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Searching the Metal-poor Star with Deep Learning Method

Searching for the rare metal-poor stars requires fast and effective analysis methods on the vast spectral survey data. Here, we develop a deep learning network to search for metal-poor and carbon-enhanced metal-poor (CEMP) stars in low-resolution spectra. We train a deep convolutional neural network (CNN) on a synthesized stellar spectra grid with T_{eff} ranging from 5000K to 7500K, $\log g$ ranging from 0 dex to 5 dex, and $[\text{Fe}/\text{H}]$ ranging from -5 dex to 0.5 dex. The deep CNN also employs the spectral absorption-line indices and intrinsic colors for all the spectra to measure the three fundamental parameters and to identify the metal-poor stellar spectra. The tests on synthesized spectra at different noise levels show that the deep CNN have the efficiency of the metal-poor recognition and good accuracy of parameterization.

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