Abstract

This paper presents fusion based pattern recognition approach of feature scores for chemical class identification of volatile organic compounds (VOCs) by response analysis of model surface acoustic wave (SAW) sensor array. Diverse features are generated by analysis of sensor array response using three feature extraction methods: principal component analysis (PCA), independent component analysis (ICA) and kernel principal component analysis (KPCA). Thereafter feature vectors are fused with three straightforward fusion strategies including i) summation, ii) multiplication and iii) combination of feature vectors. Chemical class recognition efficiency of fused feature is experimentally verified by feeding them to the input of support vector machine (SVM) classifier. Experimental outcomes are based on analysis of 12 data sets generated with SAW sensor model simulation, containing different intensity of noise and outliers. It has been observed that in research of three fusion schemes; fusion by summation of feature vectors achieves persistently highest correct chemical class recognition rate (average 90%) of VOCs followed by combination and multiplication. Though in case of less noisy SAW sensor array response, fusion by combination of feature vectors results comparable class recognition efficiency to that of fusion by summation.
References

Feature Scores Fusion for Chemical Class Recognition of Volatile Organic Compounds by Response Analysis of Surface Acoustic Wave Sensor Array


Index Terms

Computer Science  
Applied Sciences
Keywords
Feature fusion  VOCs class recognition  SAW sensor  Electronic nose