

# Courses 2015-16

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BCAM-Basque Center for Applied Mathematics, Bilbao, Basque Country, Spain [www.bcamath.org](http://www.bcamath.org)

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## PRACTICAL COMPUTER VISION: THEORY & APPLICATIONS

Computer vision field includes methods for acquiring, processing, analyzing, and understanding images in order to be used or transformed in the form of decisions within high-level systems. Nowadays, computer vision is on the heart of modern industrial and medical applications, and they become more popular in our daily life: in our smart phones, smart cameras, search engines based on images (google images), robots, image-based medical diagnose applications, etc.

This course is designed to show the fundamentals of computer vision theory together with practical examples. It is oriented to students without any experience on computer vision or image processing or with very basic knowledge on this field. The main goal of this course is to offer the basic skills and knowledge about common techniques, currently used in real-world examples in industry and medicine. The goal is to provide the students with the needed knowledge to start their own projects.

The course material will be formed by slides with the main theory, and source code examples in Matlab and C++ (to be used in conjunction with OpenCV library). It is not needed experience in OpenCV or image processing, but it is desirable some basic knowledge in high-level programming languages (C++ or Java or Matlab).

### PROGRAMME

1. Introduction to fundamental concepts of image processing
2. Enhancement & Restoration techniques
3. Morphological operations
4. Image segmentation
5. Object Recognition

### TECHNOLOGICAL KNOWLEDGE

It is advised to have some background on Java, C++, Python, Matlab or OpenCV, or some programming background, at least to be able to understand the examples.

### REFERENCES

- [1] Digital Image Processing, 3rd Ed. Gonzalez and Woods, 2008
- [2] Digital Image Processing using MATLAB, Gonzalez, Woods and Eddins, 2009
- [3] Learning OpenCV: Computer Vision with the OpenCV Library By Gary Bradski, Adrian Kaehler Publisher: O'Reilly Media, 2008

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