Visual Computing

DR. TERENCE SIM
SCHOOL OF COMPUTING
NATIONAL UNIVERSITY OF SINGAPORE

Making Machines Smarter

M. Hilbert, Online Course *Digital Technology & Social Change*, University of California: https://canvas.instructure.com/courses/949415

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Programming vs Learning

Learning Ping Pong

https://youtu.be/SH3bADiB7uQ

Visual Computing Overview

https://youtu.be/xoyNiatRIh4

Computational Photography

计算机图形学

Pattern Recognition

模式识别

3D Reconstruction

3D建模

https://youtu.be/jIr5BaY9aPk

Applications

Military / Security

Medicine

Education

Transport ation

Phone apps

Sports

and many more …

Face Detection: In memory of Dr. Sung Kah Kay, 31 Oct 2000

Learning and Example Selection for Object and Pattern Detection

MIT PhD Thesis 1996

Skull reconstruction

by Assoc. Prof. Leow Wee Kheng
http://www.comp.nus.edu.sg/~leowwk/skull/

Face Makeup by Example
(Dong Guo & Terence Sim)

https://youtu.be/J53eYyydwxw

CVPR 2009

Digital Face Makeup by Example

Dong Guo and Terence Sim

Photo Retouching

Example

Before

After

Makeup By Portraiture

Example

Input

Result

https://youtu.be/h6sA0we-iLc

https://youtu.be/3tHnr7SXFCo

https://youtu.be/8Qi7_gbJLys

https://youtu.be/ReDxkr_xH7c

Learning Visual Computing

Knowledge

- Computer Programming
- Algorithms & Data Structures
- Linear Algebra
- Probability & Statistics
- Machine Learning
- Image Processing
- Computer Vision
- Computer Graphics

Tools

- Python or C/C++
- OpenCV
- Numpy / Scipy or Dlib
- PyTorch / Keras / Tensorflow

Better: Computer graphics, Optimization, Multivariate Calculus

Summary

- Exciting time to work in computer vision
  - Cameras are ubiquitous
  - Images are plentiful
  - Much commercial potential
- Steep learning curve
  - Many topics to master,
  - Many tools to learn
- Many jobs available
  - Pays well
  - Hi-tech startups