TBIS

Topic of the Speech:

Near-infrared Spectroscopy Identification Method of Cashmere and Wool Fibers

Professor Yaolin Zhu

Xi’an Polytechnic University
China

Professor Yaolin Zhu, born in 1977, male, Professor, Master's Supervisor, and Member of the China Textile Engineering Society, Shaanxi Provincial Automation Society, and Xi'an Youth Science and Technology Association. He obtained Doctoral Degree in Communication and Information Systems from Shanghai University, and completed postdoctoral research in Electronic Science and Technology at Xi'an University of Technology and Northwestern Polytechnical University. He previously conducted visiting research at the Information Virtual-Reality Laboratory of Reutlingen University in Germany in the field of textiles. In addition, he studied communication signal processing and intelligent information systems at Shanghai University.

He has received numerous awards including a Third Prize for Shaanxi Provincial Science and Technology Advancement, a Second Prize for Shaanxi Provincial Higher Education Science and Technology Advancement, a Third Prize for Xi'an Municipal Science and Technology Progress, a Second Prize and Third Prize for Academic Papers at the Shaanxi Textile Engineering Society conferences, 4 authorized invention patents, and 1 software copyright. He serves as a Director of the 2nd Shaanxi Provincial University Science and Technology Association Council, a Member of the China Communications Society, a Senior Member of the China Textile Engineering Society, and a Member of the Xi'an Youth Science Association. He is recognized as a Leading Talent in High-level Innovation and Entrepreneurship in Nanjing, Jiangsu Province, and serves as the Deputy Director of Science and Technology for Jiangsu's "Double Creation Plan".

ABSTRACT SUBMISSION
-FOR INVITED SPEAKER ONLY

Near-infrared Spectroscopy Identification Method of Cashmere and Wool Fibers

Yaolin Zhu*, Yong Zhang, Long Chen
School of Electronics and Information, Xi'an Polytechnic University, Xi'an, 710600, China
*Presenter's email: fz_zyl@126.com

ABSTRACT (NO MORE THAN 500 WORDS:)

The detection of cashmere and wool fibers using near-infrared spectroscopy has the advantages of fast detection speed without sample pretreatment. However, the positions of the absorption peaks and absorption bands are close due to the similarity of the chemical compositions of cashmere and wool fibers, which leads to poor identification accuracy and unrepresentative. To address these issues, this paper proposes two identification methods for the near-infrared spectroscopy of cashmere and wool fibers: "Near-infrared Spectroscopy Identification Method of Cashmere and Wool Fibers Based on Wavelength Selection" and "Near-infrared Spectroscopy Identification Method of Cashmere and Wool Fibers Based on Feature Cross". For the first method, it reorganizes the wavelengths by using the information gain ratio, groups the sorted wavelengths according to the principle of equal density. We seek the wavelengths with a high contribution rate by using the grouping genetic algorithm to find the best grouping combination. The whole evolutionary process is controlled by the C4.5 algorithm. It uses Partial Least Squares Discriminant Analysis (PLS-DA) to automatically distinguish cashmere and wool fibers with an accuracy of 97.85%. It was confirmed that the use of the wavelength selection algorithm to filter the NIR spectroscopy effectively enhances the recognition accuracy of cashmere and wool. In the second method, it performs derivatives and different scales of DWT to the raw spectral data to effectively eliminate noise interference and highlight the spectral peak features. Then it extracts the feature wavelengths by using Boruta's algorithm, and adopts the extracted features for feature cross to further enrich the extracted spectral feature information. The classifier KNN has the recognition rate with an accuracy of 98.75%. It verifies that the selected features with feature cross could better characterize the spectral information of specific fibers and improve identification accuracy. In summary, the proposed near-infrared spectral identification of cashmere and wool fibers based on wavelength selection and feature cross provides new ideas for the feature research on fiber feature identification.