COVIS – Feature detection lab

Deliverables		
Format: PDF with code	**Due date**: TBD	**Page limit**: 6 (not incl. code)
Feedback		
Format: Annotated PDF	**Due date**: TBD	
Evaluation		
Graded	**% of overall module grade**: 25	

Goal

To track a given object in a video using openCV's feature detection and matching tools.
Object to be tracked

The object to be tracked is the white bulb in figure 1, which is the first frame of the video provided for the lab.

Fig 1. The object to be tracked

Requirements

The tracking will be shown by displaying a rectangle which encloses the bulb on each frame of the video. The rectangle will give the orientation angle of the bulb with respect to its orientation in the first frame of the video.

The SURF detector is to be used.

Two methods will be tested:

1. By matching the object in current frame to the object in the first frame of the video.
2. By matching the object in current frame to the object in the previous frame of the video.

Tips

- The bounding box of the bulb in the first image is given. The interval in x (image columns) is [24,196] and in y (rows) [44,210].
- The `VideoCapture` class must be used to declare the video input.
- The provided video is in color: you will convert each frame to grey scale.
- The `detect` and `compute` methods are used to perform key point detection and descriptor calculations respectively.
- The matcher will be chosen as a `FlannBasedMatcher`.

- The `match` method calculates the actual matches.
- To visualize the calculated matches, `drawMatches` can be used.
- To calculate the transformation between two images, use `findHomography`.
- To calculate the images of the corners of a rectangle by the transformation, use `perspectiveTransform`.
- To actually see the displayed images, you need to call the `waitKey` function in your main loop. Otherwise, the `highgui` modules do not get the chance to perform the display actions.

Report

The report should:

- Explain your method, for each of the cases, so the code can be read easily. I should not need to figure out your ideas: you must explain them to me.
- Compare the two methods.

Code

The code must follow good programming practices. It should be included in the PDF **and** delivered as a zip file. Make sure the code can be executed and give the necessary guidelines for the teacher to be able to execute it.