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A Novel Retraining Method of Multiple Self-Organizing Maps for Gas Sensor Drift Compensation

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The drift effect of gas sensors severely affects the performance of an electronic nose, because the primarily built pattern recognition models degrade over time. A multiple self-organizing map (MSOM) network is an adaptive approach to compensate for gas sensor drift by self-retraining during the test phase. However, the conventional local retraining method of multiple self-organizing maps may lose drift information if the retraining is carried out with successive homogeneous samples for a long time. In this paper, we propose a novel global retraining method to keep each retraining vector (RV) fresh over time. Compared with the local retraining approach, the new method updates all the retraining vectors after one of them has been replaced. Experimental results demonstrate that the global retraining method retains the network recognition ability on drift effect, whereas the local retraining and adaptive resonance theory methods show high error rates. Finally, a discussion on the retraining rate is given to optimize the process speed of the MOSM network with the global retraining strategy.

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