Área: AMB

Development of a low cost electronic nose based on MOS gas sensors. Discrimination of some volatile organic compounds as a proof of concept

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Highlights

A low-cost e-nose was developed and tested with volatile organic compounds presenting excellent performance and low response time. It is intended for non-invasive detection of infectious diseases.

Abstract

Electronic nose is a device that mimics the mammalian olfactory system. The cost of the cheapest commercial equipment ranges from around US$9,000 to US$11,500 and may still be too high when considering its implementation in low-budget contexts where there is a lack of specialized personnel for handling and limited infrastructure for sample processing. The aim of this work is to assemble and test the performance of a low-cost e-nose based on components that can be easily found in the electronic market for less than US$ 250. In this equipment the analog responses of an array of 10 different MOS gas sensors, exposed to air saturated with vapors of five different volatile organic compounds (VOCs), were digitalized and processed by an Arduino Mega prototyping platform connected to a personal computer. Multivariate analyses and machine learning classifiers algorithms allowed excellent discrimination of the VOCs as shown in Figure 1.

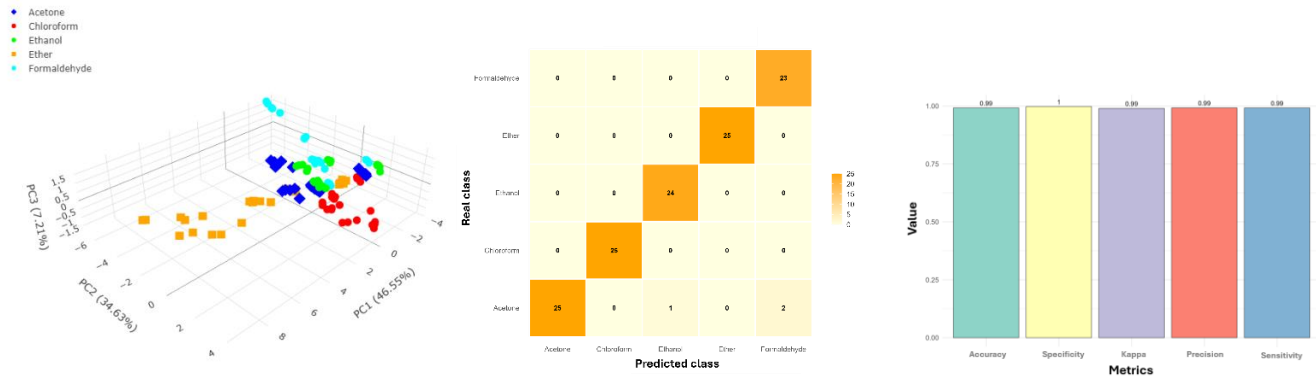

Figure 1: Principal component analysis (PCA) of five organic solvents; **Figure 2:** Confusion matrix for K-Nearest Neighbors classifier obtained for organic solvents; **Figure 3:** Metrics used for the performance analysis of the K-Nearest Neighbors classifier (Sensitivity, specificity, accuracy, kappa and precision).

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