RECOGNITION OF SOLAR FLARES IN MICROWAVE OBSERVATIONS USING MACHINE LEARNING

Julia Shamsutdinova, Larisa Kashapova

Institute of Solar-Terrestrial Physics SB RAS, Irkutsk, Russia,
yulia@iszf.irk.ru

We present the first results of testing methods of machine learning for the recognition of solar flares observed with Siberian Radioheliograph (SRH) within the frequency range of 3–24 GHz. The input data are two-dimensional solar radio spectra (dynamic spectrum) and one-dimensional temporal profiles at a frequency of 9.4 GHz. The output results mark the shape of each spectrum or temporal profile as "classical" and "complex". The Support Vector Machine (SVM) was used for the classification of temporal profiles. The model was initially trained and tested at the Nobeyama Spectropolarimeter (NoRP) temporal profiles at a similar frequency of 9.4 GHz. The Convolutional Neural Network (CNN) was used for classification of solar dynamic spectra. We discuss and compare the results obtained using various classification techniques, different types of input data, and preprocessing methods to achieve an optimal result.