UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Multimedia Data Processing

2324-1-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 course is taught in English.

Lessons will be held in presence.

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

Examination:
Oral exam + practical activities (4 mandatory) + final project (optional)

Evaluation Type:
Final mark out of thirty

Oral exam
The exam (oral) consists of open questions about digitalization and compression of multimedia signals and signal processing mainly in the case of images. This part verifies the competencies acquired and it is based on what taught during the lessons, available on the slides and on the indicated text books.

Assignements
The practical activity is a fundamental part of the course. Periodic assignemts are proposed during the practical activity. These assignements remain valid for the academic year in which the teaching is delivered. **Four assignments are mandatory** to pass the axam.

Final Project
A final project in matlab (optional) 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