

Gaussian Processes for Optimal Sensor Position
Master Project
Background and Progress Report

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1 Project Description

1.1 Summary

Gaussian processes (GP) have been widely used since the 1970's in the fields of geostatistics and meteorology. Current applications are in diverse fields including sensor placement. In this project, we propose the employment of a GP model to calculate the optimal spatial positioning of sensors to study and collect air pollution data in big cities. We will then validate the results by means of a data assimilation software with the data at the proposed positions.

1.2 Data

London South Bank University (LSBU) air pollution data (velocity, tracer)

2 Literature Review

2.1 The MAGIC Project

2.2 Modelling Spatial Data with Gaussian Process

2.2.1 ...

2.2.2 Estimating the Covariance Function

2.3 Optimising the Sensors Locations

2.4 Data Assimilation

2.4.1 Definitions

2.4.2 DA in the MAGIC Project

3 Progress Report

3.1 Learning the GP

3.1.1 Data Points

In our case we have data available from the simulation and from the

3.1.2 Covariance Matrix

3.2 Optimisation of Sensors Locations

3.3 Validation

- Estimate the performance at the current Locations
- Propose new placements