Introduction to GPy

A Python Library for Gaussian Processes

What is GPy?

- GPy is an open-source Python library developed by the Sheffield Machine Learning Group.
- It provides a flexible and user-friendly interface for Gaussian Process (GP) modelling.
- Supports custom kernels, model composition, and hyperparameter optimisation.

Key Features

- Wide range of built-in covariance functions (RBF, Matern, Periodic, Linear, etc.)
- Support for kernel composition (sums, products) and Automatic Relevance Determination (ARD).
- Gaussian Process Regression (GPR) and Classification (GPC)
- Hyperparameter optimisation via marginal likelihood maximisation

How to use (from [2])

- A model (**GPy.models**) is created
- A kernel (**GPy.kern**), data and, usually, a representation of noise are assigned to the model.
- The kernel and noise are controlled by hyperparameters. Calling the optimise (**GPy.core.gp.GP.optimize**) method against the model invokes an iterative process which seeks optimal hyperparameter values.
- The model object can be used to make plots and predictions (**GPy.core.gp.GP.predict**).

References and Resources

- GPy Documentation:

  [1] https://sheffieldml.github.io/GPy/

  [2] https://gpy.readthedocs.io/en/deploy/#

- Source Code:

  [3] https://github.com/SheffieldML/GPy