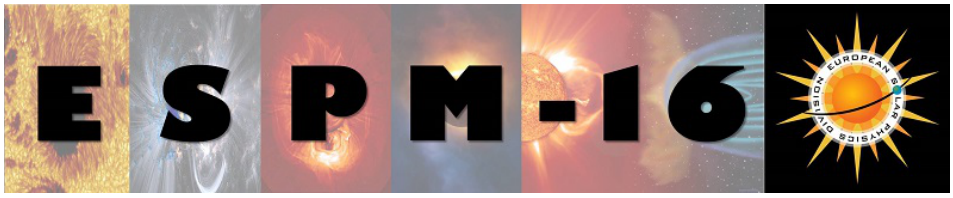

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Artificial Intelligence for Ground-Based Solar Network Telescopes

Wednesday, 8 September 2021 14:52 (13 minutes)

Within the last years artificial intelligence (AI) excelled in many disciplines, providing major advances in image processing techniques with the use of deep learning. As part of the EU H2020 SOLARNET project we develop methods for the anticipated Solar Physics Integrated Network Group (SPRING), a global network of ground-based solar telescopes. In this presentation we discuss the application of deep learning to solar data, covering our recent developments and ongoing activities. We highlight three components of our data processing pipeline where AI can provide major advances. (1) We discuss the image pre-selection, where we developed a novel deep learning method for image quality assessment that is based on the true image distribution of high-quality observations and that provides an objective estimate that is in good agreement with the human perception. (2) For the post-processing of the observations we demonstrate the usability of image enhancement procedures and show that our deep learning approach can even mitigate strong atmospheric degradations (e.g., clouds), while solar features are preserved. (3) We discuss automated detection methods and focus on our newly developed solar flare and solar filament detection for Hα observations. We show that these deep learning methods can provide reliable detections in real-time and higher-level data products (catalogues) for further scientific use.

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