

ELL-409 (Machine Intelligence and Learning)

Assignment 3 - Support Vector Regression

02 April 2020

General Instructions:

- This assignment is to be done on an individual basis.
- The weightage of the assignment to the course will be decided later.
- Use of Python/MATLAB for implementation is encouraged. Use of neural network libraries like keras is strictly not allowed. Please convert jupyter notebook file to python file before submission.
- While coding, take care of comments and proper indentation.
- Please feel free to discuss the assignment with your classmates but the code and report must be your own. Plagiarism will be heavily penalized.
- Name the program file as `<user_id>_<assign no>.py` / `<user_id>_<assign no>.m`. Name the report as `<user_id>_<assign no>.pdf`.
- Create a project folder namely '`<user_id>_<assign no>`'. This folder should contain the report and program file. Compress this folder and upload it to moodle for final submission.
- All the file names should be as indicated in the assignment, otherwise submissions will not be accepted because the submission will be evaluated **automatically using evaluation/plagiarism scripts**.
- The submission deadline is **April 6th, 23:59 (IST)**. Any late submissions will be penalised.

Description:

Perform Support Vector Regression (SVR) on the [given dataset](#) using a general-purpose convex optimization package (such as CVXOPT) as well as using a customized solver known as LIBSVM/sklearn. Present the analysis and comparison of results obtained using the two methods. You've to predict MEDV using the given 13 features.

Use of cross-validation is recommended.

Reading Material:

Primary reference to be followed:

[A geometric approach to support vector regression](#)

Convex Optimizer Python

<https://courses.csail.mit.edu/6.867/wiki/images/a/a7/Qp-cvxopt.pdf>

<https://docs.scipy.org/doc/scipy/reference/generated/scipy.optimize.linprog.html>

Report:

- Report should contain analysis including graphs depicting effects of varying the hyperparameters on the model performance.
- Try to observe overfitting and underfitting with change in the values of the hyper-parameters.
- Compare the results for different types of kernels.
- Compare the results from the two methods mentioned in the description.
- Considering the current circumstances, the demo may or may not happen, so try to make a comprehensive report.