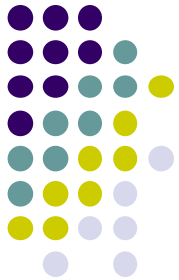
Image Processing and Computer Vision - Lab2



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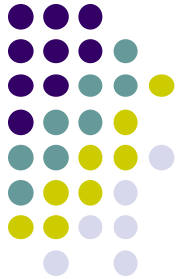
The Plan

1. Intro to Image Processing
2. Intro to OpenCV
   - today (04/04) and next week (09/04)
3. Fourier Transform (and Friends)
4. Image Segmentation
5. CCD, CMOS, and Optical Systems
6. Car Lane Detection
7. Face Detection and Tracking
8. Neural Network Introduction

Intro to OpenCV

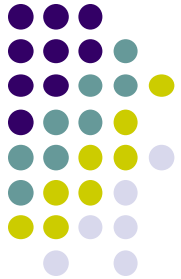


- Today and next week
  - 3 hours
- Text of the exercises/tasks
  - on the Teaching Portal
- You need a webcam
  - alternatively, you can use still images or a video
- Goal
  - Experiment with basic image processing operation with OpenCV

Intro to OpenCV

- Three (and a half) exercises
  - Warm Up: revise last lecture (code and slides)
  - 1: create a program for performing base operations with images
  - 2: add a logo (superimpose image) to each frame of the video shown in the application
  - 3: calculate and show the histogram of each video frame

Add a logo

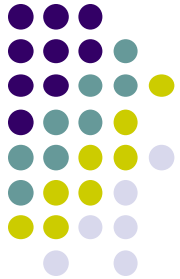


- … also known as “adding two or more images”
- Three suggested options:
  - addition -> `cv2.add(img1, img2)`
  - linear blending -> `cv2.addWeighted(…)`
  - replacement of an image portion
- *Warning*: most (all) of these methods needs two images with the **same** width and height

Histogram calculation

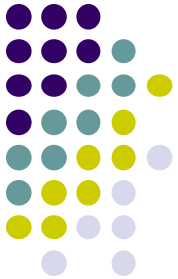
- **OpenCV** has a method to do that:
  - `cv2.calcHist()`
- It needs the source image (first parameter) as an array
  - e.g., `[img]`
- To compute the histogram of a RGB image, you have to execute the method three times, one for each channel

Histogram calculation



- **Matplotlib** has a method to do that:
  - `plt.hist()`
- It needs the source image (first parameter) as an array
  - e.g., `[img]`
- To compute the histogram of a RGB image, you have to execute the method three times, one for each channel

Draw a histogram



- You can use matplotlib…

```
plt.plot(hist)
plt.xlim([0, 256])
plt.title("Histogram")
```

- If you want to show the histogram of all three RGB channels, you have to draw 3 histograms…

Histogram equalization

- `cv2.equalizeHist(img)`

- *Warning:* the method returns the equalized image, not its histogram
  - to show the histogram, you need to redo the previous steps (from the calculation onwards) but with the image from this method

Intro to OpenCV

- In the first session: you should be able to complete the Warm Up and the first exercise
- Hints, insights, links, etc. are in the text of the exercises
  - I am here for you…
  - … please ask if you need any help or clarification

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