REAL TIME MONITORING ODOR SENSING SYSTEM USING OMX-GR SENSOR AND NEURAL NETWORK

Goal of Project:

The aim of this survey is producing more unique mapping for odor sensing pattern. By this unique mapping identification of odor will be automated

As a result of that automated identification the application of neural neurons will give us more reliable answers also results.

The Problems to be Studied:

In this survey the pattern recognition of odor sensing in NN will be studied.

Up to this time by different methods odor sensing had been learn with different pattern recognition. In this survey odor sensing will be taught to OMX-SR sensors by back-propagation algorithm in multi-layer perception.

Moreover Fuzzy Clustering model and Multi-Layered model’s speed will be argued while OMX-SR sensors were being learned.

At the end of survey the truth rate, advantages and disadvantages of those two models will be compared.

Overview of Current Methods:

The artificial neural network is used in the recognition and classification of different odors and is constructed as a standard multilayer feed-forward network trained with the back-propagation algorithm.

Each odor presented to the sensor array produces a signature or pattern characteristic of the odor.

By presenting many different odors to the sensor array, a database of signatures is built up. This database of labeled odor signatures is used to train the pattern recognition system.

When a chemical sensor array is combined with an automated pattern identifier, it is often referred to as an electronic or artificial nose.
Electronic noses that incorporate ANNs have been demonstrated in the following applications:

- Quality control in the food industry
- Quality control of packaging material
- Medical diagnostics
- Environmental monitoring
- Perfume and aroma industry
- Control of beverages, e.g. wine and beer
- Tobacco industry
- Coffee industry
- Assessment of car interiors

In this study a practical example about electronic nose was presented to use perfume and aroma industry.

In this survey the parameters of the neurons are chosen through a minimization of the output error for a known training set. ANNs, like people, learn by example.

An ANN is configured for an application such identifying chemical vapors through a learning process.

Moreover Fuzzy Clustering Neural Network structures and Multi-Layered structures also will be compared.

In MLP model when we give the input pattern to the computation that has the output pattern. Output occurs by the effect of generalization and synthesis of connections strenghts and what it has learned and stored. Hence in MLP data must be managed due to its input pattern.

In FCNN model input layers are self-organizing layers. Before computation the data divides subnet MLP networks. As a result of method in BP algorithm feedback propagation gets faster and reliable.

Results shows that by Fuzzy Clustering Neural Network model the percentage of learning is bigger than Multi-Layered model.

The calculations of those models will be shown and the effects of learning will be denoted.

Moreover how is OMX-SR sensors is learned by those two models. How are chemical sensors behaves like biological sensors.
In matlab, the evaluation of Fuzzy Clustering Neural Network model and Multi-Layered model will be shown by calculations.

**Expected Results of Survey:**

Survey shows that real-time learning in odor system has two phases. These are training and testing phase.

The training phase aims to localize the sample that should bring reliable and faster results.

In presentation Fuzzy Clustering Neural Network Model is shown that it is more reliable and faster than Multi-Layered model.

In both model Back-Propagation algorithm is used. Although it has disadvantages because of covariance matrix it used.

To get the learned output as input BP algorithm collects the data in covariance matrix. This situation sometimes occurs the lost of data.

In the testing phase because of the self-organized layer in FCNN the learning rate is 0.95 in MLP model 0.01 respectively.

The most important behaviors of those models is with more samples the learning can be done. Generating more input with less error and lost time.

In this survey we will use 16 attributes 20 samples for each. At the beginning of the survey we have 16 desired output to able to evaluate the error.

The aim is to learn machine with least error and get the closest output to the desired output.
One perfume (odor) will have 20 samples its weight will be updated by learning rate and the output which has smallest error output will be accepted.

At the end of learning we will have 16 evaluated outputs.

References


3- KARLIK Bekir and YUKSEK Kemal Fuzzy Clustering Neural Networks for Real Time Odor Recognition System, Journal of Automated Methods and Management in Chemistry, Dec. 2007 Article ID 38405