LECTURE 1: Introduction

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• This is an interdisciplinary course, offered for the third time in UCF.
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• Lectures: Mon/Wed, 1pm-2.15pm
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- **Lectures:** Mon/Wed, 1pm-2.15pm
- **Office hours:** Mon/Wed, 2.30pm-3.30pm
Syllabus

- Basics of Radiological Image Modalities and their clinical use (MRI, PET, CT, fMRI, DTI, …)
- Introduction to Medical Image Computing and Toolkits
- Image Filtering, Enhancement, Noise Reduction, and Signal Processing
- Medical Image Registration
- Medical Image Segmentation
- Medical Image Visualization
- Machine Learning (Deep Learning) in Medical Imaging
Syllabus

• Grading:
  – In-class Midterm (30%)
  – Paper presentation/discussion (20%)
  – Individual Project (50%)
    • Will be selected from a list of projects or you can come with your own project
    • Coding is not necessary, but welcome!
    • OK to use existing software to do analysis/project
      – 3D Slier, ITK-Snap and other toolkits
Medical Image Computing

- Image Processing
- Computer Vision
- Imaging Sciences (Radiology, Biomedical)
- Machine Learning
Motivation

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• This course will mostly focus on analysis of biomedical images, and imaging part will be briefly taught!
Optional Reading List

• Level-set Methods, by J. A. Sethian, Cambridge University Press.
• *Insight into Images: Principles and Practice for Segmentation, Registration and Image Analysis*, Terry S. Yoo (Editor) (FREE)
• *Algorithms for Image Processing and Computer Vision*, J. R. Parker
• Medical Imaging Signals and Systems, by Jerry Prince & Jonathan Links, Publisher: Prentice Hall
Conferences and Journals to Follow

• The top-tier conferences (double blind, acceptance rates are below 25%, high quality technical articles):
  – MICCAI (medical image computing & computer assisted intervention)
  – IPMI (Information Processing in Medical Imaging)
  – Other conferences: IEEE ISBI, EMBC and SPIE Med Imaging
  – Clinical Conferences: RSNA (>65,000 attendances), ISMRM, SNM
    • Vision and ML conferences: CVPR, NeurIPS, ICML, ICLR, ECCV, ICCV
• The top-tier technical journals:
  – IEEE TMI, TBME, PAMI, and TIP
  – Medical Image Analysis, CMIG, and NeuroImage
• The top-tier clinical journals relevant to MIC:
  – Radiology, Journal of Nuclear Medicine, AJR, Nature Methods, Nature Medicine, PlosOne, Radiology AI, …
• ArXiv, BioRxiv…
Knowledge Check

• X-Ray ?
• CT ?
• MRI ?
• fMRI ? (functional MRI)
• Diffusion MRI / Diffusion Tensor Imaging
• EEG ?
• MEG ?
• MRS?
• MPI ?
What is your motivation?