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List of Symbols

α_{ik}	Eigenvectors
PC_K	Principal component
W_{ij}	Weights
b_{ij}	Biases
E_{total}	Total error
$f'_k(net_k)$	Slope of the activation function
D_d	Delay to be provided in the program while discharging
D_C	Delay to be provided in the program while charging
V_{IL}	Logic low of microcontroller
V_{IH}	Logic high of microcontroller
V_{DD}	Microcontroller supply voltage
V_{RL}, V_{in}	Analog voltage output of the sensor
$t_{d,max}$	Maximum discharging time
$t_{c,max}$	Maximum charging time
V_{CP}	Voltage across the capacitor
N_0	Counter value
F_0	Frequency of the crystal oscillator
V_C	Supply voltage to the sensor
V_H	Heater voltage of the sensor
R_S	Sensor resistance
R_L	Load resistance connected in series with sensor resistance
R_a	Stable sensor resistances when exposed to air
R_g	Stable sensor resistances when exposed to gas
ΔR_g	Difference between stable sensor resistances when exposed to air and gas
V_B	Stable baseline voltage of the sensors
V_P	Stable peak sensing voltage of the sensors
C_n	Gas concentration in ppm

V_{gc}	Volume of the sensor chamber
V_{vap}	Volume of gas vapor
D_{liq}	Density of liquid
V_{liq}	Volume of liquid
$IW\{1,1\}$	Weights at input layer
$LW\{2,1\}$	Weights at hidden layer
$LW\{3,2\}$	Weights at output layer
$b1$	Biases at input layer
$b2$	Biases at hidden layer
$b3$	Biases at output layer
d_{intra}	Euclidean intra-class distance
d_{inter}	Euclidean inter class
$d_{ratio}(i, j)$	Euclidean inter-intra class distance ratio
χ^2	Chi-square error
$U(X_i)$	Standard uncertainty
S	Standard deviation
a	Half-width between upper and lower limits of uncertainty
S_i	Sensitivity
α	Exponent of the power law

List of Abbreviations

MOS	Metal Oxide Semiconductor
VOC	Volatile Organic Compounds
E-Nose	Electronic Nose
CAT	Computer Assisted Technology
DI	Direct interface
DIC	direct interfacing circuit
DAQ	data acquisition
MATLAB	Matrix Laboratory
PCA	Principal Component Analysis
LDA	Linear Discriminant Analysis
SOFM	Self Organized Feature Map
FFBP	Feed Forward Back propagation
ANN	Artificial Neural Network
LabVIEW	Laboratory Virtual Engineering Workbench
USB	Universal Serial Bus
UART	Universal asynchronous receiver-transmitter
SAW	Surface Acoustic Wave
QCM	Quartz Crystal Microbalance
DAL	Data Acquisition and Logging
BMU	Best Matching Unit
ES	Expert Systems
SVM	Support Vector Machine
E-Tongue	Electronic Tongue
TF	Theaflavin
TR	Thearubin
RBF	Radial Basis Function
PNN	Probabilistic Neural Network
SVD	Singular Value Decomposition
ADC	Analog-to-digital converters
EUC	Estimation of Uncertainty Contribution
nADC	Non-linear Direct Interfacing based ADC

C-nADC	Error Compensated nADC
U-nADC	Uncompensated nADC
MFC	Mass Flow Controller
PCB	Printed Circuit Board
VI	Virtual Instrument
LM	Levenberg-Marquardt
HTAAS	Hand-held Tea Aroma Assessment System
MCU	Microcontroller Unit