DEPARTMENT OF COMPUTER SCIENCE
UNIVERSITY of HOUSTON

Computer Vision

Course Highlights

- **What is image analysis and computer vision and how does it relate to other fields like image processing and computer graphics?**

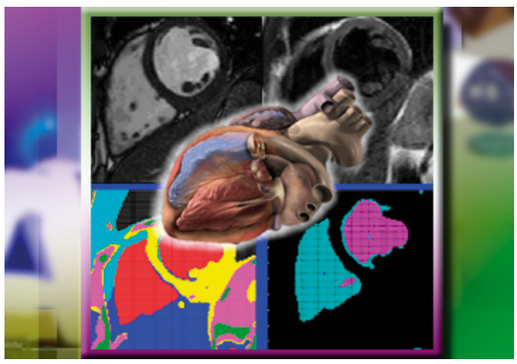
The rapid and enormous improvements in sensing (visible and infrared cameras, medical imagers) and high-performance computing have led to an explosion of data. Providing computers with a sense of vision is providing unprecedented opportunities.

Computer vision describes the automatic deduction of the properties and the structure of a three-dimensional world from one or more images. The detection of tumors from medical images, the robotic control of an unmanned lunar rover, and the detection of faults in seismic data are examples of ***computer vision applications*.**

The growing number of Computer vision applications will demand a new type of engineer and scientist trained with skills such as those offered in this course.

Topics

- Image Acquisition & Representation
- Image Preprocessing
- Boundary Detection
- Image Segmentation
- Shape Representation
- Image Data Compression
- Case Studies(Motion Analysis, Texture Analysis, Surveillance)



Learning technologies

- The course is being taught in a multimedia classroom (and on ITV) and lectures are supplemented with on-line demos and exercises.
- Course management is done using WebCT including submission of assignments and posting of scores.
- All lectures and reference material are available through WebCT and the instructor's course webpage.

Labwork

- Five programming assignments
- A Final programming project

Is this course for you ?

Major Objectives:

- Appreciation of the state of the art in computer vision. What problems have been solved? What are the active research areas?
- Knowledge of established techniques in a few key areas of computer vision. How are they implemented? What are they good for? How well do they work?
- Possession of critical analysis skills necessary to pursue computer vision research with examples drawn from all the major industries of the Houston area (e.g. NASA, Medical Center, Oil industry).

About the Instructor

Ioannis Kakadiaris is the founder and *Co-Director of UH's Visual Computing Laboratory* and the *Director of the Division of Bioimaging and Biocomputation* at the UH Institute for Digital Informatics and Analysis. His research interests include Computer Vision and Biomedical Image Analysis, Modeling, and Simulation. Ioannis is the recipient of the UH Enron Teaching Excellence Award (2003) and an NSF Early Career Development Award (2002).

And student(s) say..

"Computer Vision has completely changed my career plans. The course was so interesting and challenging, particularly in the way Dr. Kakadiaris handled it." **Musodiq Bello, *UH Computer Science***

"I have used the knowledge gained from the course several times in research and development on geoscience software in academia and industry." **Chris Harding, *UH Geoscience***

"The best part of this course is that at the end of the semester you have not only learned theory and have implemented it through assignments and projects but you also know the rationale behind those different theoretic approaches to similar looking problems with their own domain specific challenges." **Amol Pednekar**, ***UH Computer Science***

Related Courses

- Mathematics of Signal Processing
- Digital Signal Processing
- Digital Image Processing
- Biological and Machine Vision
- Digital Pattern Recognition
- Fundamentals of Medical Imaging
- Image Reconstruction and Medical Imaging
- Computer Graphics

Reference Material

- *Image Processing, Analysis & Machine Vision* (2nd edition), M. Sonka, V. Hlavac, and R. Boyle, PWS Publishing.
- *Computer Vision: A Modern Approach*, D. Forsyth and J. Ponce, Prentice Hall.

For more information, visit: www.vcl.uh.edu/courses/cosc6373