UNIVERSITY OF BAHRAIN

College of Information Technology

Electronic Nose Based on an Artificial Neural Network with Multimedia Applications

A Thesis Submitted in Partial Fulfilment of the Requirements for the Master’s Degree in Information Technology

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Abstract

This study proposes a prototype system for an electronic nose handheld odour meter (OMX-GR sensor) to recognise odours of three types of meat and whether it is good or bad. An artificial neural network (ANN) is the core of the system using software in C# with Visual Studio 2010 to analyse the data and recognise the odours. The ANN uses a backpropagation multi-layer algorithm with certain parameters for momentum and learning rates with supervised learning and the sigmoid activation function. The data input to the ANN software must be prepared in a special format.

The ANN is needed here in order to decide what is the best architecture selection to be applied, after many training structures the winner structure is Consequently ratio of 2:6:1 with a validation of the least mean of sum of square error at 0.03, 1.72729 training error, 0.77849 validation, and 0.03% testing. For such results the 2:6:1 structure considered as the best ANN architecture for the problem solution which had the less validation result.

In the future, mimic smell sense development will be applied and integrated into computer and smart devices. Accordingly, the smell sense is believed to a new element that to be added to major elements in multimedia.