

ABSTRACT

Activities on the sun that disrupt the space environment are massive explosions (flares) and coronal mass ejection (CME). Both types of these disorders generally come from the sunspot group. Based on McIntosh, sunspots have 60 classes that can determine the source of the explosion (flare). Observation of sunspots is done manually which requires a classification system to facilitate the observation of sunspots quickly and accurately.

This research designed a sunspot classification system based on McIntosh using the Convolutional Neural Network (CNN). The input used is in the form of images obtained from the Solar Monitor website in .jpg format and entering the preprocessing stage by cropping, resizing, and changing the image to grayscale. The next step is to use the Convolutional Neural Network (CNN) method with the AlexNet architecture model.

The results of the system design in this Final Project uses Convolutional Neural Network (CNN). Image data used are sunspots with 5 classes, namely Dai, Dao, Ekc, Hax, and Hsx, totaling 750 images, each class has 150 images. The results obtained were 99.81% training accuracy, 91.82% validation data accuracy, 90.4% test data accuracy, 91,84% recall, 91,94% precision and an average computation time of 6.996 seconds / image. The parameter values used are the number of epochs = 60 and the value of learning rate = 0.001.

Keywords: *Sunspot, Convolutional Neural Network, AlexNet*