Faculty of Mechanical Engineering and Robotics

Department of Robotics and Mechatronics

Python for Machine Learning and Data Science

Course for Mechatronic Engineering

Instruction 7:

Project datasets: Models configuration & results assessment

You will learn: how to configure and assess learners for specific purposes.

Additional materials:

- Course lectures 5 [*obligatory*] http://galaxy.agh.edu.pl/~zdw/Materials/Python/LectureNotes/
- Report template http://galaxy.agh.edu.pl/~zdw/Materials/Python/

Learning outcomes supported by this instruction:
IMA1A_U01, IMA1A_U05, IMA1A_U06, IMA1A_U07, IMA1A_K01, IMA1A_K08

Course supervisor:
Ziemowit Dworakowski, zdw@agh.edu.pl

Instruction author:
Adam Machynia, machynia@agh.edu.pl

Introduction

During this laboratory session, you should finalize the configuration of your models and perform their final assessment. Depending on the specific task, discuss with the teacher which steps will be crucial.

Tasks

Task 7.1: Implement cross-validation for your model. Use accuracy for the classifier and negated RMSE for the regressor. For regression, convert the negated output back to RMSE. Calculate the mean of the obtained scores.

Task 7.2: Compare the results of 3-fold, 5-fold, and 10-fold cross-validation.

Task 7.3: Utilize different metrics for cross-validation.
For classification, evaluate: recall, precision, and f1.
For regression, assess: R^2 and mean absolute error.

Task 7.4: Implement a grid search for your model. Choose an appropriate parameter space and scoring metric.. Use 5-fold cross-validation.

Task 7.5: Train your model with the tuned hyperparameters using the full training set. Evaluate its performance.

- For classification, assess: accuracy, recall, precision, and F1 score.
- For regression, assess: R^2 and mean absolute error.

Task 7.6: For your model, prepare some of the following (consult with the teacher):

- Calculate the true positive rate, true negative rate, false positive rate, and false negative rate.
- Plot the ROC curve.
- Plot the confusion matrix.
- Plot the prediction error.

Task 7.7: Present and describe the results in the form of a report.

Task 7.8: Add a comparison with another model.

Task 7.9: Discuss the impact of parameter setup or data processing choices on the model's performance.