



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Visual Information Processing and Management

2425-2-F1801Q148

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#### Aims

The student will acquire the skills to faithfully capture, process and interpret pictorial media including with Deep Learning based techniques. He/she will also acquire the skills to integrate image and video content-based search systems into apps and multimedia information systems.

#### Contents

The course provides the theoretical and practical fundamentals for:

- image acquisition and reproduction (the skills acquired will be useful in the areas of cultural heritage, fashion and design, medical image analysis and telemedicine, virtual and augmented reality, ...)
- image post-processing (e.g. increased readability, fog removal, removal of compression artifacts, ...)
- semantic segmentation (e.g. in automotive: pedestrian, car, road, sidewalk, ... in medical: healthy tissue vs. tumor tissue)
- automatic localization, description, and recognition of objects even in complex scenes
- automatic annotation of images and videos with keywords (tagging)
- browsing and similarity search of images and videos in multimedia archives

#### Detailed program

Objective color perception and measurement, colorimetry, color appearance models

- Basic principles of image reproduction in graphic devices, such as digital cameras, monitors and video projectors, and printers

- Image acquisition and processing chain in digital cameras (with recap of image processing fundamentals)
  - Adaptive algorithms for image post processing (contrast modification, noise reduction, localization artifact removal, image composition, ...)
  - Subjective and objective methods for image quality assessment
  - Recognition and classification of objects and images using traditional learning techniques based on pictorial and visual features
  - Localization, recognition and classification of objects and images with techniques based on deep learning
  - Methods for indexing and retrieval of pictorial data in multimedia information systems
- The exercises will be conducted in the laboratory, in MATLAB language, and include a series of exercises such as image color transfer, image panorama creation, consumer photo classification, object detection,...

## Prerequisites

None. Having taken an image or signal processing course is not a mandatory prerequisite. The course is self-contained.

## Teaching form

Lectures (48) in presence with delivery and interactive mode. Exercises/lab (MATLAB) with discussion of case studies, in-presence with interactive and delivery mode

## Textbook and teaching resource

Articles and Notes given by the Professor.

The lecturers provide additional materials (handouts and videos) pertaining to image processing to those who wish.

## Semester

first semester

## Assessment method

Discussion of a project that can be done in a group of up to three people, with individual evaluation.

## Office hours

just after the lessons or by request

# Sustainable Development Goals

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