of the models have accuracies more than 0.7. Second, ResNet developed by Microsoft has the best accuracies : 0.77 for flare classification and 0.83 for flare occurrence. Third, the accuracies of these models vary greatly with changing parameters. We discuss several possibilities to improve the models.

[구 SS-05] A comparison of deep-learning models to the forecast of the daily solar flare occurrence using various solar images

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As the application of deep-learning methods has been succeeded in various fields, they have a high potential to be applied to space weather forecasting. Convolutional neural network, one of deep learning methods, is specialized in image recognition. In this study, we apply the AlexNet architecture, which is a winner of Imagenet Large Scale Virtual Recognition Challenge (ILSVRC) 2012, to the forecast of daily solar flare occurrence using the MatConvNet software of MATLAB. Our input images are SOHO/MDI, EIT 195Å, and 304Å from January 1996 to December 2010, and output ones are yes or no of flare occurrence. We consider other input images which consist of last two images and their difference image. We select training dataset from Jan 1996 to Dec 2000 and from Jan 2003 to Dec 2008. Testing dataset is chosen from Jan 2001 to Dec 2002 and from Jan 2009 to Dec 2010 in order to consider the solar cycle effect. In training dataset, we randomly select one fifth of training data for validation dataset to avoid the over-fitting problem. Our model successfully forecasts the flare occurrence with about 0.90 probability of detection (POD) for common flares (C-, M-, and X-class). While POD of major flares (M- and X-class) forecasting is 0.96, false alarm rate (FAR) also scores relatively high(0.60). We also present several statistical parameters such as critical success index (CSI) and true skill statistics (TSS). All statistical parameters do not strongly depend on the number of input data sets. Our model can immediately be applied to automatic forecasting service when image data are available.

[구 SS-06] FISS and SDO Observation of a Brightening Event Near a Pore

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We report a fine scale transient brightening event near a pore boundary with the Fast Imaging Solar Spectrograph (FISS) of the 1.6m Goode Solar Telescope (GST), the Atmospheric Imaging Assembly (AIA) aboard the Solar Dynamics Observatory (SDO), and Helioseismic and Magnetic Imager (HMI) aboard SDO. The event appears in all AIA extreme ultraviolet bands, also in the two FISS lines, Hα and Ca II 8542 Å, and lasted for a minute. The brightening occurred at a footpoint of a loop. The conjugate brightening occurred at the other foot point outside the FISS field of view. The brightening near the pore exhibit a redshift of 4.3 km s-1 in the Hα and about 2.3 km s-1 in Ca II line. Differential emission measure derived from 6 AIA EUV passbands and cloud model fitting of the two FISS lines indicate the temperature increase of between 10,000 and 20 MK at the main event. After the brightening, the upward mass motion appears in the AIA images. We discuss the physical implication of this brightening in the context of magnetic reconnection and coronal heating.

[구 SS-07] Analysis of Ellerman Bomb Spectra Observed by FISS

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We have studied the high-resolution Hα and Ca II 8542Å line profiles of Ellerman Bombs (EBs) obtained with the Fast Imaging Solar Spectrograph (FISS) installed on the 1.6m Goode Solar Telescope (GST) in Big Bear Solar Observatory (BBSO). The FISS spectra of EBs are compared with synthetic profiles computed using RH non-LTE radiative transfer code and a set of 1D atmospheric models with local transient heating, the latter of which is modeled by varying local temperature enhancement in magnitude and height. We could reproduce each of the observed Hα and Ca II line profiles separately with different atmospheric models, but not with a single atmospheric model. To fit the observed Hα lines we often need much higher temperature enhancements than those needed for fitting Ca II lines. Possible causes for this temperature mismatch are briefly discussed.

[구 SS-08] Statistical study on the kinematic distribustion of coronal mass ejections from