

Title: Automating the McIntosh Classification System using Machine Learning

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Abstract:

Currently, the strongest available tool for forecasting solar flares is the classification of sunspot groups using the McIntosh classification system, but the accuracy of the historical classifications is questionable due to the subjectivity of the experts who classify the regions and the predictive power is limited due to low resolution of data. This project uses machine learning to automatically and objectively classify the regions and provide a more complete dataset that can be used to forecast solar activity in the future. The machine algorithms that this research uses are K Nearest Neighbors Classification, Support Vector machines, Random forest Classification, and AdaBoost Classification. Although the accuracy scores in comparison to the previously made classifications are low, the true merits of this approach lie not in its ability to copy the classifications of past observers, but instead to improve our methods of space weather prediction.