

Bachelor Thesis:

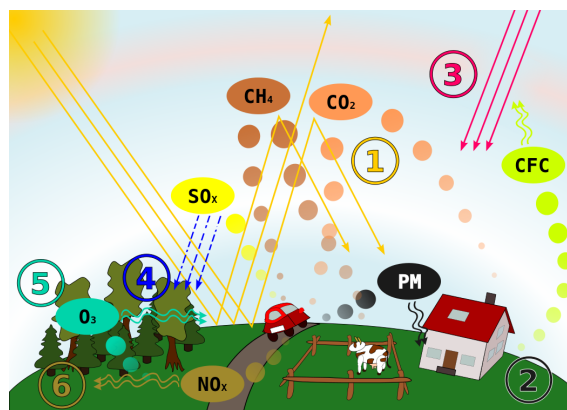
## Exploiting Correlations between Pollutants for Fine-Grained Air Quality Assessment

**Motivation:** Urban air pollution is a major concern in modern cities. Atmospheric pollutants considerably affect human health and are responsible for environmental problems, such as acid rain and the depletion of the ozone layer. As a consequence, monitoring air quality has received an increasing interest in the last few years.

Nowadays low-cost gas sensors are widely available on the market and several research groups started using them to measure the air quality. These gas sensors are inexpensive, small, and suitable for mobile measurements. Hence, researchers started to integrate them in mobile sensor nodes, for example, using public transport vehicles. The nodes mobility allows to obtain measurements with high spatial resolution covering large areas.

However, a major drawback of using low-cost sensors is their limitation in terms of accuracy, stability and sensitivity. Depending on the target pollutant, there can be significant differences in measurement quality. In fact, some pollutants (*e.g.* ozone  $O_3$ ) can be accurately measured even with low-cost sensors, while others (*e.g.* nitrogen dioxide  $NO_2$ ), require high-end sensing devices.

**Task:** In this thesis we want to investigate if we can estimate pollutant measurements based on measurements from different pollutants and possibly other environmental factors. This approach relies on the fact that pollutants and environmental factors, *e.g.* UV-radiation or ambient temperature, strongly (but possibly highly non-linear and with complex time dynamics) correlate with each other. We want to exploit these correlations by developing a machine learning tool that can estimate a trace of a pollutant concentration with the help of a city-wide correlation model and various environmental data traces. Finally, we will be able to assess the concentration of certain pollutions that can not be measured with state-of-the-art low-cost sensor technology.



**Requirements:** You should have basic mathematical knowledge and be interested in machine learning tools.

**Interested?** Please have a look at <http://www.tec.ethz.ch/research.html> and contact us for more details!

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