Computational Intelligence Methods for Low-cost AQ Sensor Performance Improvement

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The computational calibration of low-cost AQ sensors consist of the development of different calibration models for the "correction" of a sensor signal under field conditions. We use low-cost sensor readings (and in some cases additional reference meteorological data) in order to develop Computational Intelligence-oriented models that improve the overall performance. For doing so, we require the side by side operation of a sensor node to reference instruments for a period sufficient to depict seasonal changes. We make use of reference measurements to develop, train and evaluate models that will be applied for improving the performance of low cost AQ sensor nodes under real world operational conditions, by improving the uncertainly of the low-cost sensors. In this way, we can comply with the DQO of the European Air Quality Directive. The approach has already been tested in the frame of the EuNetAir Cost Action with successful results, confirming that the standard in-factory calibration performances can be strongly ameliorated by CI-based algorithms. Improved results can also be obtained for sensor nodes for which no in-factory calibration exists. The use of CI methods allows considering low-cost AQ microsensors as appropriate for the support of official AQ monitoring tasks.

References

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