Syllabus of the course "Methods for Image Processing" a.y. 2016/17

January 14, 2017

This document reports a description of the topics covered in the course *Methods for Image processing* for the academic year 2015/16, in relation to those covered in the textbook:

> R.C. Gonzalez and R.E. Woods, Digital Image Processing, (3 ed.), Prentice Hall, 2008. ISBN 9780131687288.

The topics have been organized in the following categories:

- Topics that cannot be ignored: the topics belonging to this category are considered fundamental and belong to the cultural background of image processing experts; these topics should not be considered as a subject of choice, if during the oral exam the student is asked to pick a subject.
- Topics to be studied well: the topics belonging to this category are those that have been studied during the course and will be considered for the exams.
- Topics that it would not hurt to know: topics not covered during the course for lack of time, but that can inspire a project (to be agreed with the teacher).

NOTE The syllabus here described refers mainly to the 6 cfu course, but it should be reduced for the 5 cfu course. In the following a possible reduction has been considered, but any other suitable downsizing of the syllabus can be agreed with the teacher.

Topics that cannot be ignored

These topics are given for granted and are marked in *cyan* in the Table of contents reported at the end of the present document. They are:

- Chapter 1 - Introduction
- Section 2.4 - Image Sampling and Quantization (excluding 2.4.4, not covered during the lessons)
- Section 2.6 - An Introduction to the Mathematical Tools Used in Digital Image Processing
- Sections 4.1 e 4.2 - Background e Preliminary concepts in Filtering in the Frequency Domain

Topics to be studied well

The topics covered during the lessons are marked in *red* in the Table of contents reported at the end of the present document. They are:

- Chapter 2 - Digital Image Fundamentals (excluding 2.4.4)

- Chapter 3 - Intensity Transformations and Spatial Filtering
- Chapter 4 - Filtering in the Frequency Domain (excluding 4.10 and 4.11)
- Chapter 6 - Color Image Processing (excluding 6.8 and 6.9)
- Chapter 8 - Image Compression (excluding 8.2.6, 8.2.7, 8.2.9, 8.2.10, and 8.3)
- Chapter 9 - Morphological Image Processing
- Chapter 10 - Image Segmentation (excluding 10.3.6, 10.3.8, and 10.6)

Syllabus reduction (5 CFU)

Students that have in learning agreement the 5 cfu course can consider the reduced syllabus. Some topics required for the 6 cfu course can be considered optional for the 5 cfu course (and they are marked in *orange*). In detail:

- Section 6.7 - Image Segmentation Based on Color
- Section 8.2.2 - Golomb Coding
- Section 9.6 - Gray-Scale Morphology
- Section 10.3.7 - Variable Thresholding
- Section 10.5 - Segmentation Using Morphological Watersheds

Topics that it would not hurt to know

Topics not covered during the lessons, but that worth at least a reading, are marked in *yellow* in the Table of contents reported at the end of the present document. They are:

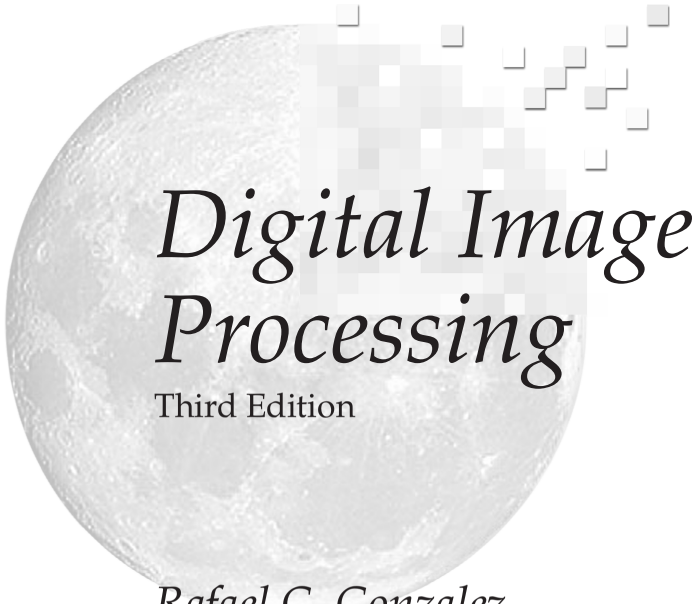
- Section 2.4.4 - Image Interpolation
- Section 4.10 - Selective Filtering
- Section 4.11 - Implementation (of FFT)
- Chapter 5 - Image Restoration and Reconstruction
- Section 6.8 - Noise in Color Images
- Section 6.9 - Color Image Compression
- Chapter 7 - Wavelets and Multiresolution Processing
- Section 8.2.6 - Symbol-Based Coding
- Section 8.2.7 - Bit-Plane Coding
- Section 8.2.9 - Predictive Coding
- Section 8.2.10 - Wavelet Coding
- Section 8.3 - Digital Image Watermarking
- Section 10.3.6 - Multiple Thresholds (in Image Segmentation)
- Section 10.3.8 - Multivariable Thresholding (in Image Segmentation)
- Section 10.6 - The Use of Motion in Segmentation

Table of contents of the textbook

In the following, the Table of contents of the textbook (R.C. Gonzalez and R.E. Woods, Digital Image Processing, 3 ed., Prentice Hall, 2008. ISBN 9780131687288) is reported with the Chapters and Sections marked using different colors for the categories the topics belong to:

- cyan : topics that cannot be ignored;
- red : topics to be studied well;
- yellow : topics that it would not hurt to know.

For any clarification please contact the teacher.



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Rafael C. Gonzalez
University of Tennessee

Richard E. Woods
MedData Interactive

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Prentice Hall

Upper Saddle River, NJ 07458

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