

Computer Vision for Visual Effects

CVFX 2015

主題

介紹如何運用現有的電腦視覺技術，處理與編輯影像和影片，製作出特殊的視覺效果。

主題

課程除了理論講解之外，也會盡量透過實驗來加深對於電腦視覺技術的認識。

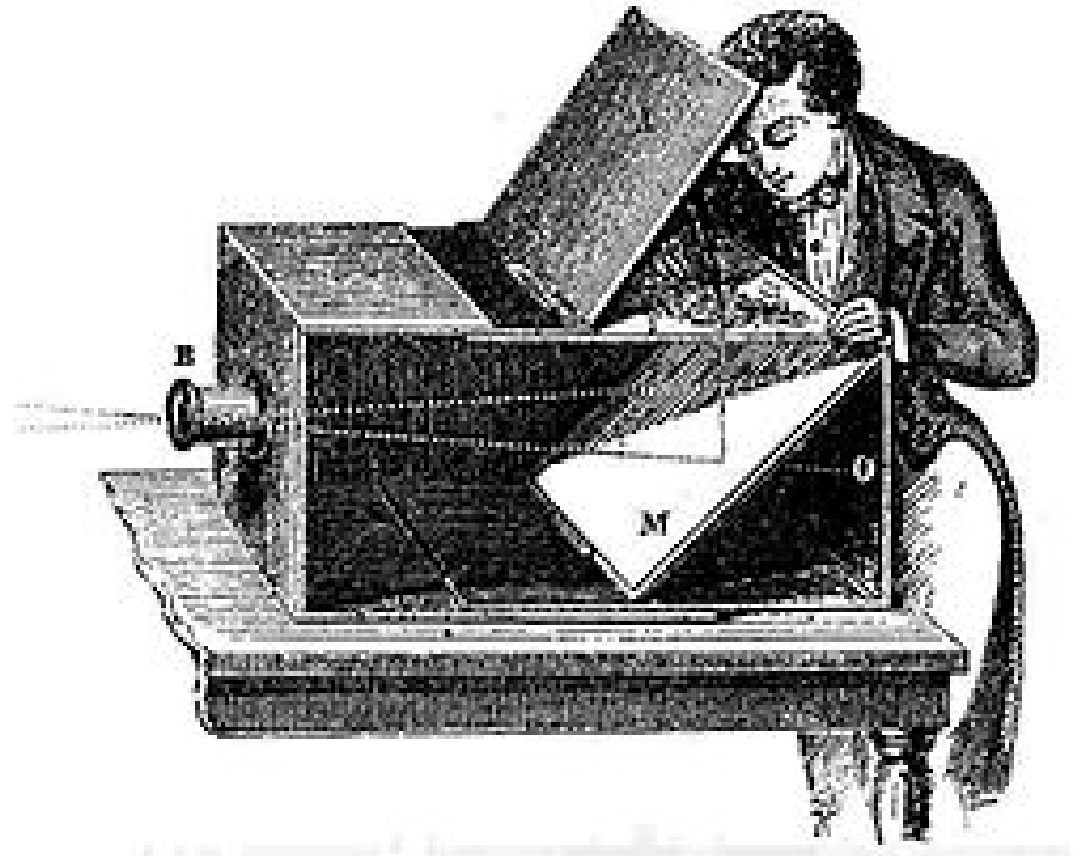
需要經常使用 Matlab 和 OpenCV 寫程式。

需要自己動手拍攝照片和影片。

需要製作暗箱以及輔助拍攝的器材。

Camera Obscura

暗箱



用原始的方式拍照：
影像處理的重要性
照片獨特
控制成像過程

釐清

不是電影特效

但作業會要求同學製作電影中出現的特效

而是電腦視覺特效

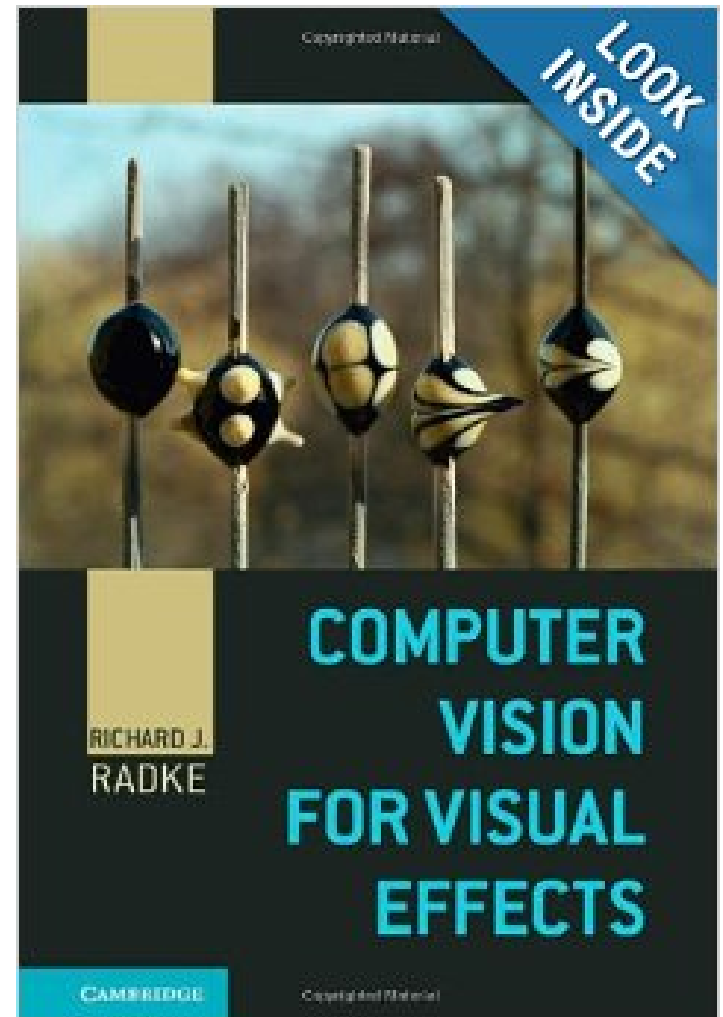
Computer Vision for Visual Effects

重點在電腦視覺和影像處理，特效是應用

教科書

Computer Vision for Visual Effects

Richard J. Radke



Book Website

<http://cvfxbook.com/>

The author is uploading video lectures

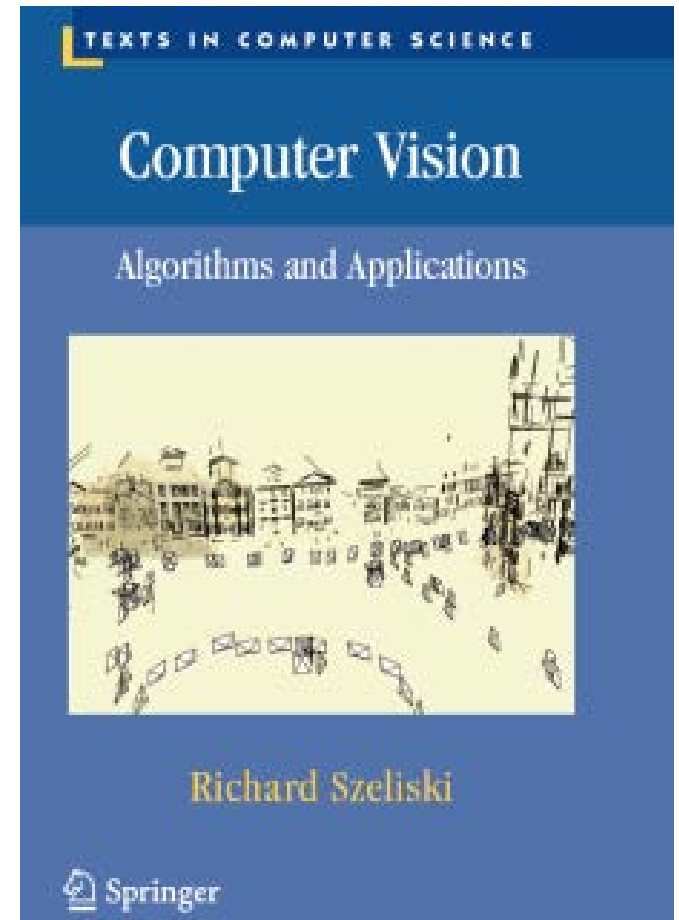
<http://cvfxbook.com/video-lectures/>

參考書

Computer Vision: Algorithms and Applications

Richard Szeliski

電子版



Prerequisites

✗ Computer vision

✗ Image processing

○ Linear algebra

○ Probability

○ Matlab, C++

Matlab Image Processing Toolbox

OpenCV

課程內容

- Color and lighting
- Inpainting and retargeting
- Tone mapping
- Matting
 - Blue-screen, natural image matting
- Image editing
 - Poisson blending
- Feature matching
- Dense correspondence
- Matchmoving

課程進行方式

每個星期 3 小時課堂講解與討論。

三人一組，共同完成作業與 Projects。

作業和 Projects 的分數將會以小組為單位評分。

個人的期末成績則會再因課堂參與及平時表現而有所差異 (10%)。

評分

80%: 作業 + Projects

呈現實驗過程與結果 demo

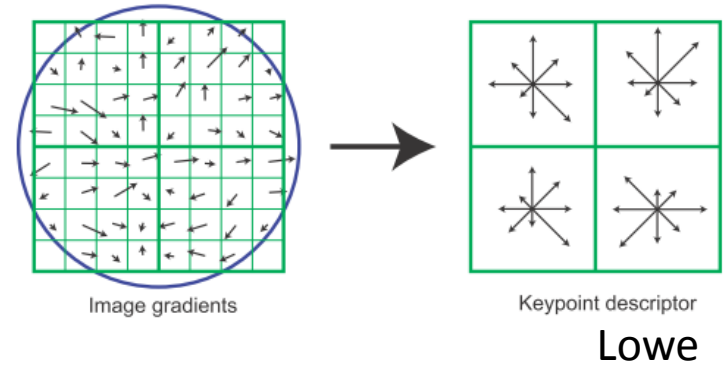
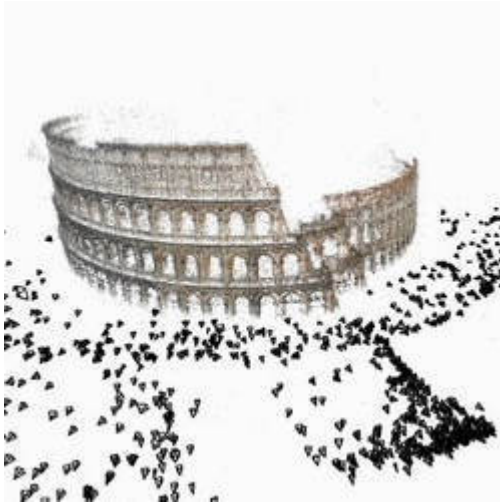
每周都有 共 14 次作業 + 3 個 projects

10%: Readings

讀十篇論文、寫心得

10%: 課堂參與、平時表現 (iLMS)

Computer Vision



Agarwal, Furukawa,
Snavely, Simon, Curless,
Seitz, Szeliski

<http://grail.cs.washington.edu/rome/>



Viola & Jones



Matrix



EyeVision, Kanade @ CMU

<https://www.youtube.com/watch?v=ohdhYEcCGVo>

freeD Static 360° Replay

The image shows a web browser window displaying a 360-degree video replay. The browser's address bar shows the URL `replay-technologies.com/fullscreen/html5-video/`. The website header features the **freeD™** logo with the tagline "FREE DIMENSIONAL VIDEO". A navigation menu includes links for HOME (free your video), PORTFOLIO (more videos), TECHNOLOGY (how it works), PRODUCTS (replay products), COMPANY (about us), and CONTACT (get in touch). Social media icons for Facebook, Twitter, YouTube, and Instagram are also present. The main content is a 360-degree video of a basketball player in a white jersey with the number 16 performing a dunk over a wooden chair on a basketball court. The court floor has "NEW ORLEANS 2014" written on it. A crowd of spectators is visible in the background. The video player interface at the bottom shows a play button, a progress bar at 00:02, and the Vimeo logo.

freeD Static 360° Replay

Free Your Video - FreeD T... x

replay-technologies.com/fullscreen/html5-video/

f t v i

freeDTM
FREE DIMENSIONAL VIDEO

HOME
free your video


PORTFOLIO
more videos

TECHNOLOGY
how it works

PRODUCTS
replay products

COMPANY
about us

CONTACT
get in touch



00:03

vimeo

freeD Static 360° Replay

Free Your Video - FreeD Tr x

replay-technologies.com/fullscreen/html5-video/

f t v i

freeD™
FREE DIMENSIONAL VIDEO

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PORTFOLIO
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00:06

vimeo

VFX Examples

- Stranger than Fiction
<https://www.youtube.com/watch?v=WDwTQ57YyzI>
- The Wolf of Wall Street
<https://www.youtube.com/watch?v=pocfRVAH9yU>
- Hollywoods History of Faking It
<https://www.youtube.com/watch?v=H8aoUXjSfsI>

Green Screen in Movies and TV

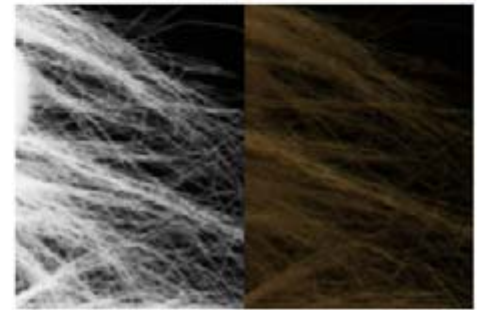
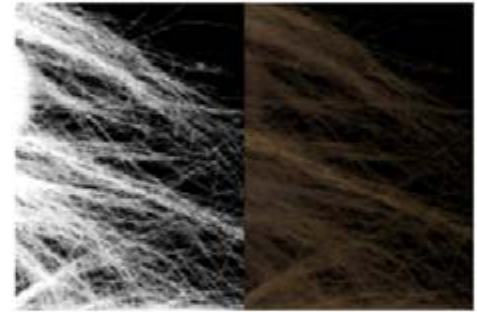
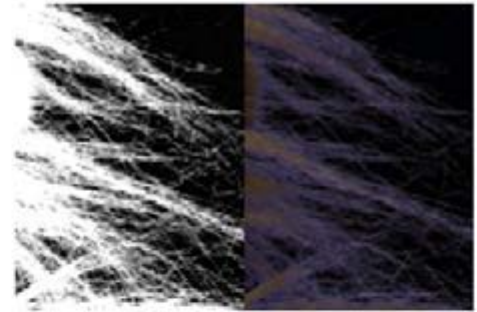
<https://www.youtube.com/watch?v=clnozSXYF4k>

Green Screen

- How to make a green screen
<https://www.youtube.com/watch?v=2BnaDgVoTJI>
- Chroma key studio setup
<https://www.youtube.com/watch?v=GjvqsB2EAuc>
- <https://www.youtube.com/watch?v=nueRJsHrF7o>

Natural Image Matting

Mishima's method
Bayesian approach
Ground truth



Alpha Matte

Composite

Inset

Chuang, Curless, Salesin

Color Grading

Shoot Your Friends: Color Grading Masterclass

<https://www.youtube.com/watch?v=2xTZtgApuDI>

Color Correction 101: Examples of Color Profiles
in Hollywood

<https://www.youtube.com/watch?v=OS6Tw5UT-8s>

Assignments

- Projective camera: simulate a scene taken with a camera with varying focal length (Dolly zoom)
- Color grading, relighting
- Inpainting
- Image editing
- Matting

Assignments

- Tracking shot, video stabilization
- Bullet-time stop motion
- Empty campus, average faces
- Matchmoving
- Rotoscoping: cartoon characters + real scenes
<http://www.youtube.com/watch?v=pqKtEcPlQ8w>

本週工作

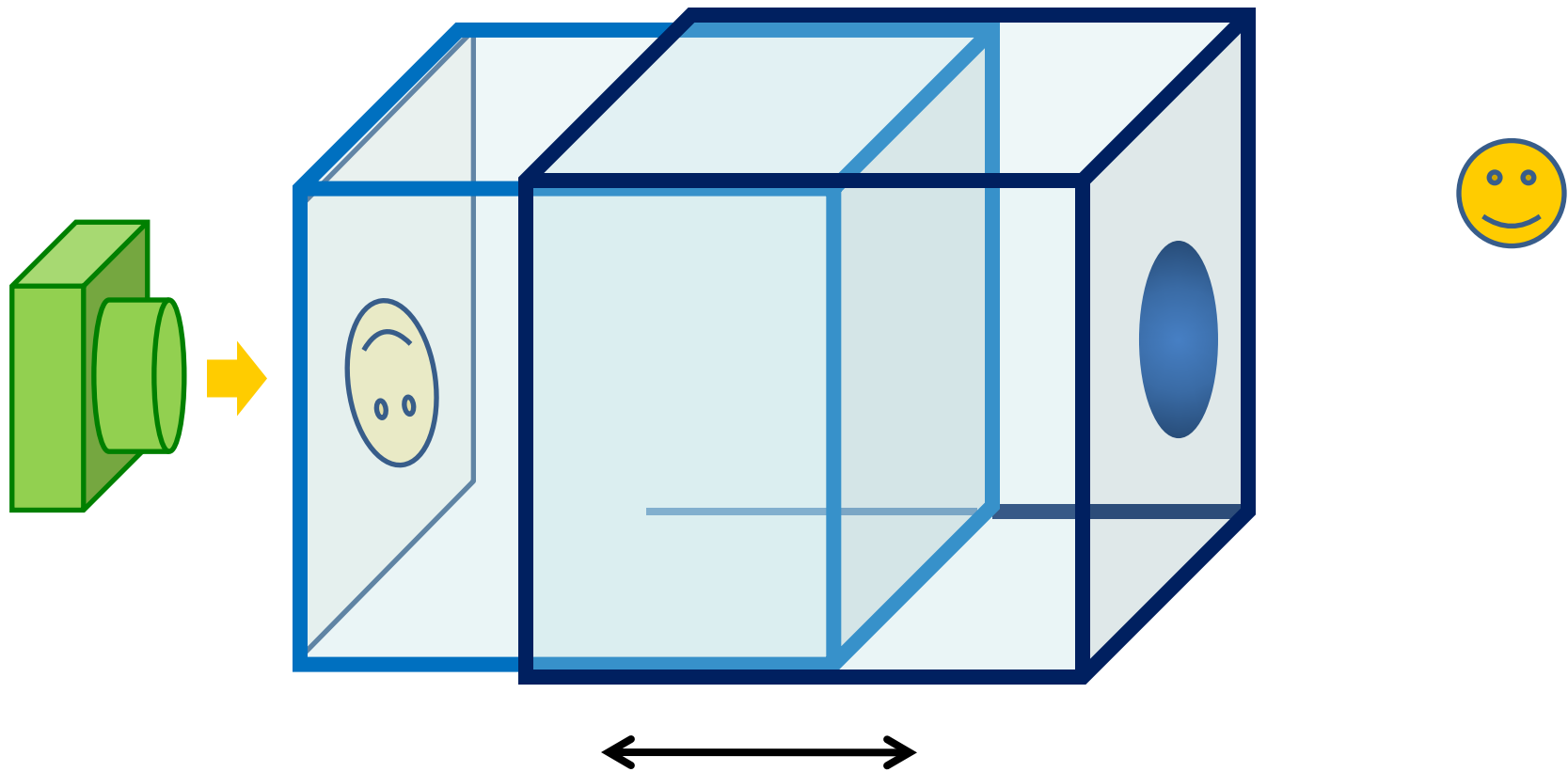
1. 分組, iLMS
2. 安裝 OpenCV, 測試附帶的範例程式
3. Reading 1
4. Assignment 1

Project I: Build a Camera Obscura

製作暗箱

每周進度報告
March 24 完工

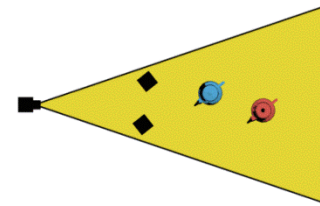
Project I



Assignment 1 (暖身)

Dolly zoom effect

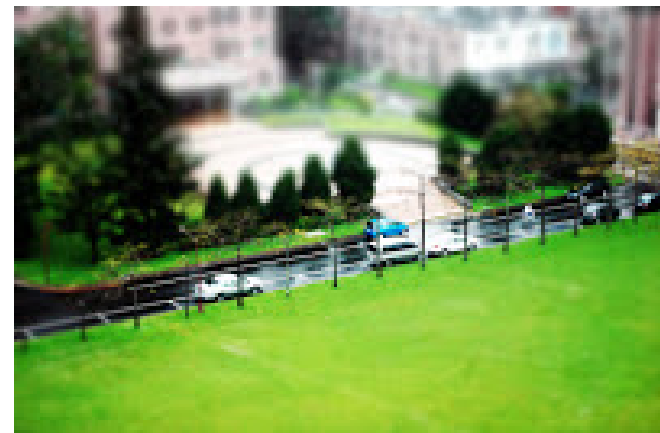
<https://www.youtube.com/watch?v=Amj6RiGiTOE>



[Wikipedia]

Miniature faking

<http://www.smashingmagazine.com/2008/11/16/beautiful-examples-of-tilt-shift-photography/>



Project II: 整個學期的工作

替同一個物體 或場景每天拍一張照片

最好是會緩慢變化的物體或場景

每天上傳 iLMS
或其他方式證明每天拍攝

