

# **Support Vector Machine Combined with K-Nearest Neighbors for Solar Flare Forecast**

**L.Rong**, H.Han, C.Yanmei and W.Huaning

National Astronomical Observatories, Chinese Academy of Sciences (lirong@bao.ac.cn)

Support vector machine (SVM) combined with K-Nearest Neighbors (KNN), called SVM-KNN method, has been considered as an approved method for SVM. In our study, SVM-KNN method is employed to model solar flare and proton events forecast. For solar flare forecast model, sunspots and 10 cm radio flux data are chosen as predictors. For solar proton events, besides these predictors, the current proton occurrence status and position are included. Data used in both two models span from Solar Cycle 23. A detailed test is proceeded for the two applications, in which SVM-KNN, SVM and Neutral Network-based method are compared. The results demonstrate that the rate of correct predictions from SVM-KNN method is higher than that from other two methods for both solar flare forecast and proton events forecast. For proton events forecast, using SVM-KNN method decreases obviously the rate of too high which is regarded as a hard problem for its application.