

用多波长和LS-SVM补偿土壤温度的方法研究

作者: 梁秀英, 李小昱

单位: 华中农业大学工学院

基金项目: 黄土高原土壤侵蚀与旱地农业国家重点实验室基金

摘要:

针对近红外光谱易受样品温度的影响, 论文采用多尺度小波变换对光谱数据进行消噪, 运用最小二乘支持向量机 (LS-SVM) 在全谱范围内建立了近红外光谱预测模型, 研究土壤温度对土壤含水率预测结果的影响, 提出了应用多波长和LS-SVM回归法补偿土壤温度对土壤含水率预测精度的影响。试验结果表明, 土壤温度影响近红外光谱预测土壤含水率, 模型预测精度降低; 采用多尺度小波消噪并提取特征光谱, 运用特征光谱和LS-SVM法建立的土壤含水率预测模型较好地补偿了土壤温度对土壤含水率预测精度的影响, 为实现田间在线测量土壤含水率提供了理论依据。

关键词: 近红外光谱; 土壤含水率; 温度补偿; LS-SVM; 多尺度小波变换

The Research on Sample Temperature Compensation for Soil Moisture Content Based on Multi-wavelength and LS-SVM

Author's Name:

Institution:

Abstract:

Since the near-infrared (NIR) spectrum is susceptible to the sample temperature fluctuations, the paper uses multi-scale wavelet transform as the pretreatment method of the spectral data and uses the least squares support vector machine (LS-SVM) regression method to establish the NIR quantitative analysis model for studying the influence of the sample temperature on the predictive power of calibration model for soil moisture content (MC) in the whole NIR spectral region. The paper proposes the LS-SVM model based on four wavelengths in NIR region to compensate for the sample temperature effect on soil MC. The experiment showed that the fluctuation of soil temperature makes the prediction accuracy of the model which was established in the whole NIR region lower. Using the multi-scale wavelet transform to extract the temperature-sensitive spectra and removed them from the original spectra, the characteristic spectra corresponding to soil MC were acquired and the LS-SVM model with four wavelengths was established. The results demonstrated that multi-scale wavelet analysis and LS-SVM regression method can substantially reduce the influence of sample temperature on soil MC. This method provides a theoretical basis for the field-line measurement of soil MC.

Keywords: Near infrared spectroscopy (NIRS); Soil moisture content (MC); Sample temperature compensation; The least squares support vector machine (LS-SVM); Multi-scale wavelet analysis

投稿时间: 2011-02-11

[查看pdf文件](#)