Methods of Knowledge Based Software Development ITI 8600

Machine Learning Home assignment

Home assignment may be defended on December the 22nd 14:00   or in January 2018 date and time TBA.

Hard deadline: Assignments should be defended before the chosen examination date.

For this home assignment one may choose one of the following exercises.

General requirements:

- No plagiarism in any form. Please cite all the sources you used.
- Prepare a short write-up describing progress of the research and achieved results. Maximum 2 pages 12pt.
- Submit your zip archive with your solution and write by means of Moodle environment ained.ttu.ee
- Implementations in Python only.
- During the defense, students are expected to demonstrate their solution and answer the questions about it.

For this home assignment one may choose one of the following exercises

Exercise 1. Handwritten digits recognition.

Implement your own or use existing tools for handwritten digit recognition. Train your classifier using any available dataset. For the validation and grading alternative digit dataset will be given in the form of csv format files. Hand written digits are represented by the points. The first column of the file describes coordinate x and the fourth column coordinate y. remaining columns describe position of the pen, pressure on the screen and the timestamp. These values are not needed. The data will be shared via ained.ttu.ee .

Output: the code is required to draw digits on the screen, mark position of each digit by a rectangle contour and place a label describing recognize digit. If digit is not recognized or wrongly recognized it is required to described values of the features which caused wrong result and graphically demonstrate position of this features in relation to the decision boundary (whenever features are numeric).

Example of existing tools: http://scikit-learn.org/stable/auto_examples/classification/plot_digits_classification.html

Example of existing datasets: http://archive.ics.uci.edu/ml/datasets/Pen-Based+Recognition+of+Handwritten+Digits

http://yann.lecun.com/exdb/mnist/index.html

Exercise 2. Human face elements extraction.

Implement your own method or use existing tools to find from human face portrait photo areas of the eyes, nose and mouth. For this purpose, you may use any existing imaging libraries.

Output: the code should display the photo, mark position of each area by surrounding it with rectangular. For any wrongly detected area or undetected it is required to analyze features leading wrong detection and whenever possible provide graphic illustration of the features in relation to the decision boundary.