MAIA

CAD: Computer Aided Diagnosis

Arnau Oliver, Xavier Lladó, Kaisar Kushibar

Course presentation

- CAD datasheet
- What is CAD about?
- Objectives
- Contents & Learning activities & Agenda
- Course evaluation
- Bibliography

Datasheet

- Academic Staff
  - Lecturers:
    - Arnau Oliver (arnau.oliver@udg.edu)
    - Xavier Lladó (xavier.llado@udg.edu)
  - Lab assistant:
    - Kaisar Kushibar (kaisar.kushibar@udg.edu)
- 5 ECTS (125 h)
  - Theory:
    - **Friday 10:00-12:00**
    - Classroom II.04B (P2 Building)
  - Lab sessions:
    - **Thursday / Friday 08:00-10:00**
    - Computer Vision Lab (P2 Building)

What is CAD about?

Objectives

The aim of this course is to introduce all the steps needed to develop a CADx medical system, i.e. a system that help physicians to deliver a diagnosis

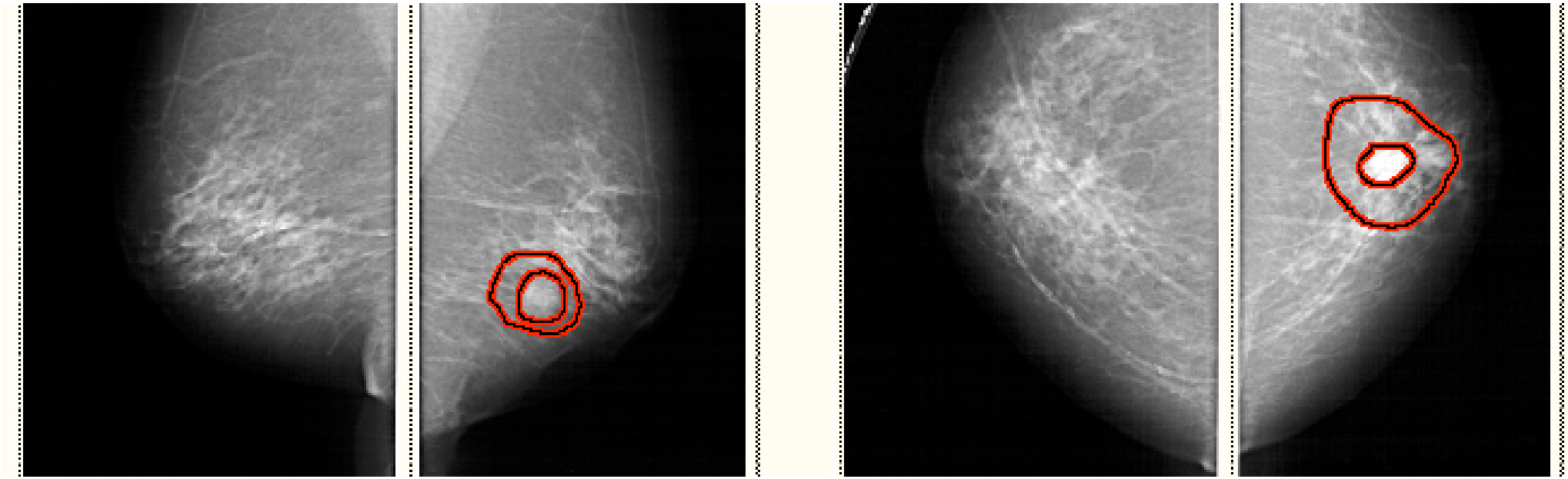
- To have an overview of general image characterisation
- To understand the use of deformable models
- Applying pattern recognition techniques to the field of medical imaging
- To learn what characteristics and what classifiers are more useful to the different medical images
- To learn what algorithm(s) could fit better for a particular application

Lectures contents

- Introduction to diagnosis and CADx (2h)
- Image characterisation: morphological, texture, and shape descriptors(2h)
- Deformable template matching and active shape model (3h)
- Free-form segmentation and active contours (3h)
- Interest point detectors and descriptors (1h)
- Object and image characterisation (3h)
- **Deep Learning (4h)**
- CADx evaluation and applications (4h)

Lab contents

- Deformable models (6h) Date: October
- Image characterisation (4h) Dates: November
- Research project. Mammography (6h) Dates: December



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Lecture activity

Lectures given by students (groups provided by teachers)
16/11/2018 & 30/11/2018 & 14/12/2018 (oral presentation)

- 15’ problem statement delivery (guide)
- 2h searching for additional information (group)
- 2h reviewing and understanding the info (group)
- 2h searching for consensus. Preparation of 1st draft doc (group)
- 30’ control with teachers (guide)
- 7h doc and presentation preparation (group)
- 15’ last review of doc and presentation (guide)
- 2h last corrections and tests (group)
- 4h classroom presentation (control)

Agenda

setembre 2018

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octubre 2018

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- Lectures
- Lab sessions
- Seminars
- Lecture activity

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Evaluation

- **Final Mark (FM):**
  - Lab sessions P1+P2 (40%)
  - Final project (30%)
  - Lecture activity (30%)

- Evaluation criteria:
  - From labs: 70% strategy and results + 30% document
  - From lecture activity: 50% document + 50% presentation and interaction

- Plan your deadlines!
  - 100% mark before the deadline
  - 80% up to a week after
  - 50% more than a week after

Bibliography

- *Handbook of Medical Imaging: Processing and Analysis,* Isaac Bankman, 2008
- *Computer vision : a modern approach*. Upper Saddle River: Prentice Hall. Forsyth, David A, Ponce Jean (2003)
- *Algorithms for Image Processing and Computer Vision*, J. R. Par, 2010
- *Digital Image Processing.* Prentice Hall. 2nd Ed. Gonzalez and Woods, 2002
- *Fundamentals of Medical Imaging*, P. Suetens, Cambridge University Press 2002
- *Biomedical Signal and Image Processing*, Najarian and Splinter, 2006
- *Biomedical Image Analysis*, Rangaraj M. Rangayyan, 2004
- *Medical Image Analysis*, A. Dhawan, Wiley. 2nd Edition 2010

- Related Journals and Conferences: *IEEE Transactions on Medical Imaging, Medical Image Analysis,* IEEE Transactions on Information Technology in Biomedicine, MICCAI (Medical Image Computing and Computer Assisted Intervention) Conference, IEEE Int. Symposium on Biomedical Imaging (ISBI), SPIE Medical Imaging Conference, CARS (Computer Assisted Radiology) Conference, …