VCC-SU : Advanced Image Understanding

EIT Digital Master VCC Program

Master School Kick-Off 2019, Trento
SU join VCC program!
Advanced Image Understanding

• Specialization of Exit given at Sorbonne University
• Focuses on:
  • Image analysis and understanding, including machine learning (but not only!)
  • Initiation to research: bibliographical review, choice of a relevant method for a given problem, implementation, critical discussion
  • Biomedical image applications (benefit of the strong scientific environment of Sorbonne University: numerous Inserm labs, Pasteur Institute ...)

Advanced Image Understanding

• Structure of entry
  • Semester 1
    • Fundamentals of image processing
    • Signal and communication
    • Computer networking
    • I.&E. Minor (12 ECTS)
  • Semester 2
    • Introduction to computer graphics
    • Project on image processing or networking
    • Wireless and mobile computing
    • I.&.E Minor (12 ECTS, includes a summer school)
Advanced Image Understanding

- Structure of exit
  - Compulsory courses (3 x 6 ECTS)
    - Initiation to research, project and seminars
    - Pattern recognition and machine learning for image understanding
    - I.&E. Study
  - Elective courses (3 x 6 ECTS)
    - Advanced methods for image analysis
    - Advanced methods for computer vision
    - Biomedical imaging
    - Advanced Networking course (Autonomic Networking, Smart Mobility Systems...)
  - 5-6 months internship (24 ECTS)
Advanced Image Understanding

- Pattern recognition and machine learning for image understanding
Advanced Image Understanding

- Advanced methods for computer vision
Advanced Image Understanding

- Advanced methods for image analysis

Variational approaches

Discrete approaches
Advanced Image Understanding

• Biomedical imaging (and applications)
Advanced Image Understanding

• Internship
  • In a research lab or in a company.
  • Many offers each year.

• After the master
  • PhD Thesis
  • Research and Development
  • ...
Advanced Image Understanding

- Entry planned to start fall of 2020
- Exit planned to start fall of 2021

Hope to see you in Paris !!!

[http://sites.google.com/view/vcc-su/accueil](http://sites.google.com/view/vcc-su/accueil)
Advanced Image Understanding

Description of courses
Advanced Image Understanding

• Initiation to research, project and seminar
  • Learn to read a scientific paper, to perform a bibliography study and a critical analysis
  • How to choose a method, adapt/improve and implement it, and lead experiments
  • How to write a scientific report

• Pattern recognition and machine learning for image understanding
  • Neural and convolutive networks for image classification
  • Localization and transfert learning, regularization, metric learning
  • Generative and GAN models
  • Deep nets and Bayesian deep nets
Advanced Image Understanding

- Advanced methods for image analysis
  - Mathematical morphology
  - Random Markov Field, graphs and patch-based methods
  - Deformable models
  - *A contrario* approach
  - Spaces of representation (scale space, wavelets)

- Advanced methods for computer vision
  - Depth and motion visual perception
  - Projective geometry, disparity maps, stereovision
  - Detection and motion estimation, tracking, action models
  - Face recognition
Advanced Image Understanding

• Biomedical imaging
  • Principles of the main biological and medical imaging techniques
  • Applications (brain, cardio-vascular, retina imaging)
  • Examples of analysis methods: segmentation, registration, shape analysis, filtering, tracking...