Class Information
SCC0251/5830 – Image Processing

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2020/1

Agenda

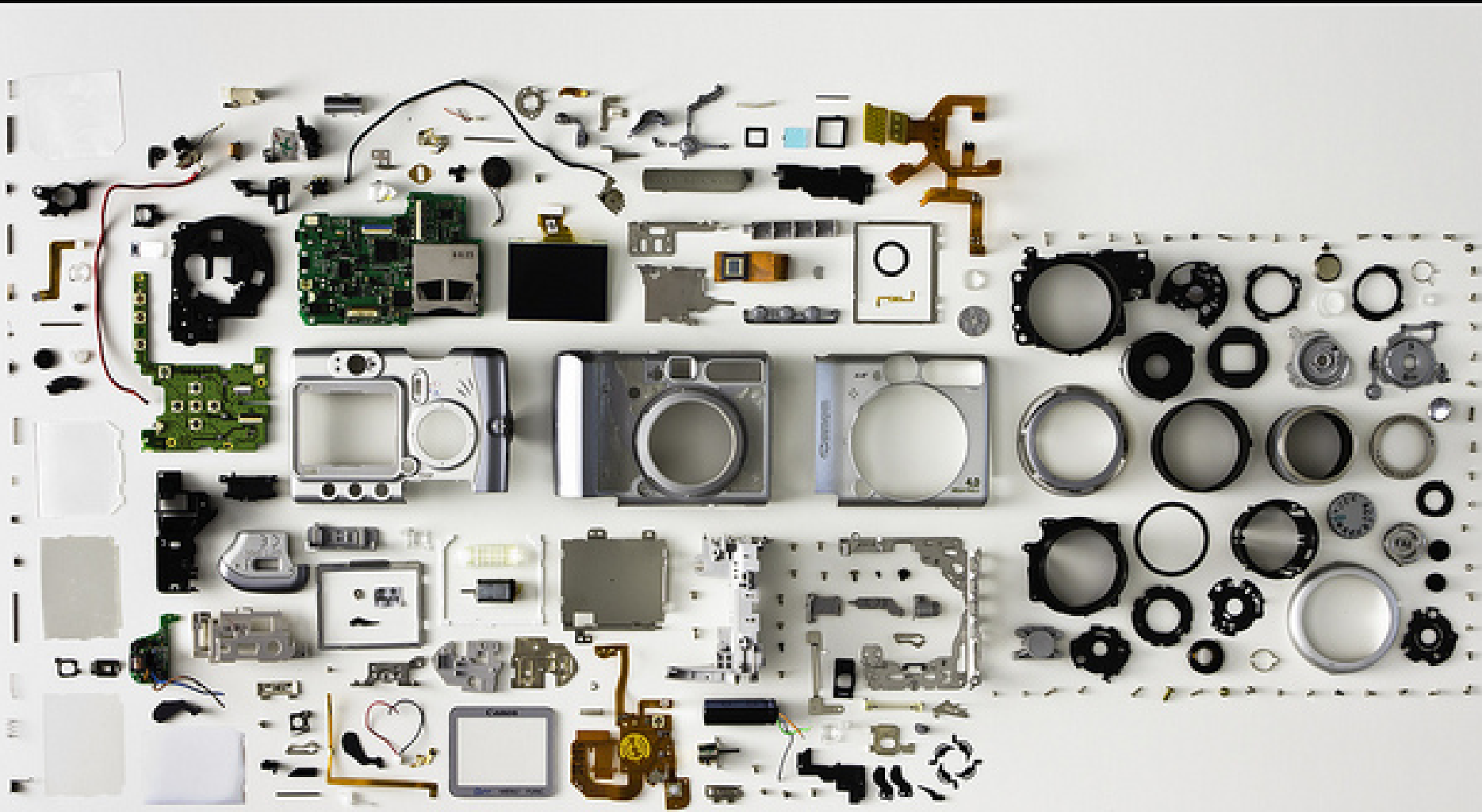
1. Course
   - Objectives
   - Contents
   - Programming language
2. Grading
3. T.A.s
4. Contents repository

Objectives

- Provide the student with the knowledge necessary to manipulate digital images, presenting relater application areas and major techniques in the field.

Contents

- Image processing fundamentals: acquisition and modelling
- Gray-level transformations and image filtering
- Image enhancement
- Fourier Transform and frequency domain operations
- Image restoration
- Image segmentation
- Colour images
- Mathematical morphology
- Image analysis: feature extraction and classification
- Convolutional neural networks

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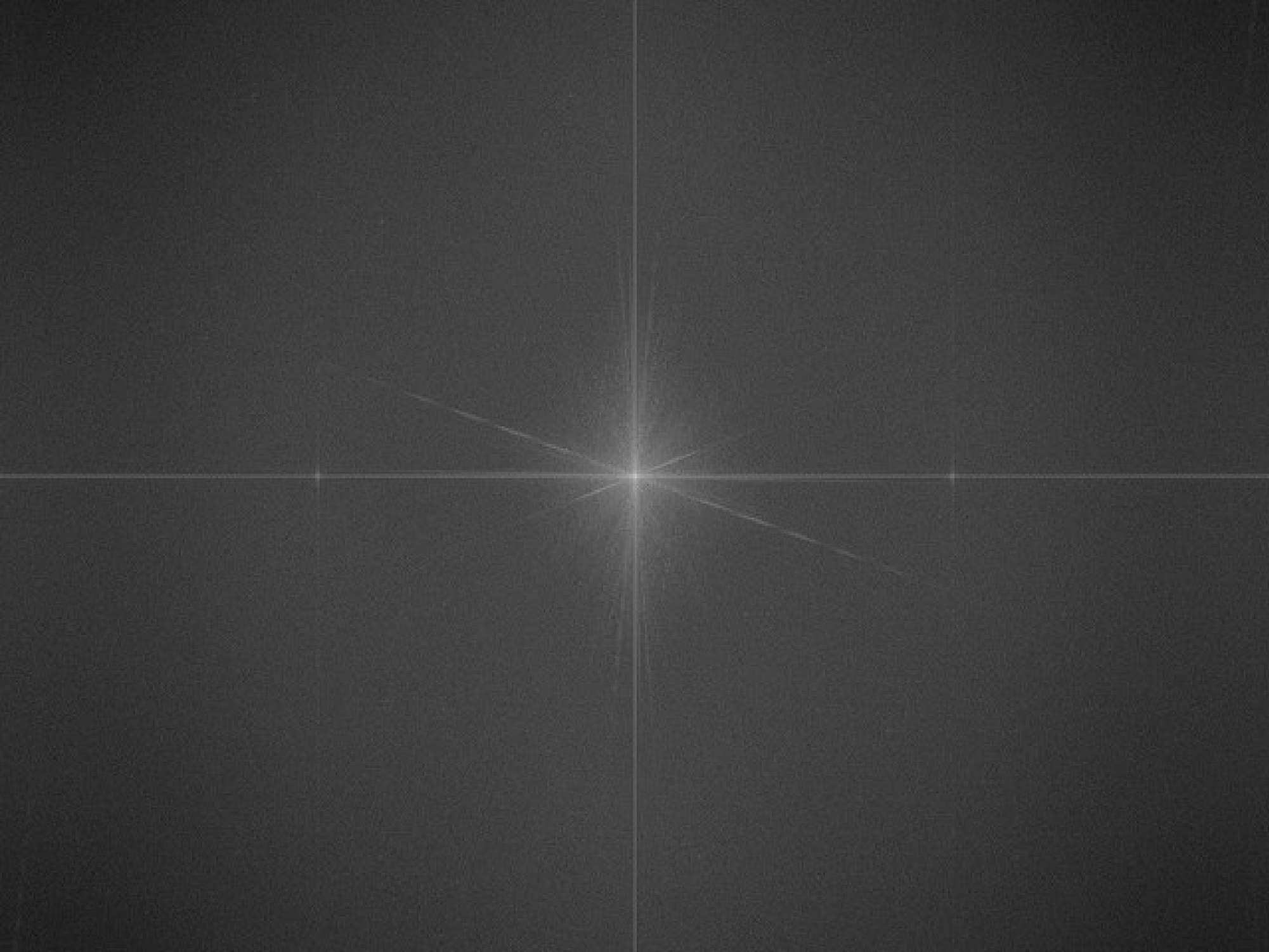

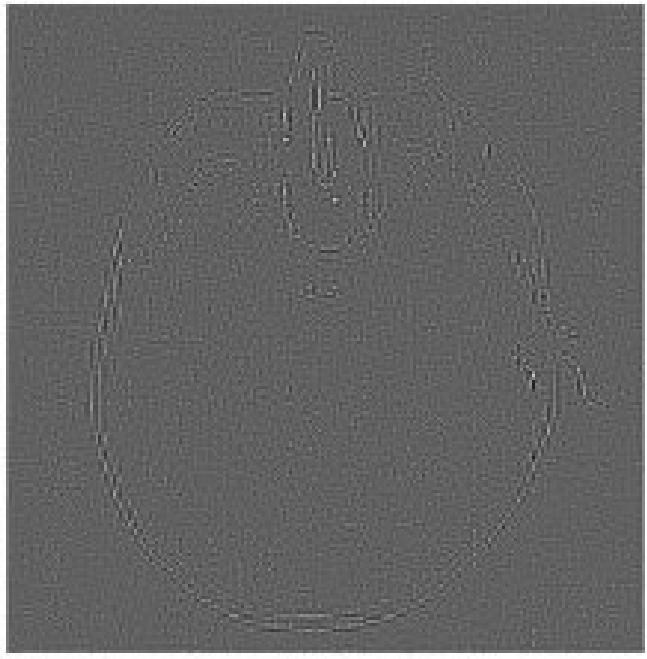

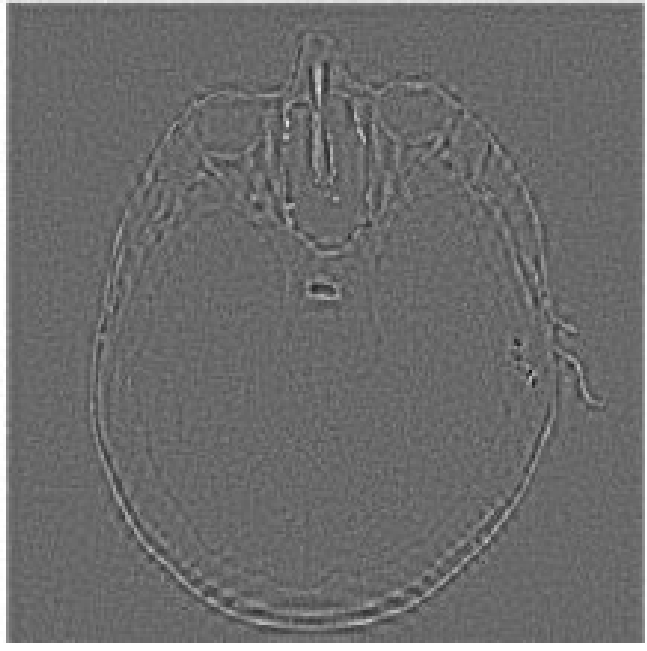

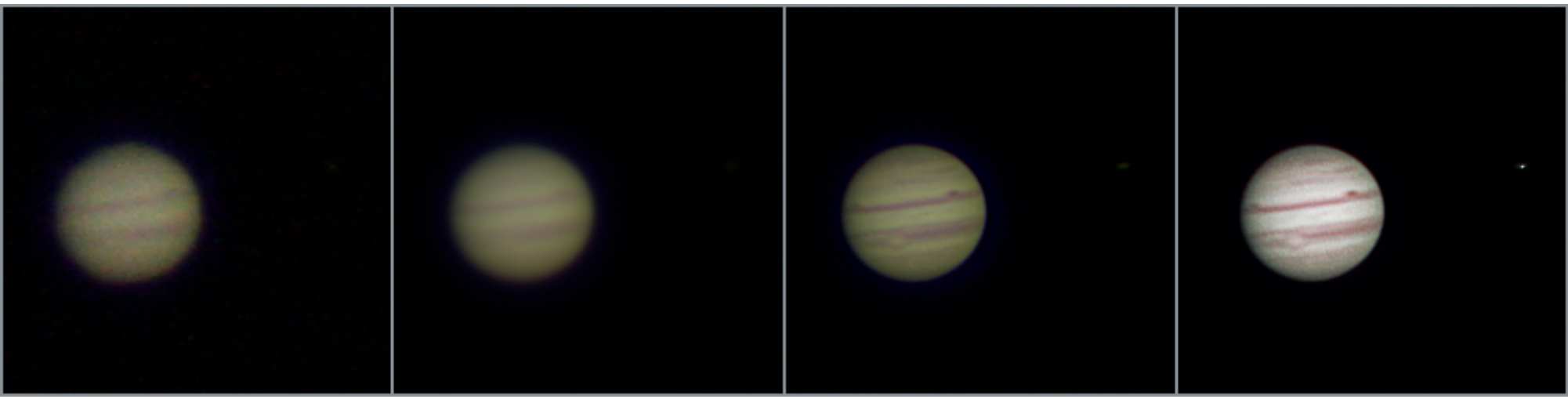

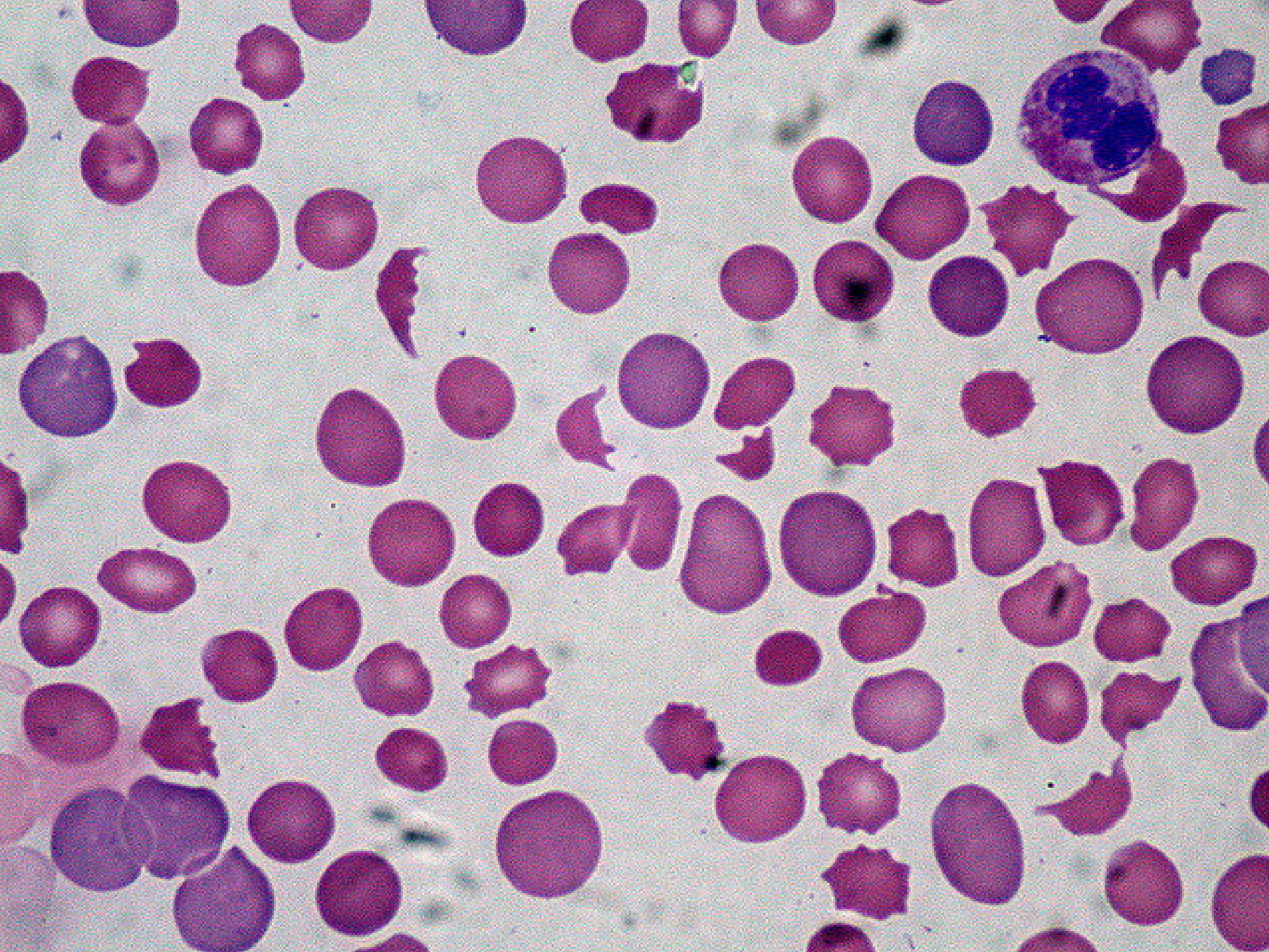


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Programming language

- `python` with `numpy`, `imageio`, `scipy`.

Grading

Harmonic mean considering:

- Assignments T (≈ 5) — discarding the lowest grade
- Final project P: proposal + partial (1), and final (2)

$$\frac{N-1+4}{[\frac{1}{T_1+1}+\cdots+\frac{1}{T_N+1}-\min_t(\frac{1}{T_t+1})]+\frac{1}{P_1+1}+\frac{3}{P_2+1}},$$

Grading

Assignments

- Individually developed using `python` + `numpy`, `imageio`, `scipy`.
- Run.codes submission system: code AFR9

Grading: Project

Project developed in groups of 2 or 3 (undergraduates) and Individually (MSc/PhD)

Choose one applications

E.g. 1) Computational photography, 2) Steganalysis, 3) Superresolution, 4) Image colourisation, 5) Image segmentation, 6) biometrics, 7) image compression, 8) recognition, etc. * a few ideas will be given later

Deliverables

1. Project proposal : 13/05
2. Partial (checkpoint): report first attempts in an online code repository: 27/05
3. Final: report final results, code and discussion: 10/06.

T.A.s

- Gabriel Cavallari
- Vinicius Torres Dutra Maia da Costa

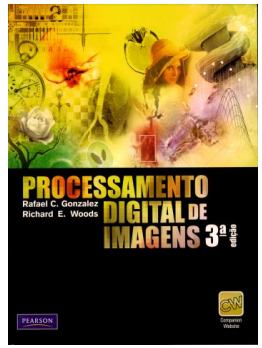
Contents repository

Course contents, schedule, slides, announcements and quizzes

- `http://ae4.tidia-ae.usp.br`

Bibliography I

GONZALEZ, R.C.; WOODS, R.E. **Processamento Digital de Imagens**, 3.ed
Pearson, 2010.



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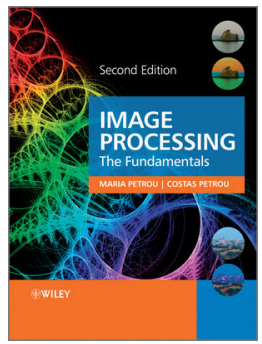

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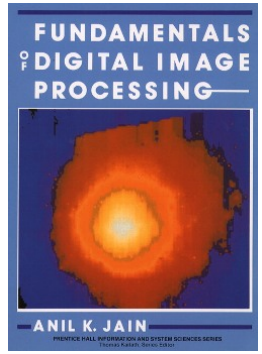

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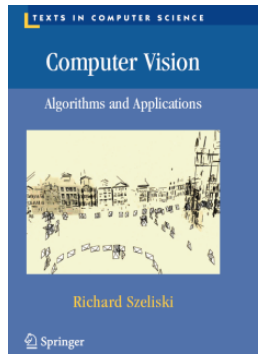

Bibliography III

OpenCV (Open Source Computer Vision)
http://docs.opencv.org.

GNU Octave
http://www.gnu.org/software/octave/.

R (GNU S)
http://www.r-project.org.