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The spatial continuity study of NDVI based on Kriging and BPNN algorithm

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ABSTRACT

Under the framework of the soil–wheat system, the sampling area was selected in the demonstration site of Lingxian country of Shandong province, Normalized Difference Vegetation Index (NDVI) of 195 sites were collected by GreenSeeker optical sensor based on the GPS localization data. The main objective of the paper developed the comparison study by Kriging and BPNN algorithm for NDVI continuity surface during wheat growth stage. The results showed that the strong variability existed in the spatial pattern of NDVI values, the structural factors' variability is 88.6%, indicated the physiological parameters of wheat growth stage mainly affected NDVI measure values on Kriging algorithm, for BPNN algorithm, its simulation results showed that the compact and continuity changes of NDVI values in case area. The spatial distribution trend of NDVI values, there is in accordance with the simulation results on the large scope for two algorithms, but BPNN algorithm has higher estimated value than Kriging algorithm, and the prediction value is higher in the west of the whole study area than the measured value corresponding algorithm structure and the approximation ability of BPNN algorithm. In a summary, whether algorithm structure characteristics, or the interpolation description, results confirmed that BPNN algorithm has the better accuracy and more advantage than Kriging algorithm in the study.

1. Introduction

During the development process, precision agriculture implementation plays an important role by better matching resource inputs to the spatial and temporal variability of environmental factors, in particular, temperature, humidity, light, water, and nutrient are critical factors affecting yield and quality of crop within the farm field. To assess and monitor crop growth status, predict crop yield, or develop a program for optimizing application of the nitrogen fertilizer, fungicide, and growth regulator in precision agriculture, remote sensing for theory and technical development has been widely used to obtain and map the temporal and spatial variability of soil-crop system in fields [1]. Recently, researchers have evaluated remote sensing techniques for estimating the nitrogen status of growing crops by determining the appropriate wavelength or combination of wavelengths to characterize crop N deficiency [2]. Vegetation indexes (VI) is a simple and effective measurement parameter, which used to indicate the earth surface vegetation covers and crops growth status in remote sensing field. VI provide a very simple yet elegant method for extracting the green plant quantity signal from complex canopy spectra. In addition, numerous researchers (Bechtel et al. [3], in recent times many researchers, for example, El-Shikha et al. [4]) have deeply and widely used Normalized Difference Vegetative Index (NDVI), derived from a very high resolution radiometer collected from satellite platforms, to assess the health and condition of crops and natural vegetation

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