmosphere of the sun. They can release huge amounts of energy in form of particles which have a direct impact on space weather and pose risks for us on Earth and our satellites. Multiple telescopes on earth and in space constantly observe the sun at different wavelengths, and measure magnetic fields etc. (see image). This is used to detect solar flare events that could pose a threat to satellites.

To get a longer advance warning time, the prediction of the start time and strength of the next upcoming solar flare event is of major interest. Development of a machine-learning based multi-frame, multi-spectral prediction system is the topic of this thesis. For training, the recorded multi-spectral data from the previous years and the recorded detection labels are available. For more technical details please get in contact.
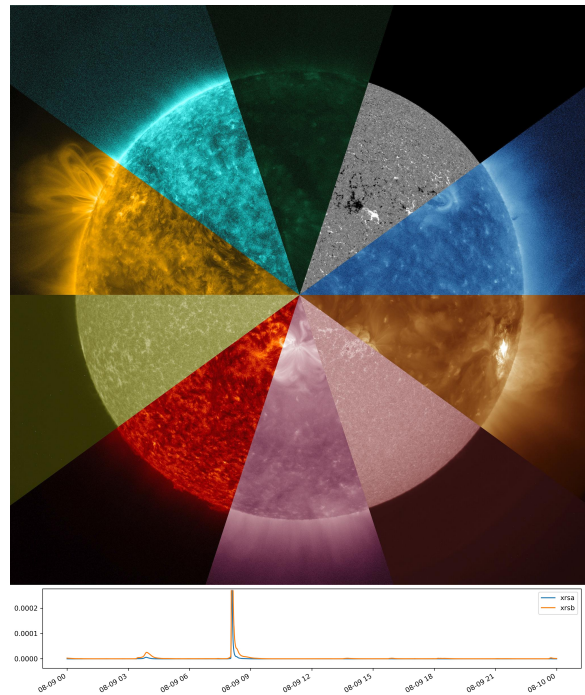
Objectives

- Program an automatic extraction of important data from the huge dataset
- Compensation of the suns own rotation for longer time series
- Development and training of a prediction model based on time-series (RNN, ConvTime, ...)
- Sensitivity analysis on the input data, to investigate important events that trigger solar flares

Qualifications

- Master student of Information and Computer Engineering, Computer Science, Software Engineering and Management, Physics,...
- Knowledge of computer vision and optimization
- Good programming knowledge e.g. C++, Python, or Matlab, ...
- preferable some experience with Python and deep-learning frameworks

Contacts

This is a joint project with Uni Graz. For more details please get in contact with Markus Hofinger (ICG, TU) or Robert Jarolim (Institute of Physics, Uni Graz)

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