VU Machine Learning

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Exercise 2

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Exercise 2

- Groups of 3 students
- Implement techniques for classification or regression
- Compare to existing techniques
- Submit the source code
- Prepare around 15-30 slides
- Individual discussions (30 min) for each group (all members must be present)
- Submission: December 23
- Discussions: after January 7 (slots will be available in Tuwel)

Exercise 2 – Techniques

- Implement a framework for automatic configuration of neural networks (NN)
  - The search space for possible configurations should include NN with different activation functions, varying numbers of layers, and different numbers of nodes per layer
  - Implement two methods
    - A simple method based on grid search
    - A more advanced method, such as local search or other techniques, that iteratively improves a current configuration
- You should implement the methods from scratch (Please do not use any part of existing code)
- You can use the existing implementations of forward and backward propagation methods or implement them yourself. In either case, you should be able to explain these implementations during the discussion
- You can use existing code/functions for general parts like mathematical calculations (derivatives…), code for reading the input and testing the algorithms (cross- validation, performance metrics…)

Exercise 2 – Data Sets

- Pick 3 classification or regression data sets
  - Data sets from the previous assignments can be used
  - Or other data sets from UCI ML Repository, Kaggle…
- Should have different characteristics
  - number of samples – small vs. large
  - number of dimensions – low vs. high dimensional
- Pre-process the data set if needed (scaling, missing values …)

Comparison

- Compare your implemented techniques on selected datasets with
  - Existing NN implementation
    - You can use the default parameters for the existing technique
  - + Another classification technique
- Apply cross-validation
- Conclusions
  - How efficient are your methods
  - Performance of your methods
  - Other findings

Submission

A zip file with

- **Source code:**
  - You can use any programming language: Python, Matlab, R…
  - Provide the information for the packages needed to run you code
- **Slides**
  - Around 15- 30 slides
  - No report needed
- Submission deadline: December 23, 23:00

Slides

- A discussion of implementations
- Comparison with the existing implementations/other algorithms
- Discussion of experimental results
- Conclusions/lessons learned

Individual discussions

- Length of discussion: 30 minutes
- You will have questions about
  - Source code
  - Techniques
  - Comparison with the existing techniques
- All members of the group should be able to explain the code/experiments
- The evaluation will be based on your code, discussion, comparison, and conclusions/lessons learned