论文

基于PCA和PNN的高甘油三脂血清荧光光谱识别

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摘要:

基于主成分分析和概率神经网络,提出了一种有效识别高甘油三脂血清荧光光谱的新方法.研究测量了正常和高甘油三脂血清在290 nm和350 nm激发光下产生的荧光光谱,并分别以3种采样间隔(1 nm、2 nm和5 nm)提取荧光强度作为样品的初始特征;利用主成分分析法对初始特征进行分析,以累积可信度大于95%的主成分作为样品特征;构建了4层概率神经网络,并分析了平滑系数和采样间隔对识别效果的影响.实验结果表明,当采样间隔采用5 nm,平滑系数位于0.26~0.92区间时,正常和高甘油三脂血清样品的识别率可达到95%和100%.

关键词: 甘油三脂　荧光光谱　主成分分析　概率神经网络

Fluorescence Spectra Recognition of Hypertriglyceridemia Serum Using Principal Component Analysis and Probabilistic Neural Networks

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Abstract:

A novel method for recognizing fluorescence spectra of hypertriglyceridemia serum was presented based on principal component analysis and probabilistic neural networks. Firstly, two sorts of fluorescence spectra of normal and hypertriglyceridemia serum were measured at 290 nm and 350 nm excitation. And initial feature vectors were obtained from fluorescence intensities at intervals of 1 nm, 2 nm and 5 nm respectively. Secondly, principal component analysis was used to distill initial feature vectors and establish new sample's feature vectors according to the cumulate reliabilities (>95%). Finally, the probabilistic neural network was designed. Recognition rates with different smoothing parameter and sampling interval were studied. Results show that recognition rates of the normal and hypertriglyceridemia serum are 95% and 100% respectively, when the sampling internal is 5 nm and the smoothing parameter is in range of 0.26~0.92.

Keywords: Triglyceride　Fluorescence spectroscopy　Principal component analysis　Probabilistic neural networks

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