UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Digital Signal and Image Management

2122-2-F9101Q014

Aims

The course will provide the theoretical and methodological bases for the analog-to-digital conversion, processing, analysis, interpretation and management of the digital signals and images in different application contexts. The paradigms used range from the traditional ones to the most recent deep learning and machine learning techniques.

Contents

The student will acquire specific skills that will put him in a position to understand the process of digitization of the signals and images; to design and implement algorithms for the processing, analysis and classification of digital signals and images (based on both traditional techniques and on the recent deep learning and machine learning techniques), and to assess their effectiveness.

Detailed program

1 Analog-to-digital conversion, processing and descriptive feature extraction in signals and images

2 Signals classification and recognition

3 Images/videos classification and recognition

4 Indexing and retrieval methods for signals/images/videos in large archives

5 Analysis of case studies

Prerequisites

None

Teaching form

Classroom lessons and exercises/laboratory sessions.

Textbook and teaching resource

Slides, articles and notes given by the professor.

Textbooks:

- Digital Image Processing, 4th Edition, Rafael C. Gonzalez, Richard E. Woods
- Digital Image Processing: Part I, Huiyu Zhou , Jiahua Wu , Jianguo Zhang (freely available at https://bookboon.com/en/digital-image-processing-part-one-ebook)
- Digital Image Processing: Part II, Huiyu Zhou , Jiahua Wu , Jianguo Zhang (freely available at https://bookboon.com/en/digital-image-processing-part-two-ebook)
- Y. Goodfellow, Y. Bengio, A. Courville, Deep Learning, 2015. MIT Press

Semester

First semester

Assessment method

Discussion of a project that can be done in a group of up to two people, with individual evaluation. The project concerns the realization of an application for the recognition of objects placed in real scenes. The project discussion will allow to verify the learning of the concepts explained in class and their correct application within the developed project.

Office hours

Just after the lessons or by request