UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Multimedia Data Processing

2223-1-F9201P211

Aims

The course offers an introduction to multimedia signals: images, video and audio, presenting the main methods of processing, digitizing and encoding. At the beginning the course analyzes the analog to digital conversion in particular by introducing the concepts of sampling and quantization. The main processing algorithms especially for the case of digital images are shown: histogram modification, filtering and white balancing. During the practical activities the student will apply the acquired theory to audio, image and video signals.

Contents

The course provides the basis for digitizing and encoding analogic signals: images, audio and videos. It also provides the competences to develop algorithms to process, code and compress digital signals.

Detailed program

1. Definition of one-dimensional signals, two-dimensional signals, N-dimensional signals

- Analog signal
- Digital signal

2 Analog to digital conversion

- Sampling theorem
- Filter Anti-Aliasing
- Quantization

3 Digital signals: sampling and quantization:

- Images
- Audio
- Video

4 Image processing

- Contrast enhancement
- High and low pass filtering
- White balance

5 Signal in the transformed domain: Fourier Transform

- Fourier analysis in the frequency domain

6 Compression

- Main compression loss-less and lossy algorithms
- Audio Compression
- Image Compression (particularly JPEG)
- Video Compression (in particular MPEG)
- Main image Formats

Prerequisites

No prerequisite

Teaching form

The course consists of lectures, classroom exercises, and practical activities. Several exercises will be carried out during the practical activities to verify the new expertise acquired. The coure is taught in English.

> Lessons will be held in presence, unless further COVID-19 related restrictions are imposed.

Textbook and teaching resource

slides published on the web site of the course

codes and exercises of the practical activities

TEXTBOOK

R. Gonzalez, R. Woods, Digital Image Processing, Pearson International Edition

Semester

second semester

Assessment method

Oral exam .The practical activities could also be verified and it is part of the program of the final examination.

A final project in matlab will provide up to 2 points for the final exam.

Office hours

Friday from 11.00 to 12.00.

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE