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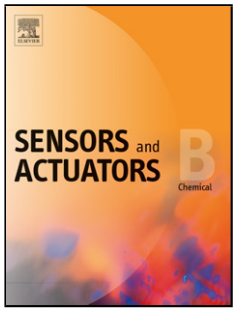

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A review of algorithms for SAW sensors e-nose based volatile compound identification

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Abstract

Recent advances in odour sensors have led to the development of new applications; among them, electronic noses have gained major interest and found successful applications in many fields. An electronic nose is a device composed of an array of odour sensors with sensitivity to a wide range of chemical compounds. Reliable electronic nose systems rely on advanced data processing techniques. Among them, machine learning has become a core technique for electronic nose design. In this document, we describe several machine learning algorithms and compare their performances on different features used in state of the art electronic nose systems.

Keywords: odour recognition, electronic nose, SAW sensors, data processing, machine learning.

1. Introduction

For many years, volatile compounds detection was achieved via classical olfactometry: the identification was based on a sensory panel composed of selected peoples or based on animal olfaction. However, physiological differences and different smelling capabilities can lead to inaccurate and non-reproducible results. To overcome these issues, alternative methods were developed: gas chromatography, mass spectrometry, optical spectroscopy and chemical sensors [1]. In this article, we focus on chemical sensors only. Basically, these sensors have the same functioning principle. It is based on the physico-chemical interaction between a volatile compound and a sensitive coating material covering a transducer. The molecules interact with the sensitive surface resulting in a change of its physical properties. These changes are converted to a measurable signal by the transducer. Many volatile compounds sensors technologies have

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