

Exercices (3rd Day)

(Template-based object tracking)

Exercise 1: Implement a MATLAB-function which accepts the name of a directory as a parameter and opens the images in this directory consecutively. Make sure that only image files are loaded (by using the file extension .png). For clarification, display the images. Use the subdirectory “Day3/Sequence/” for testing purposes.

useful functions:

`dir`, `size`, `strcat`, `strfind`

Exercise 2: Implement a simple object tracker using the image sequence in “Day3/Sequencesmall/”. Perform the following steps:

- Take the image “Day3/HBahnsmall.png” as model.
- Compute the cross correlation of the model with each image in the sequence.
- Find the best local match in each image.
- Visualize the tracking by plotting the found object position and the current trajectory (Line that connects successive object positions) into each image and by displaying the images on the screen.

Now, repeat the procedure using the normalized cross correlation. Does this significantly effect the tracking result? Can you imagine why?

What happens towards the end of the image sequence? When does the tracking fail and why?

Cross Correlation:

$$\Psi(u, v) = \sum_{x,y} f(x, y) \cdot t(x - u, y - v)$$

Normalized Cross Correlation:

$$\Gamma(u, v) = \frac{\sum_{x,y} (f(x, y) - \bar{f}_{u,v}) \cdot (t(x - u, y - v) - \bar{t})}{\sqrt{\sum_{x,y} (f(x, y) - \bar{f}_{u,v})^2 \cdot \sum_{x,y} (t(x - u, y - v) - \bar{t})^2}}$$

where \bar{t} is the mean of the feature, and $\bar{f}_{u,v}$ is the mean of $f(x, y)$ in the region under the feature.

useful functions:

`im2double`, `rgb2gray`, `sum`