

CS4243 – Computer Vision & Pattern Recognition

Course Logistics

Angela Yao

13.01.2026

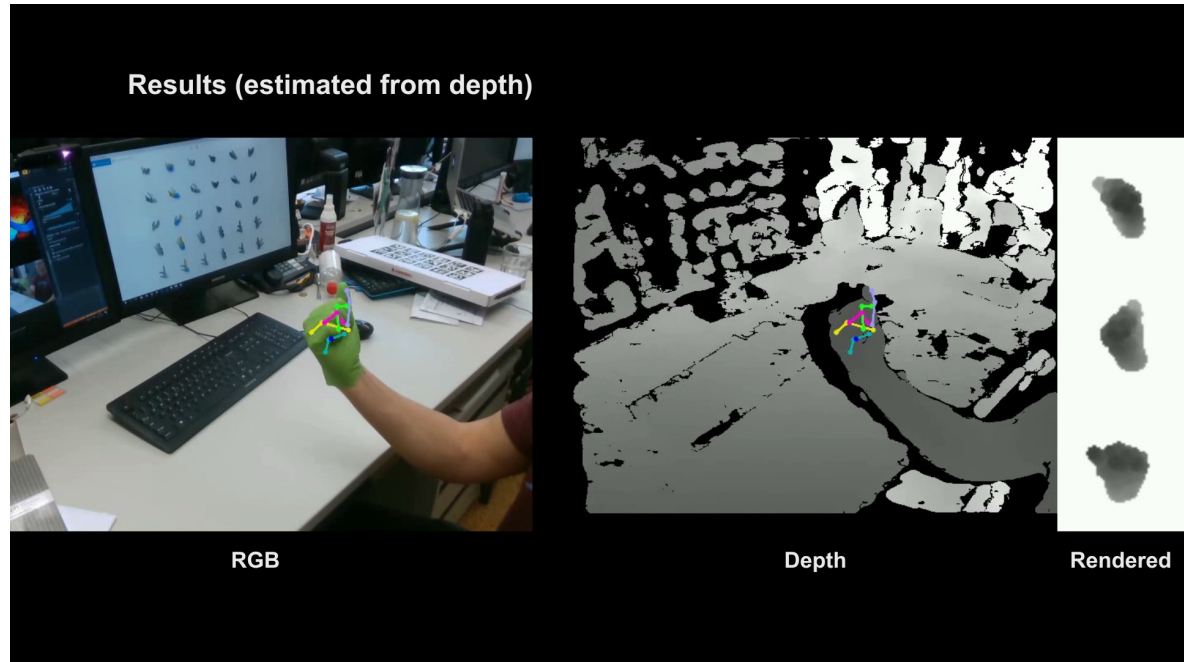
Instructor



Angela Yao

COM3 02-26

ayao@comp.nus.edu.sg



Research

- 3D pose estimation, video understanding
- sequence & time series modelling
- semi-supervised & unsupervised learning

Teaching Assistants

Pengzhan Sun	pengzhan@u.nus.edu	Lab 1, Lectures 1-4
Jiayin Zhu	zhujiayin@u.nus.edu	Lab 2, Lectures 5-6
He Qiyuan	qhe@u.nus.edu	Lab 3, Lectures 7-9
Tanuj Sur	tanujsur@comp.nus.edu.sg	Lab 4, Lectures 10-12
Dibyadip Chatterjee	dibyadip@comp.nus.edu.sg	Midterm + Admin



Email vs.
Discussion

Discussion on Canvas Forum

- Questions about content of lectures, labs, assignments, tutorials
- Questions about logistics of X/Y/Z
- Aim for turnaround by end of next working day (Mon - Fri)

Email

- Personal issues that don't affect anyone else in the class



Why are you taking CS4243?

<https://pollev.com/cs4243>

I heard that everyone got As last year and am hoping for an easy boost to my GPA.

- workload is high
- this is a math course; please don't join to learn deep learning

*I want to earn the big bucks as a
computer vision engineer
at Google / Amazon / Facebook.*



check out

CS4248 – Natural Language Processing

CS5242 – NN & Deep Learning

CS5447 – 3D Computer Vision

CS5260 – NN & Deep Learning II

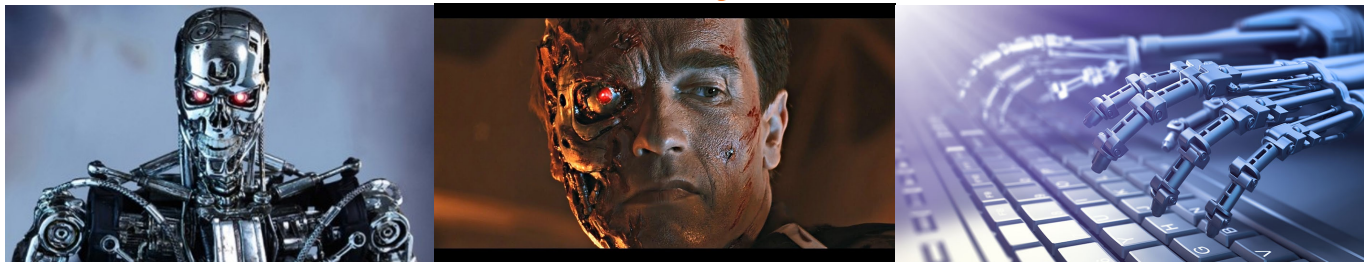
*I'm not actually enrolled and still
waiting for my appeal.
**Fingers crossed.*

Two offerings in fall & spring by different instructors.
Main distinctions:

1. This version is centers on “classic” vision,
only touches on deep learning at lecture 12.
2. More challenging course materials and workload?! ;)

*AI is cool and I want to
~~build the next Skynet.~~*

*learn how to automatically
interpret images and video.*



Intended Learning Outcomes

1

Understand the inherent structures and associated properties present in image data

2

Analyze algorithms for automatically extracting information from images and video

3

Implement popular computer vision algorithms

4

Solve image and video problems using computer vision techniques

Syllabus

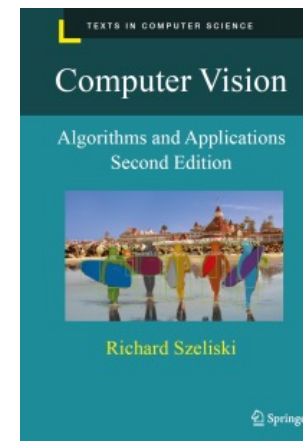
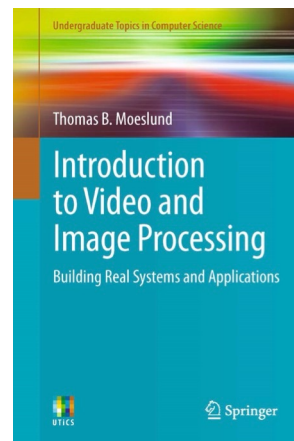
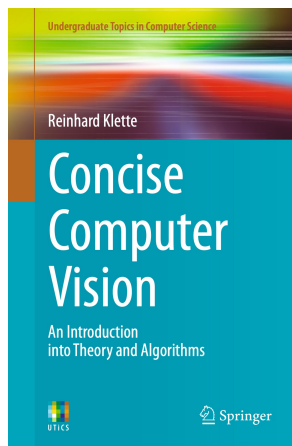
"traditional" CV: applying math and machine learning to images and video

- Introduction to CV + Digital Images
- Image Filtering
- Gradients & Edges
- Lines & Hough Transform
- Image Segmentation
- Visual Textures
- Local Features I: Keypoints
- Local Features II: Descriptors
- Homography
- Optical Flow
- Tracking
- Neural Networks

a cursory look at deep learning

Reference Materials

1. [Concise Computer Vision](#) by Reinhard Klette
2. [Introduction to Video and Image Processing](#) by Thomas B. Moeslund
3. [Computer Vision: Algorithms & Applications](#) by Richard Szeliski
4. [Visual Object Recognition](#) by Grauman & Leibe



What Can I Expect?

tl;dr interesting & fun BUT lots of math & work

- “The subject is very interesting” ... “hands-on.”
- “[I liked] the application-based learning in the labs”
- “Labs and the project were fun!”
- “The labs are really serious work, often taking up to 3 whole days for the python uninitiated. It did get easy though. It was arguably the toughest part of the whole module.”
- “Too much workload.” ... “like 6MC’s”
- “Too much math”

CV = Math + Machine Learning



"... too much content about math formula. ... should cover more practical materials instead of theoretical math."



Theory and derivations can give insight into *why* the method works and when it will fail. We will aim to strike a balance between practical and theoretical.

Practical / hands-on IS NOT
learning API calls from established libraries.

We will implement different algorithms and methods (almost) from scratch for learning and understanding.

There will definitely be lots of
math, equations and derivations..

Please do not register for this module if you don't enjoy understanding mathematical foundations, doing derivations and other

~~You Should~~ ^{must} Be Comfortable With ...

- Linear Algebra
 - manipulating matrices: multiplication, inversion
 - eigenvalue decomposition
- Calculus, Probability, Statistics
 - functions & derivatives
 - random variables
- Machine Learning
 - classification & regression
 - training, validation, testing
 - optimization
- Programming (in Python)

Basic toolset for problem setup, doing derivations, understanding how the methods work. Check out the sample math (Canvas > Files > Miscellaneous).

The bulk of computer vision today is machine learning applied to images and video. These concepts form the foundation.

How to Do Well in CS4243

- Show up to live lecture!
- Take advantage of the resources (TA, instructor, FAQs, discussion forum) and ask lots of questions!
- Focus on the problem formulations, motivations and assumptions of the algorithms, don't stress over all the small details
- Know what you are getting into: workload (heavy) + content (math oriented)



Module Format

Lectures:

- Slides + live lecture are the authoritative source
- Video (50-80 mins) materials may slightly differ since it comes from a previous offering. They are meant only to aid your learning.

Tutorial / Lab Sessions:

- Five sessions in weeks 5, 7, 9, 11, 13. **Attend any slot that you wish.**
- ~45 mins of presentation by TA (see tutorial handouts for contents)
- remaining time is Q&A for lectures, lab material of your choice
- Not graded – it provided to supplement your learning and understanding

Assessment

Labs (4 x 9% = 36%)

- Groups of up to 2 people, do not need to be in same lab/tutorial section
- Deadline on Fridays at 22h00, 33% deduction (3% of final grade) per late day
- **Two 24 hour freebies → no need to email, will be applied automatically**

Midterm (24%)

- Mar 10, 14:30 – 15:30, Lecture hall + adjacent venue (tbd)
- Done on ExamSoft + 1 A4 page cheat-sheet
- Refer to past quiz materials on Canvas as reference for study

Final Exam (40%)

- May 6, 17-19h, done on ExamSoft; 1 A4 page cheat-sheet

Canvas

- Turn on notification for announcements

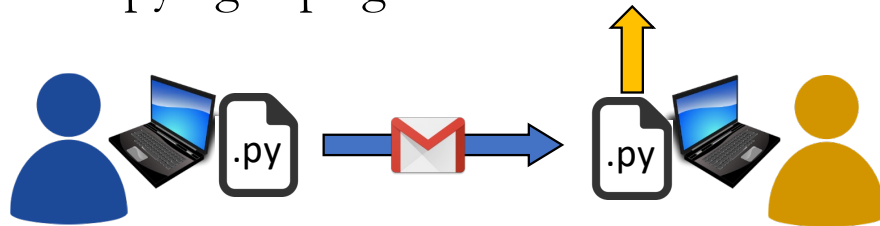
The screenshot shows the 'Notification Settings' page for the course 'CS4243 Computer Vision'. The left sidebar contains navigation links: Account, Dashboard, Courses, Calendar, Inbox, History, Commons, Studio, DYOM, Help, and a back arrow. The main content area has a left sidebar with 'Notifications' selected, and a right sidebar with 'Profile', 'Files', 'Settings', 'Shared Content', 'Student Feedback', 'Student Feedback Reports (For teachers)', and 'Global announcements'. The 'Settings for' dropdown is set to 'CS4243 Computer Vision'. A toggle switch is turned on, with the text 'Enable Notifications for CS4243 Computer Vision and Pattern Recognition [2220]'. Below this, a message states: 'You are currently receiving notifications for this course. To disable course notifications, use the toggle above.' The 'Course activities' table lists various activities with their notification status. The 'Announcement' row is circled in red, and the 'Announcement created by you' row has a question mark icon.

Course activities	Email dcsyya@nus.edu.sg
Due Date	🔔
Grading policies	🔔
Course Content	🔔
Files	🔔
Announcement	🔔
Announcement created by you	🔔 ?

Academic Honour Code

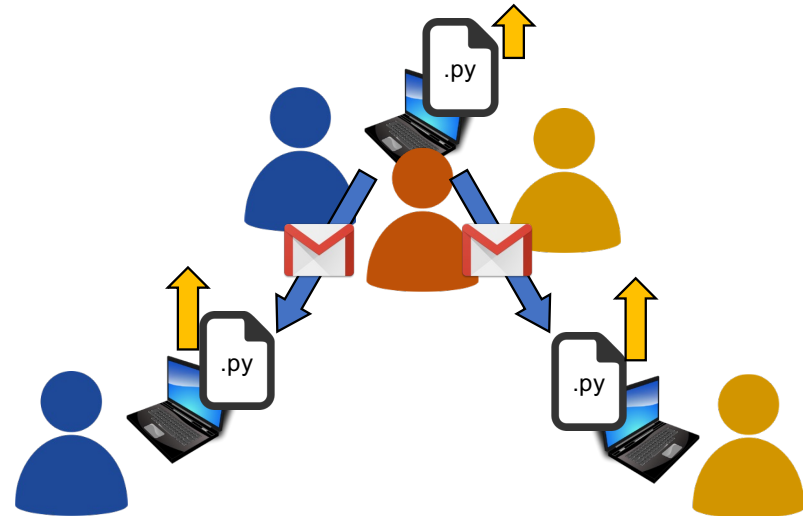
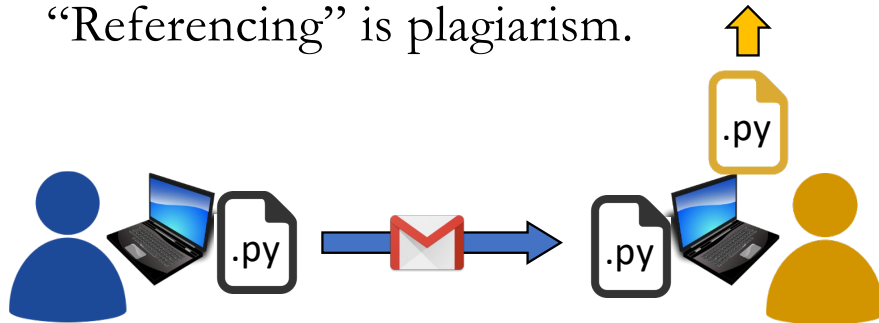
- Since move to E-Learning with Covid, NUS has moved to a zero-tolerance policy.
- **Automatic F-grade for plagiarism and cheating.** [\[link\]](#)

Copying is plagiarism.



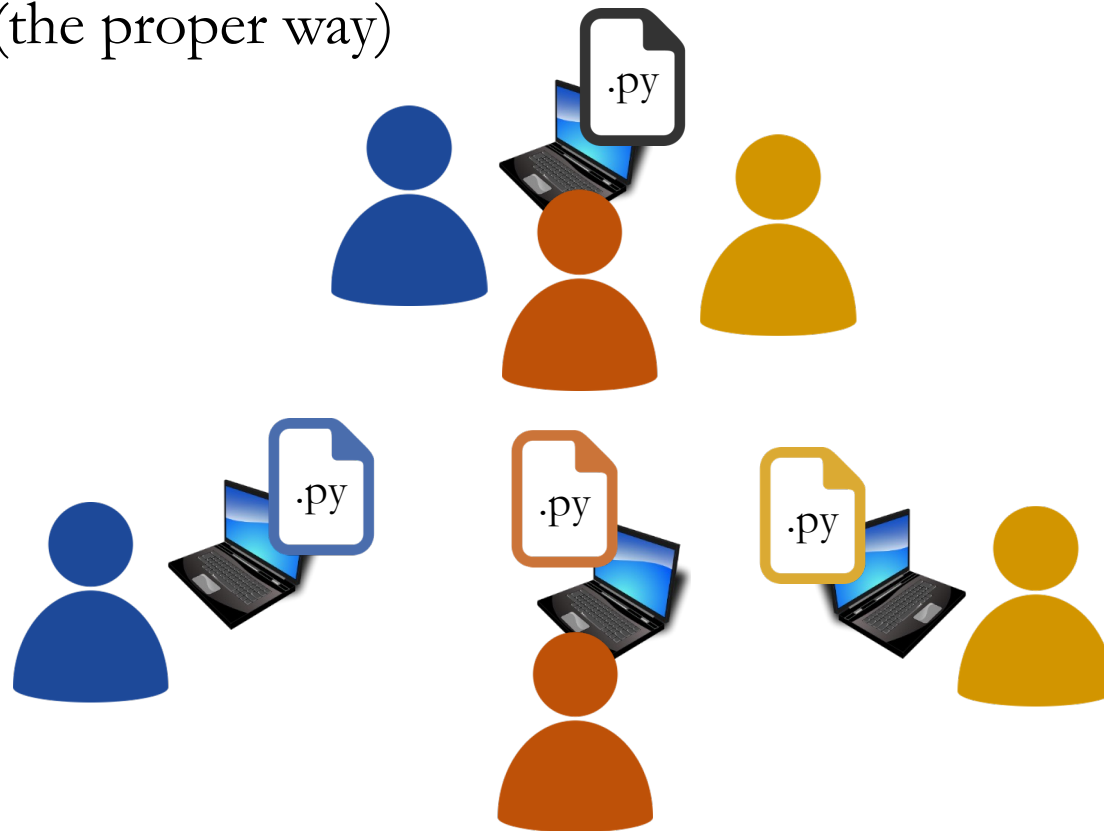
“Discussion” is plagiarism.

“Referencing” is plagiarism.



Not Plagiarism

Discussion (the proper way)





Right Infringements on NUS Course Materials

All course participants (including guest students) who have access to the course materials on CANVAS or any approved platforms by NUS for delivery of NUS modules are not allowed to re-distribute the contents in any forms to third parties without the explicit consent from the module instructors or authorized NUS officials.