

This lab is about becoming familiar with commonly-used features in the computer-vision community. We will be applying numerous filters, including the Gaussian, Sobel, Canny and Prewitt filters. We will also compute and then visualise the histogram of oriented gradients (HoG) of each image; the histograms are used as the features for our images. In another task you will use Haar-cascades for face detection within both images and videos.

Again, a Jupyter notebook is provided for you to work through the lab material. We have additionally supplied you a test image and video on Blackboard.

☐ **Task 3.1**

Run the notebook and understand the concepts covered. Explore the use of different features and their suitability in processing various images styles.

1. Download and study the new Jupyter Notebook and the demo data.
2. Run through the cells of `CVDL_Student_Lab3.ipynb`.
3. Try processing images with different styles. Try natural images, man-made structures *etc.*, and develop an intuition regarding the filtering properties and behaviour.
4. Run the face and eye detection demo and understand the underlying cascade behaviour.
5. Extract HoG features from the demo image. Try tuning the hyperparameters of the extractor and visualise the results. Can you intuit anything from the effects of changing the parameters?

☐ **Challenge Task**

1. Try implementing some other OpenCV cascade classifiers; for example, try the upper-body detector. (You may need to download some videos or images to test the classifier on.)
2. What other feature-extractors can be utilised for image classification purposes?
3. What is the benefit of scale-invariant features?