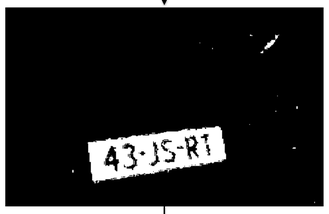
License Plate Detection

Giorgio Acquati & Edoardo Maria Lanzini
Computer Science and Engineering, TU Delft

Plate Localization

Starting frame

color filtering



Filter HSV values corresponding to yellow

apply morphological operations

After *closing*, the plate is a consistent blob that can be isolated using *blob detection* techniques

blob detection

In order to extract blobs, the *Connected-component labeling* (**CCL**) technique is used and blob are filtered based on area and aspect ratio

plate rotation

The plate is adjusted for in-plane rotation

Character Recognition

Input plate from the Localization

fix out-of-plane rotation

Fix the out-of-plane rotation. The plate is clear and ready for the Character Recognition

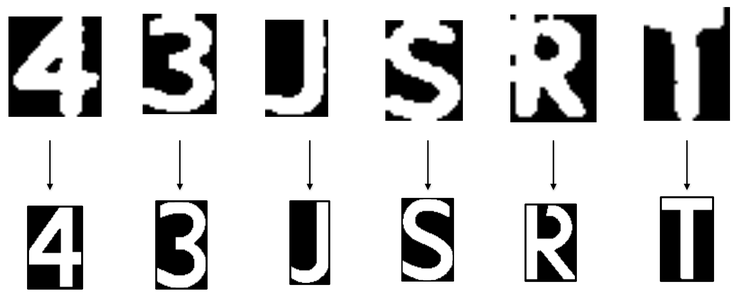
edge detection + closing

In order to separate the letters, the Canny Edge Detector is applied followed by closing

blob detection

At this point, blobs are detected using the *Connected-component labeling* (**CCL**) technique and the letters are filtered based on centroid position, width and height

The template matching is performed comparing the blobs with clean images of each character, finding the one with the lowest amount of mismatches. A noticeable *accuracy* improvement was achieved aligning the centroids of the images to compare and padding the difference



Shot Transition Detection

The two techniques we used to split up the video into basic scenes are *Histogram differences* (**HD**) and *Edge change ratio* (**ECR**). The method implemented works on a two-phase principle:

1. Scoring

Each pair of consecutive frames is given a certain score that represents the similarity/dissimilarity between the two frames

2. Decision

All scores previously calculated are evaluated and a cut is detected if the score is considered high

Further improvements

- Generalize Plate Localization to any Plate color
- Adapt to different Light Conditions
- Extend Template Matching to all characters

Work in progress

Performance

Category I: **0.93**
Category II: **0.82**
Category III: **0.45**