The identification of K giant stars in LAMOST pilot survey

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Abstract. A support vector machine (SVM) method is applied to select K giant stars directly from the spectral features of LAMOST spectra. The performance of the algorithm is assessed using the MILES library. It shows that the completeness of the K giant stars is 87% with only about 6% dwarf contamination. This allows us to select 18,013 K giant stars at $|b| > 20°$ and 38,108 at $|b| < 20°$ from LAMOST pilot survey data.

Keywords. methods: data analysis, stars: fundamental parameters (classification), Galaxy: structure

1. Introduction

LAMOST survey will observe about 7.5 million stellar spectra over its 5-year survey (Deng *et al.* (2012)). Among the dataset, the K giant stars are good tracers for many studies of the Milky Way because they are luminous, allowing us to study a larger spatial volume.

2. Identification of K giant stars

We cross-identify the LAMOST pilot survey data with SDSS DR8 and obtain 2,534 matched stars with sspp stellar parameters, which are used to select the "true" K giant stars. The equivalent widths of Balmer, Mg triplet, CN, G4300, and TiO lines are measured from the LAMOST spectra and treated as the input variables. We then use them as the training data to build a support vector machine (SVM; Cortes & Vapnik 1995) classifier for K giant identification. The MILES library (containing 350 K giant stars) is tested to assess the performance. It shows that the completeness of the classification reaches to 87% (304) with only 6% (21 stars) dwarf contamination.

We apply the SVM model to LAMOST pilot survey data, which contains 334,450 stellar spectra with S/N> 10, and find 18,013 (10%) K giant stars at $|b| > 20°$ and 38,108 (24%) at $|b| < 20°$.

References

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