

Webpage for the lecture: <https://mathopt.de/TEACHING/2020MML/>

Optimization Methods for Machine Learning

WS 2020 – 3. exercise sheet

Exercise 3.1 (Iris classification and visualisation of data and results)

Goals: Use *matplotlib* to visualize data and ML-results.

1. Get *matplotlib* for your Python version.
2. Get the exercise template *ex03_temp.py* from our webpage <https://mathopt.de/TEACHING/2020MML/> and go through the provided lines.
3. Complete the function `svm_model`:
 - Required arguments are `feats`, `labels` and `kernel`, with optional arguments for the parameter `gamma` and `random_state` set to their *sklearn* default values.
 - The function should split the data, set up and fit the *support vector machine*.
 - Return the list of splitted data and the fitted model.
4. Complete the function `svm_2d_contour_plot` to visualize the data and ML-results:
 - Use the output of our `svm_model` function and provide an optional argument `h` for the mesh-granularity.
 - Plot all the data using the `scatter` function from `matplotlib.pyplot`. Optional: Highlight all the data points that are in the test set.
 - Build a mesh using the `numpy.meshgrid` function. (Hints: Use `numpy.arange` for the coordinate axis.)
 - Predict labels for this mesh. (Hints: We need an array of all coordinates in our mesh. Have a look at `numpy.ravel` and different `concatenate` options.)
 - Plot the predictions with the `contourf` function. (Hints: Predictions need to be in the same format as the mesh data. Try `.reshape`.)
5. Use both functions to fit the *support vector machine* to both the *petal* and *sepal* data and plot your results.
6. Repeat your analysis. Discuss your findings.