Investigation of the influence of relative humidity and temperature on the IoT solution with low cost air quality monitoring sensors

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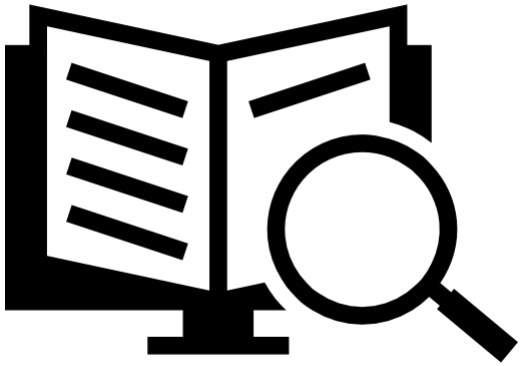
Paper layout



- Introduction
- System architecture
- Calibration methods
- Results and performance evaluation
- Conclusion

Introduction

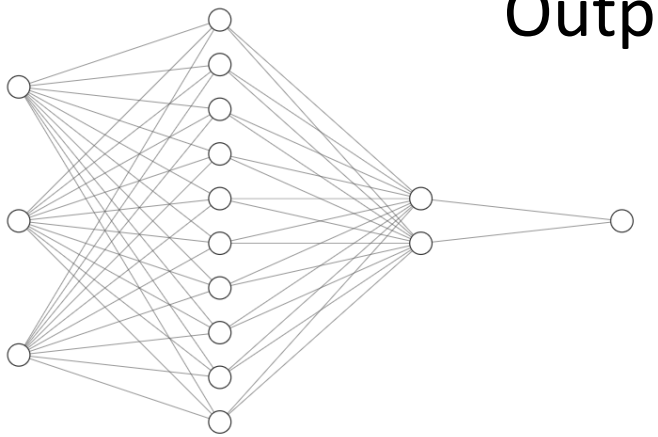
- IoT Solutions – ecology and green energy
- IoT solutions for air quality monitoring
- Low-cost off-the-shelf sensors
- Calibration due to the influence of relative humidity and temperature
- Least squares method and neural networks for calibration

System architecture and calibration methods

- Plantower PMS 7003 PM sensor
- Linear calibration – Least squares method
- Neural network calibration:

Inputs

- humidity
- temperature
- linearly calibrated data

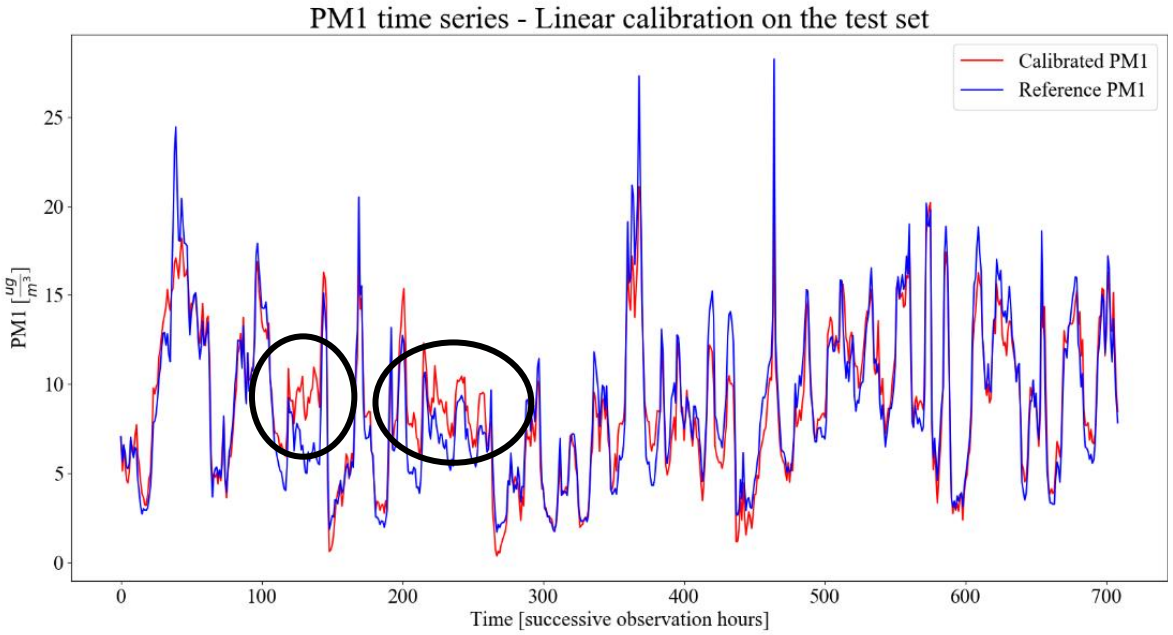


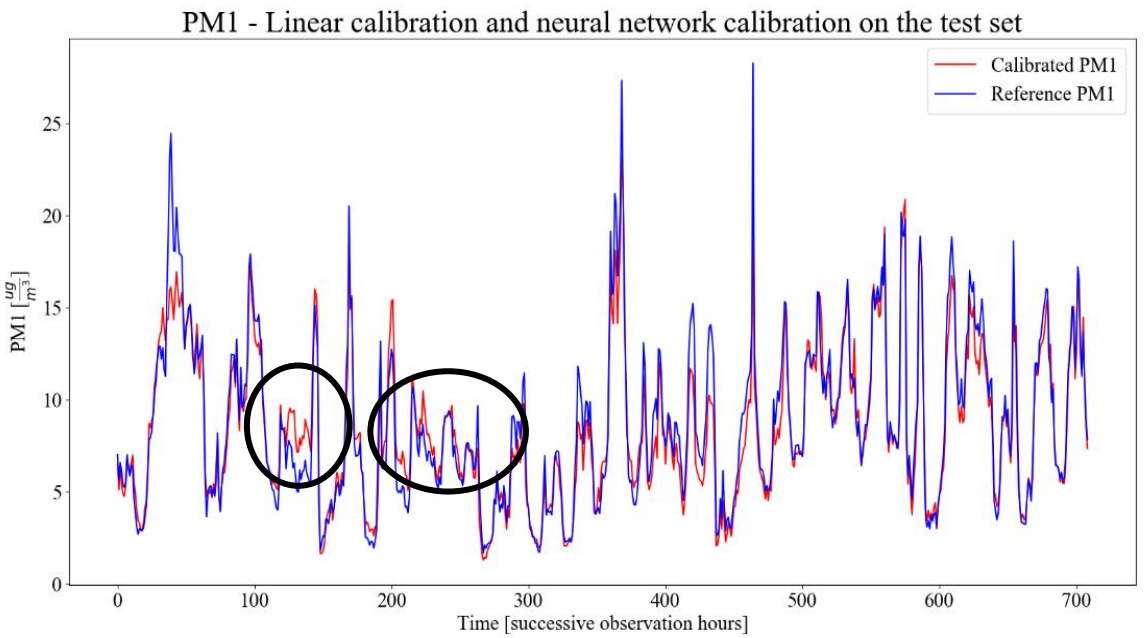
Output

fully calibrated data

Results and performance evaluation

Fitting calibration parameters on the train set and showing results on the test set



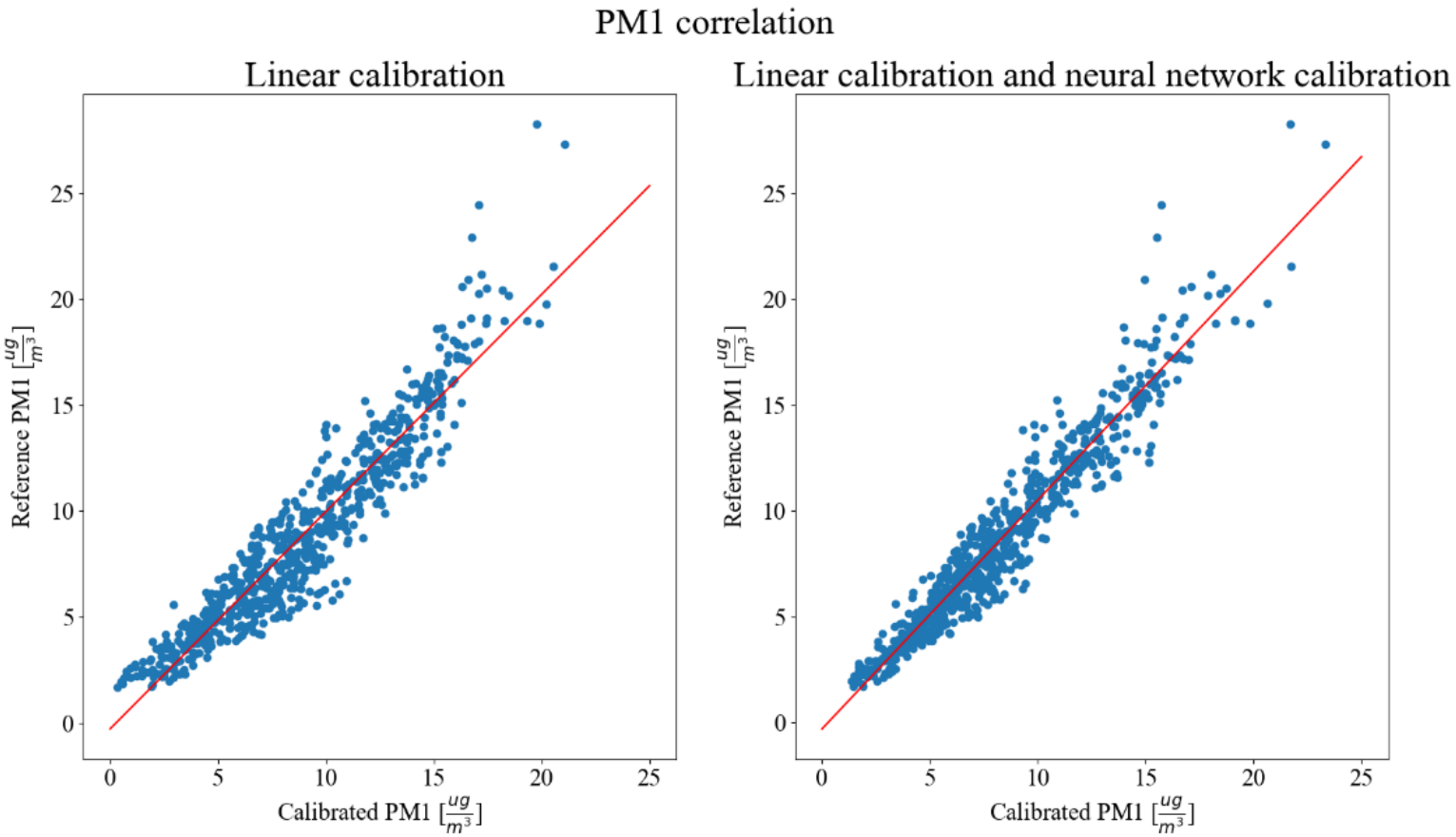


RMSE=1.15 $\frac{ug}{m^3}$

RMSE=0.87 $\frac{ug}{m^3}$

Results and performance evaluation

- Neural network calibration
- Increase of the linear correlation between the calibrated and reference data



Conclusion

- The used PM sensor has a high correlation with the reference measurement.
- The temperature and relative humidity have an influence on the measurements and the influence can be modelled by neural networks.
- Data was recorded during June and July and further studies will use measurements from autumn and winter.
- Calibration of the PM2.5, PM10 and other low-cost gas sensors, like CO and NO2.

Thank you for your attention!