Introduction to Computer Vision

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What is Computer Vision?

The goal of computer vision is to develop algorithms that allow computer to “see”.

Also called

- Image Understanding
- Image Analysis
- Machine Vision

A brief history of computer vision

- 1960s - started as a student summer project at MIT.
- 1970s and 80s – part of AI – understanding human vision and emulating human perception.
- 1990s – depart from AI , geometric approach.
- Today – various mathematical methods (statistics, differential equations, optimization), applications (security, robotics, graphics).

What is Computer Vision?

Trucco & Verri:

Computing properties of the 3-D world from one or more digital images.

Properties: mainly physical (geometric, dynamic, etc.)

My favorite:

Computer vision is inverse optics.

Related fields

- Image Processing
- Pattern Recognition
- Photogrammetry
- Computer graphics

Our Time

It is a good time to do computer vision now, because:

- Powerful computers
- Inexpensive cameras
- Algorithm improvements
- Understanding of vision systems

Mathematical tools

- Linear algebra
- Vector calculus
- Euclidean geometry
- Projective geometry
- Differential geometry
- Differential equations
- Numerical analysis
- Probability and statistics

Programming tools

- OpenCV
  - A library of routines useful for computer vision
  - Open Source system widely used around the world
  - Contains many examples and demo programs
  - Requires VC++ or Ch interpreter to use
- VC++ or Ch
  - Assignments normally written in C++ or C
  - The easiest way to use the OpenCV library is with
    - VC++ 6.0 (examples are on the CD)
    - The .net version of VC++ should also work
    - Another option is Ch, a C interpreter (also on the CD)
    - No advantages over C++ except ease of use (but slower)
- Course CD has OpenCV and Ch interpreter