VU Machine Learning

Summersemester 2020

Exercise 3.3

Automated Machine Learning

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This is one of possible topics for exercise 3. See other possible topics in the pdf file above. You have to select only one topic for exercise 3

Exercise 3.3

- Automated Machine Learning
  - Implementation of a local search based algorithm (simulated annealing can not be used) or a genetic algorithm for automated selection/configuration of machine learning algorithms
  - Comparison with other state of the art approaches
  - Group work (like in the first two assignments)
  - Deadline: 31.07.2020
  - Presentations: after the submission

Implementation of algorithm

- Implement a metaheuristic algorithm (see appendix) that searches for the best machine learning technique (and best hyperparameters) for a particular classification/regression data set. **Simulated annealing can NOT be used, as it was used in the last semester**

Implementation of algorithm

- Search space:
  - At least five available machine learning algorithms
  - Most important hyperparameters that should be tuned for each of these algorithms. You can specify for each hyperparameter a reasonable range of possible values
  - The aim is to find a solution (the best algorithm/hyperparameters) in the search space that optimizes an evaluation score (e.g., classification accuracy or RMSE)
- Please write me an email if you have an any question
- If you would like to discuss any issues regarding the implementation this is also possible in June/July

Comparison with other approaches

- Compare you approach with two state of the art AutoML systems (e.g. auto-sklearn, TPOT…)
- Use for comparison four classification or regression data sets (you can also use the data sets from the previous assignments)
- Time limit: at least 1h per data set

Submission

- Your implementation
- More than 15 slides with this structure
  - Main information for your implementation: representation of solution, neighborhoods, evaluation function, parameters used for implemented technique…
  - Selected state of the art AutoML systems for comparison
  - Discussion of results

Presentations/Discussion of assignment

- Discussion of code
- Implementation issues
- Discussion of results and your findings

Appendix: Metahauristic Techniques

Tabu Search

https://www.dbai.tuwien.ac.at/staff/musliu/ProblemSolvingAI/Class7TabuSearch.pdf

Iterated Local Search

http://www.econ.upf.edu/~ramalhin/PDFfiles/2001_MIC_FILS.pdf

Generic algorithms

Chapters 3 in http://www.cs.vu.nl/~gusz/ecbook/ecbook-course.html

Implementation of other algorithms is also possible

- Please write me an email if you are interested to implement some other algorithm: nysret.musliu@tuwien.ac.at