Data-driven multi-objective optimisation of coal-fired boiler combustion Systems

Coal is important source of energy even it produces NOx pollutants. Manipulating input parameters during combustion to minimize NOx pollutant production, lowers the energy production efficiency, which creates a multiobjective optimization problem between energy production efficiency and NOx pollutants produced.

No analytical model exists for modeling coal burning process, which leads to the need of using data driven optimization methods for solving the problem. Previously point prediction methods like support vector prediction have been used. Problem with these methods is that they ignore uncertainty in model predictons. Also these methods ignore noise and measument errors which might occur.

This paper presents a method of addressing these issues by using gaussian process regression models to optimize the NOx pollutants and unburned coal content. Gaussian process is good fit for this task since there it can consider uncertainty in predictions and allows predicted confidence in operation to be assessed.