Practical Assignment Proposal Presentation

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Major guidelines

- Students should form groups of 3-4 persons;

- The delivery deadline for the report, code, dataset and contributions is 14 December 2018.

- The delivery deadline for the material of the public presentation is 20 December 2018.

Deliverables

Each group is required to deliver:

- A four A4 page report in IEEE Transactions article format describing the methodology and obtained results, both qualitatively and quantitatively;

- The MATLAB code developed during the project;

- The material prepared for the public presentation of the group assignment;

- A brief description of the contribution of each element of the group to the assignment.

Practical assignment proposal

The main goals are the **detection and recognition of traffic signs** in realistic outdoor images.

- The practical assignment is composed of 3 tasks.

- Tasks 1) and 2) are mandatory, whereas task 3) is for valorization (3/20 points).

- The methods are to be developed using the approaches discussed during the classes.

Tasks

1) Development of an algorithm for **traffic sign detection**. The algorithm should detect and segment each of the traffic signs that are present in an image by creating a rectangular region of interest (ROI) around each detected sign. The algorithm should be automatic, i.e., work without any user interaction. Finally, the performance of the detection method is to be evaluated via **Recall** and **Precision**. A sign is detected if the **Jaccard Index** of the segmented ROI is higher than 0.5.

2) Development of an algorithm **to identify the class of the traffic sign** represented in a single-sign image. The dataset is formed by images from the following four classes: **mandatory**, **prohibitory**, **danger** and **other**. The performance of the classification method is to be evaluated via Recall and Precision (for each class).

3) Development of an algorithm that, given a single-sign image of a specific class traffic sign, **recognizes the traffic sign** shown in the image. Each group will deal only with images from a single class of traffic signs from the three available ones: mandatory, prohibitory and danger. The performance of the classification method is to be evaluated via Recall and Precision.

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Datasets

Each task has its own dataset with the corresponding Grand Truth (GT). The images in the datasets were taken from the two datasets available in the **INI Benchmark Website** (http://benchmark.ini.rub.de), the **"German Traffic Sign Detection Benchmark (GTSDB)"** and the **"German Traffic Sign Recognition Benchmark (GTSRB)"**.

Task 1 dataset: This dataset is formed by 40 images, 20 with just one sign, 10 with two signs and 10 with more than two signs.
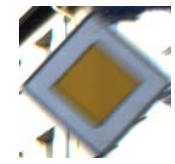
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Task 1 dataset – Additional information

- The images have 1360 x 800 pixels and are saved in .png format;

- Signs to be detected belong to four classes:

    'mandatory' ; 'prohibitory'; 'danger' and 'other'

- The Ground-Truth (GT) file is saved in .mat format;

- Each sign is represented by its Region of Interest (ROI), which is a rectangular region draw around the sign;

- The information available in the GT file for each sign is:

    . the name of the image file;
    . the initial row of the ROI
    . the final row of the ROI
    . the initial column of the ROI
    . the final column of the ROI

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Task 2 dataset: This dataset is formed by 160 images (40 mandatory, 40 prohibitory, 40 danger, 40 other).

- Each image contain only one traffic sign;

- Images contain a border of 10% around the actual traffic sign (at least 5 pixels) to allow for edge-based approaches;

- Images are stored in .png format;

- Image sizes vary between 15x15 to 250x250 pixels

- The actual traffic sign is not necessarily centered within the image;

- The GT is formed just by the name of the file and a string that identifies the class (e.g. 'danger')

other

mandatory   **prohibitory**   **danger**

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Task 3 datasets: The datasets contain images similar to those of Task 2 dataset.

Three datasets are available and each group needs to select only one. In each dataset, images of different specific signs are available. Each dataset contains several examples of **8 distinct signs**.

Mandatory sign classes

| M_1 | M_2 | M_3 | M_4 | M_5 | M_6 | M_7 | M_8 |

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Prohibitory sign classes

| P_1 | P_2 | P_3 | P_4 | P_5 | P_6 | P_7 | P_8 |

Danger sign classes

| D_1 | D_2 | D_3 | D_4 | D_5 | D_6 | D_7 | D_8 |