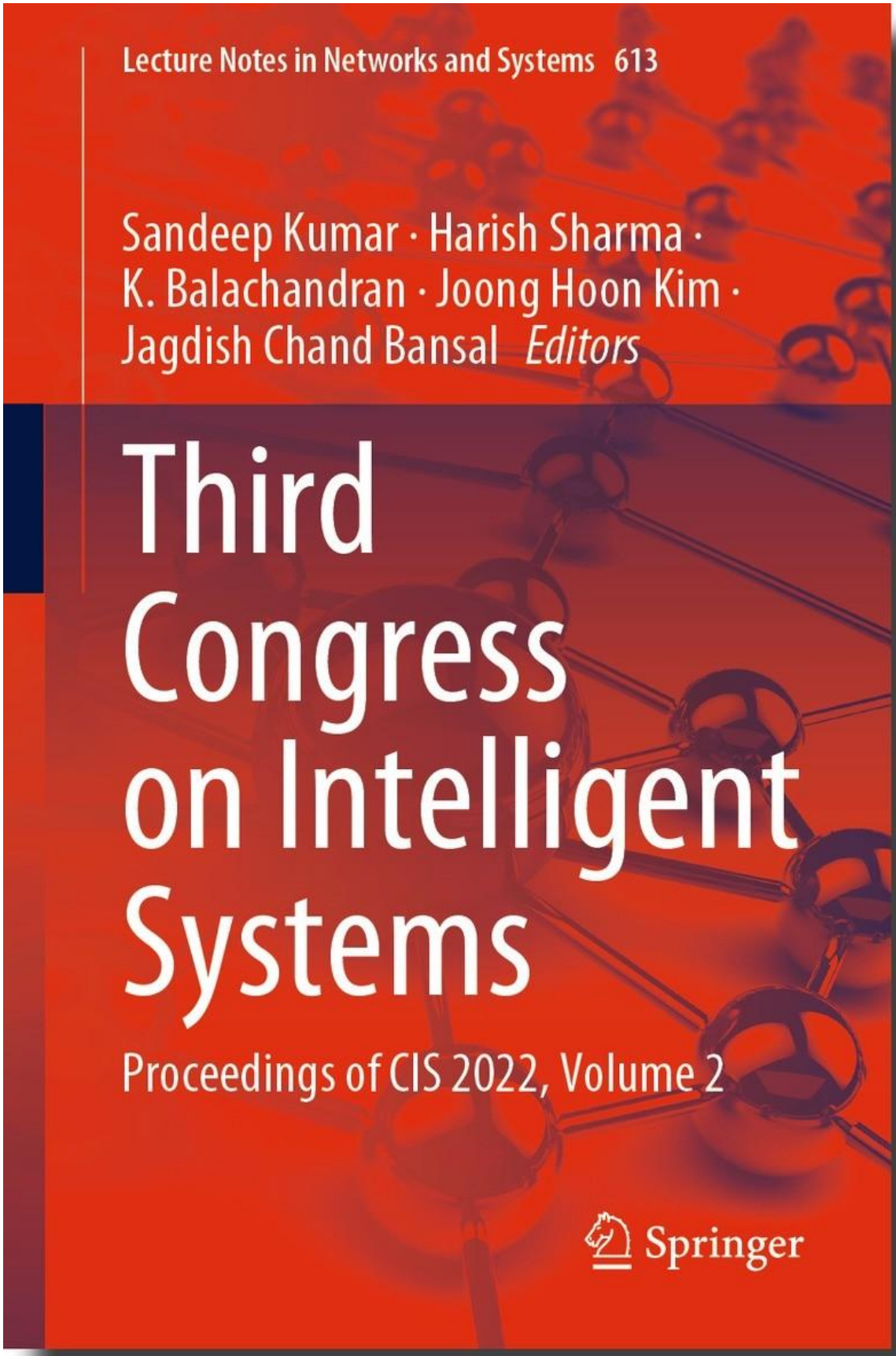
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Detection of Starch in Turmeric Using Machine Learning Methods

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Madhusudan G. Lanjewar, Rajesh K. Parate, Rupesh Wakodikar & Jivan S. Parab

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Abstract

Detecting adulterants in turmeric is necessary because turmeric is a vital food constituent that adds color and flavor. In this work, the pure turmeric powders were mixed with starch to produce distinct concentrations (0, 10, 20, and 30%) (w/w). The reflectance spectra of samples were taken by visible-NIR spectroscopy. Spectroscopy in the wavelength range 400–1700 nm was used to record reflectance spectra of pure turmeric and starch-contaminated samples. The recorded spectra were preprocessed using a Savitzky–Golay filter and a second derivative with poly order of 2. The preprocessed spectra are then standardized, which are used to train and validate ML models. Three ML models were employed for classification: logistic regression (LR), K-nearest neighbor (KNN), and support vector machines (SVM). The LR and KNN obtained 100% accuracy, precision, recall, and *F*1-score, while SVM obtained 90% accuracy, 92% precision, 94% recall, and 91% *F*1-score. The performance of these models was tested with the stratified five fold method. The KNN model obtained the highest average accuracy of 92%, which is excellent compared to the other models.