



# DERIVATIVE FREE OPTIMIZATION

## Assignment

Sioux Mathware has its own derivative-free optimizer for (non-linear) least squares problems. This works much better than a gradient-based solver when fitting parameters of expensive models/simulators for which derivatives are not easy/cheap to compute. In this assignment, we want to improve the performance and robustness of this solver adding an element of Gaussian process regression. Gaussian processes form the basis of a class of optimizers that is also popular for problems like hyper parameter tuning of machine learning models. These commonly don't exploit least-squares structure and leave a lot on the table therefore.

## Activities

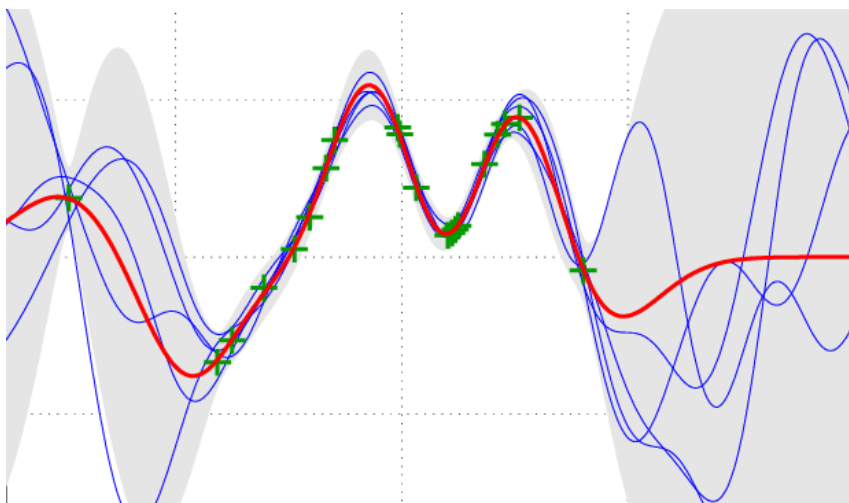
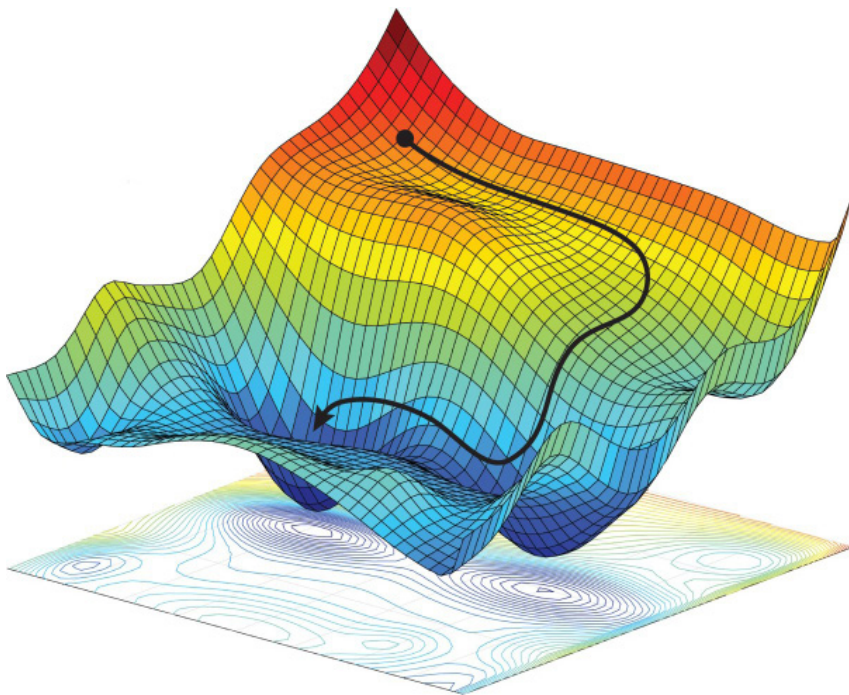
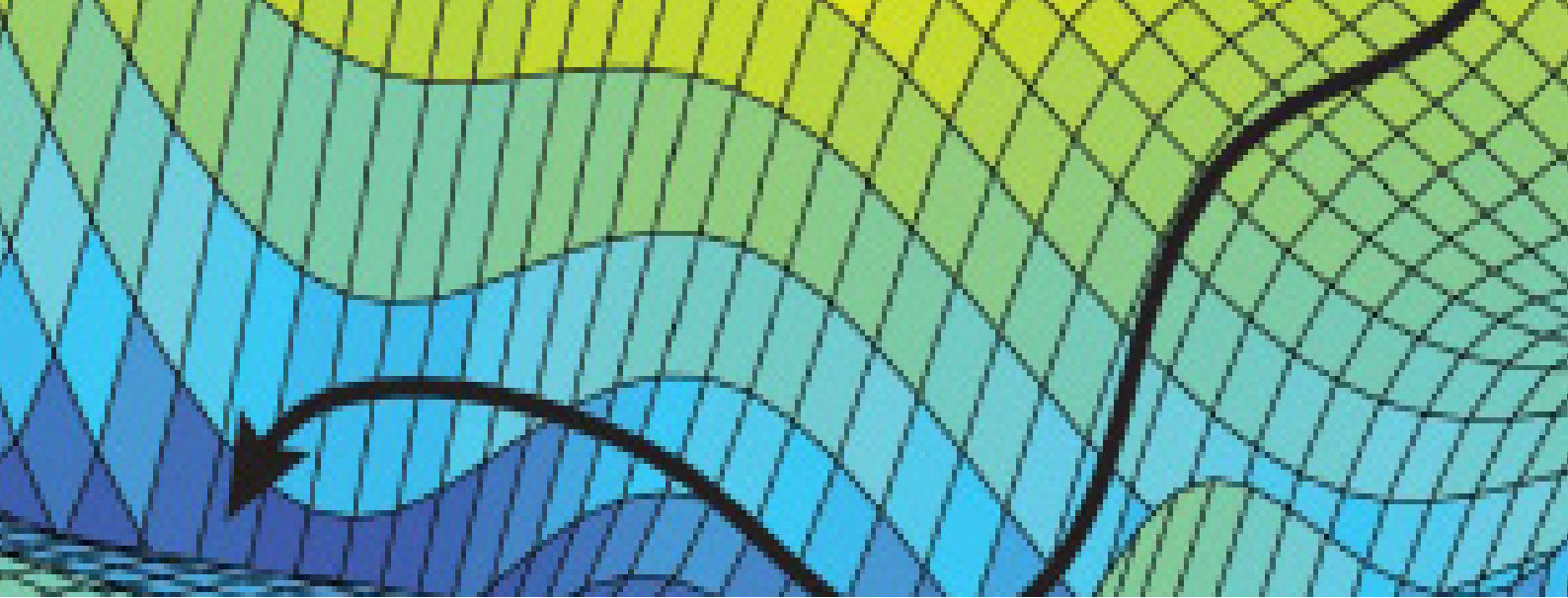
The student will extend the Python implementation of the existing solver with a notion of uncertainty through the use of Bayesian modeling. The resulting solver is to be compared with the old version and also a basic Gaussian process regression-based optimizer on a set of benchmarks coming from machine learning. Translation of the Python code to C++ is also a valuable activity.

## Internship overview

- Master Student
- Internship
- Mathware
- Location: Eindhoven

## Technologies

- Derivative free optimization
- Gaussian process regression
- Non-linear least squares



### Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great career opportunities
- Contributing to a safe, healthy and sustainable society

### Get in touch!

Would you like to know more about this student assignment?

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