An Electronic Nose system for aromatic rice classification

Abstract

Aromatic rice is a variety of rice with good cooking qualities such as nice aroma and flavour. It is pricier because it is only suitable to be cultivated in regions with specific climatic and soil conditions. Presently, the aromatic rice quality classification uses either Isotope Ratio Mass Spectrometry (IRMS), Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Near Infrared (NIR) or Deoxyribonucleic Acid (DNA). The rice aroma can also be classified using Gas Chromatography Mass Spectrometry (GC-MS), human panels or Electronic Nose (e-nose). The training for the human pan-els is lengthy, but the results are comparable to those using the said instrument analysis. However, the use of human panels has significant drawbacks such as fatigue, inconsistent and time consuming. This paper presents the development of a new cost-effective, portable, e-nose prototype with embedded data processing capabilities for aromatic rice classification. This system is intended to be used to assist the human panels. The e-nose utilises Hierarchical Cluster Analysis (HCA) and Principal Component Analysis (PCA) for data analysis. An Artificial Neural Network (ANN) was used to classify the unknown samples. The results show that the e-nose is able to successfully classify the aromatic rice with high accuracy.