Exercises 03: 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: K-Means

First, open "Blobs.py". Second, play with the parameters. Explain the algorithm and the value "inertia_". Change the parameter "n_clusters". Plot the "inertia_" value in relation to the parameter "n_clusters". Document the algorithm and the results (cf. Exercises 01: Exercise 3: Algorithm Description of A*).

Exercise 2: K-Means and Images

First, open "KM_img.py". Second, play with the parameters. Use the "flower.jpg" and "china.jpg". Change "load_img" so that you can use your own images. Load one own image.

Document the results (cf. Exercises 01: Exercise 3: Algorithm Description of A*).

Bonus Exercise 3: Regression with Polynomial Features (2D Case)
If the task has not yet been solved.

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.

Bonus Exercise 5 (Implement K-Means)

Implement K-Means on your own. Document the algorithm and the results (cf. Exercises 01: Exercise 3: Algorithm Description of A*).