Object Detection in 2D and 3D Images
Fall 2016

Course Syllabus

Course Overview:
Ever wondered how your digital camera is able to find your face in the view finder (that square which hovers around your face!)? Or how Facebook recognizes you or your friends in photos? Algorithms for face detection and face recognition are now widely employed for surveillance, security and entertainment applications. In this course, you will learn how such algorithms are developed not just for faces but for generic objects. The challenge essentially lies in capturing the wide variation in appearance of the objects due to change in pose and size of object and to distinguish it from the background clutter in different lighting conditions.

The main goal of the course is to develop methods for differentiating between object of interest and background in 2D and 3D images. This will lead to understanding of i) Object classification - whether an object is present in an image or not, ii) Object detection/segmentation - if present, where it is present in the image and how accurately can it be localized? and, iii) Object recognition - Given the location and type of object, is it possible to recognise it as one of previously seen objects? Applications to both 2D digital images and 3D medical images (CAT scans) will provide the student a better understanding of the techniques learnt during the course.

Why is this course important?: You will learn efficient technologies for automatically detecting objects of interest in 2D and 3D images. With the plethora of images that is present in the current internet enabled world, these technologies will only become more and more important and necessary to quickly extract relevant information. This course will provide you the tools to do that and help you to adapt/extend them to a particular domain.

What is this course not?: This is an applications course and not a theoretical one. It means you will learn how algorithms are built for applications such as car detection, face recognition, lung segmentation etc. Concepts in basic image processing will be reviewed but you will not learn intricate details of signal processing or machine learning algorithms.

Pre-requisites: CS 315. Students should be able to write simple programs in C++ / MATLAB and use open source software (openCV, InsightToolKit).