Exercises 02: ML

Content

Please note that all results of each exercise should be included in one PDF file. The group name and the names of the members should be visible in the document.

Exercise 1: Plot Reference Functions

Use matplotlib to plot the following functions in 2D and 3D (range from -10 to 10):

1. Sphere
2. Griewank
3. Ackley
4. Rastrigin

Add the formal description of each function and the figures to the result document.

Exercise 2: Symbolic Regression (2D Case)

First, use “pip” to install “deap”. Second, open the “GP.py” file with Visual Studio code. Modify the source code to find a symbolic representation for each reference function from Exercise 1. Calculate the mean squared error between points from the reference function and the symbolic representation (“from sklearn.metrics import mean_squared_error”). Play with the parameters and find the best symbolic representation. Document the algorithm and the results (cf. Exercises 01: Exercise 3: Algorithm Description of A*).

Exercise 3: Regression with Polynomial Features (2D Case)

First, use “pip” to install “smt”. Create a program that uses regression to find a model for each reference function from Exercise 1. Calculate the mean squared error between points from the reference function and the model (“from sklearn.metrics import mean_squared_error”). Play with the parameters and find the best model. Document the algorithm and the results (cf. Exercises 01: Exercise 3: Algorithm Description of A*).

- from sklearn.linear_model import LinearRegression
- from sklearn.preprocessing import PolynomialFeatures
- from smt.sampling_methods import LHS

Bonus Exercise 4 (n-dimensional Case):

Use higher dimensional data and compare symbolic regression with regression with polynomial features.