

Deep Learning for Computer Vision

Fall 2020

<http://vllab.ee.ntu.edu.tw/dlcv.html> (Public website)

<https://cool.ntu.edu.tw/courses/3368> (NTU COOL; for grade, etc.)

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2020/09/15

Before We Start...

- Following Taiwan CDC (& NTU) Regulations...
 - If social distancing cannot be enforced (obviously not able in this class), please **wear a mask** to protect yourself and those around you.
 - In addition to slides, we do offer **lecture videos** (slides + notes + audio) which will be available online at NTU COOL after the class.
 - Thus, it's OK if you are not able to physically come to the class.
But, # of enrollments of this course is still based on the classroom capacity (147).



Deep Learning for Computer Vision

- Time/Location: Tuesday 7, 8, 9 (14:20-17:30) @ BL-112 (**for now**)
- Website:
 - <http://vllab.ee.ntu.edu.tw/dlcv.html> (primary)
 - <https://cool.ntu.edu.tw/courses/3368> (announcement, grade, etc.)
 - <https://www.facebook.com/groups/3198278343542909> (**Facebook: DLCV Fall 2020**)
- Required Knowledge & Skills
 - Knowledge of linear algebra, vector calculus, and basic probability (**required**)
 - Programming skills (**required in Python**)
 - Backgrounds in machine learning (**optional**)
- This course is offered in English (lecture part).
- Q&A during/after class can be in any language which can be understood by both sides.

What to Expect from this Course?

- (Deep) Learning-Based Computer Vision
 - Fundamentals of machine learning
 - **Deep learning** technologies for visual representation, classification, synthesis, and beyond
 - Differ from the course of Computer Vision in Spring 2020/2021 (more **geometry-based computer vision**)
- Practical Experiences
 - Assignments and projects dealing with real-world visual data
 - Final projects possibly supported by industries with prizes
- Lots of work and fast paces, but hopefully helpful with lots of fun!



FUN!

Disclaimer

- Currently, you are responsible for your own **computing resources** (i.e., GPUs), which are absolutely required for your HWs & the final project.
- Syllabus, course policy, and HW/project details might change over time. (DL/CV/AI are fast growing/changing research topics.)
- This course will be very **demanding and challenging!**
- **Yes, we did fail students in the past semesters (~5% each semester).**



Computing Resources

- **Not** offered (as of Sept 15th)
- However, you do need them for your HWs/final projects.

	authentication	free quota	comment
Azure (Microsoft Azure)	✓ student ID ✓ credit card	+ USD \$ 100 + USD \$ 200	1*K80 = USD \$ 0.9 / hour
GCP (Google Cloud Platform)	✓ credit card	USD \$300 / 3 months	
AWS (Amazon Web Service)	✓ credit card	-	1 GPU = about US\$ 571.01 / year
Colab (Google Colaboratory)	✓ no limit	-	<ul style="list-style-type: none"> ● session may be interrupted if running time > certain hours (exact time unknown) ● suggest only for testing code

Course Information

- Teaching Team & Office Hours
- Course Policy
- How to enroll in this class if not already in?

Teaching Team & Office Hours

- Instructor: Yu-Chiang Frank Wang (王鈺強)
- Research Areas
 - Computer Vision, Machine Learning, Deep Learning, & Artificial Intelligence
- Education
 - PhD, ECE, Carnegie Mellon University, 2009
 - MS, ECE, Carnegie Mellon University, 2004
 - BS, EE, National Taiwan University, 2001
- Contact Info
 - Email: ycwang@ntu.edu.tw
- Office Hour for DLCV Fall 2020:
Preferably during/after class; appointment by email is suggested.



TAs & Office Hours: (all at BL-527)



黃聖喻 (Sheng-Yu Huang)
r08942095@ntu.edu.tw
TA Hours: Thu 3-4pm



黃郁珊 (Yu-Shan Huang)
r09942089@ntu.edu.tw
TA Hours: Tue 1-2pm



范萬泉 (Wan-Cyuan Fan)
r09942092@ntu.edu.tw
TA Hours: Wed 1-2pm



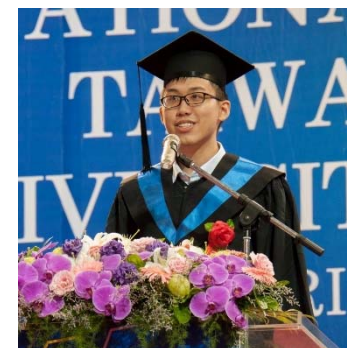
蕭如芸 (Zu-Yun Shiau)
r09942069@ntu.edu.tw
TA Hours: Mon 3-4pm



楊晟甫 Cheng-Fu Yang
cfyang58@ntu.edu.tw
TA Hours: Fri 11am-12pm



譚丞佑 Ugo Tan
ugoyoyo123@gmail.com
TA Hours: Thu 4-5pm



楊喬諳 (Chiao-An Yang)
joeyang@ntu.edu.tw
TA Hours: Wed 2-3pm

You should contact your TA **by email** at ntudlcv@gmail.com .

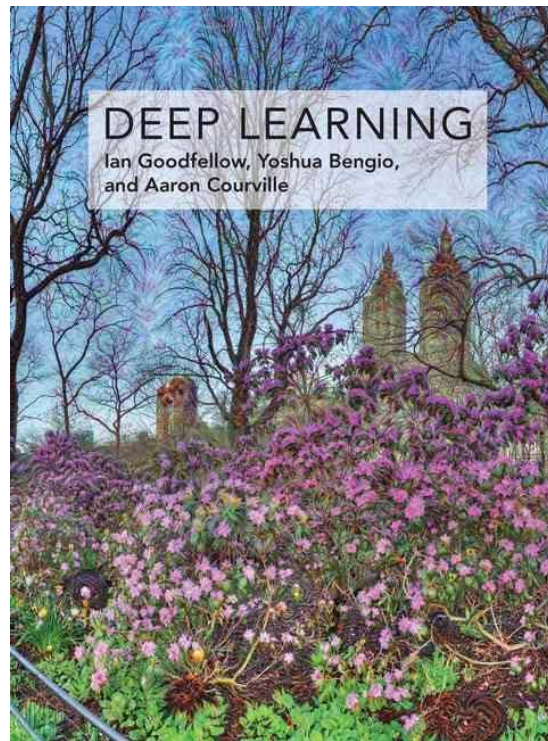
You can also discuss with TAs & other classmates at the **Facebook Page** (**not** via messenger)

Tight (yet tentative) Schedule

Week	Date	Topic	Remarks
1	9/15	Course Logistics	
2 ✓	9/22	Machine Learning 101	
3	9/29	Convolutional Neural Network (I)	HW #1 out
4	10/6	Convolutional Neural Network (II): Visualization & Extensions of CNN	
5 ↓	10/13	Tutorials on Python, Github, etc. (by TAs); Invited Talk by Prof. Philipp Krähenbühl (UT Austin)	HW #1 due
6	10/20	Object Detection & Segmentation ✓	HW #2 out
7	10/27	Generative Models & Generative Adversarial Network (GAN) ✓	
8	11/3	Transfer Learning for Visual Classification & Synthesis (I)	HW #2 due
9	11/10	Transfer Learning for Visual Classification & Synthesis (II); Representation Disentanglement	HW #3 out
10	11/17	TBD (CVPR Week)	
11	11/24	Recurrent Neural Networks & Transformer (I)	HW #3 due
12	12/1	Recurrent Neural Networks & Transformer (II)	
13	12/8	Meta-Learning; Few-Shot and Zero-Shot Classification	HW #4 out
14	12/15	From Domain Adaptation to Domain Generalization	Team-up for Final Projects
15	12/22	Beyond 2D vision (3D and Depth)	
16	12/29	Image Inpainting and Outpainting; Guest Lecture	HW #4 due
17	1/5	Guest Lectures	
	1/18-22	Presentation for Final Projects	TBD

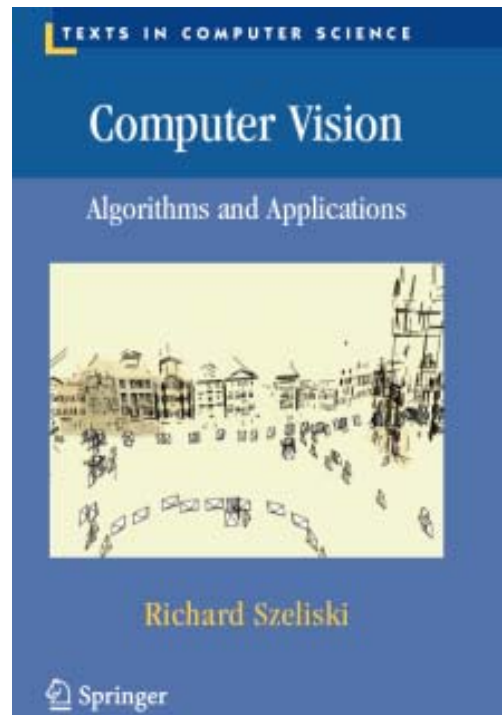
Textbook (Optional)

- Deep Learning, MIT Press
 - Ian Goodfellow, Yoshua Bengio, and Aaron Courville
 - Free online versions available at www.deeplearningbook.org

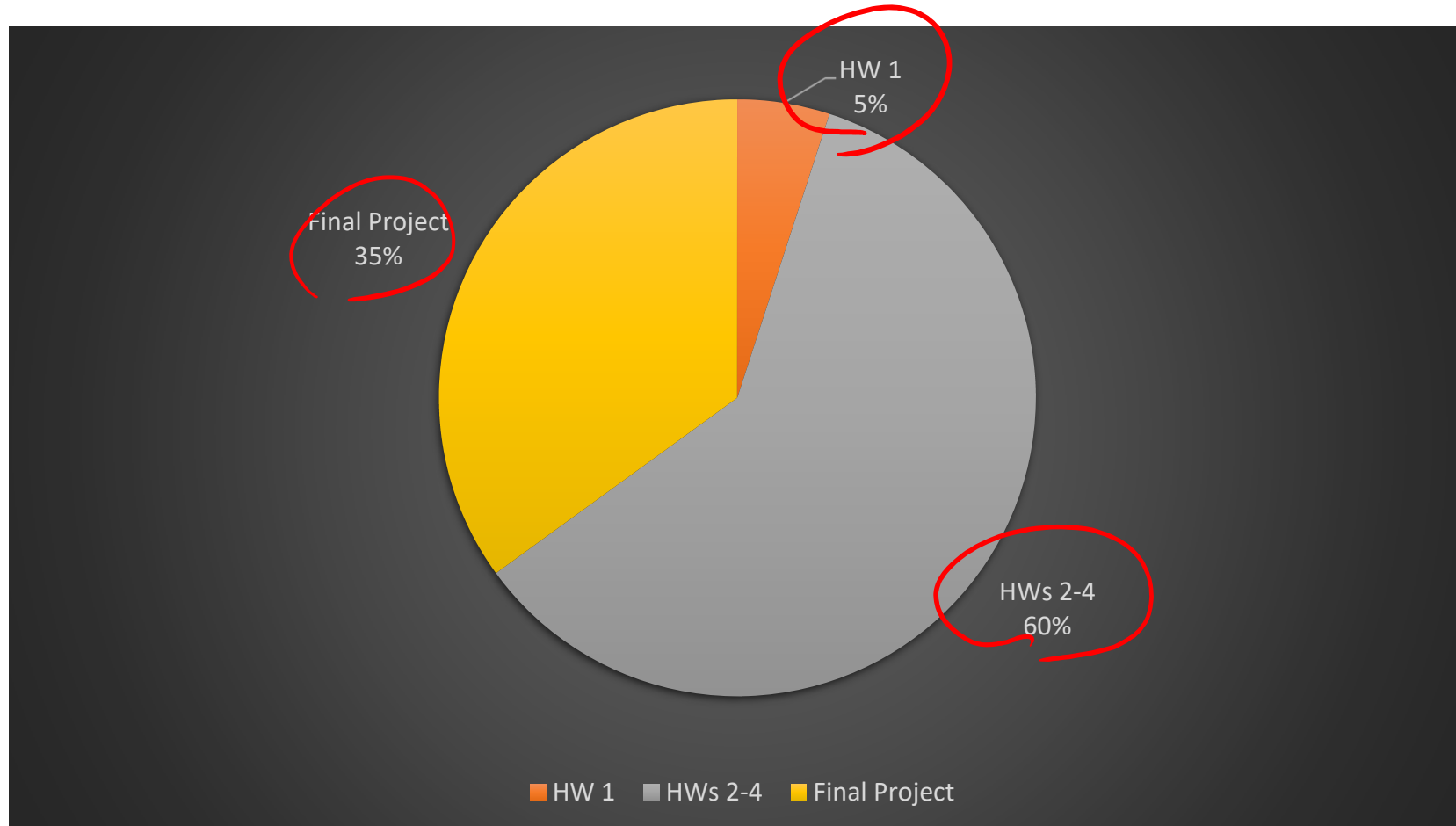


Textbook (Optional)

- Computer Vision: Algorithms and Applications, Springer
 - Richard Szeliski
 - Free online versions available at <http://szeliski.org/Book/>



About Grading



Bonus points available for HWs 2-4

About Grading (cont'd)

- HW assignments **(65%)**
 - HW 1 (non-DL HW, 5%), HW 2~4 (DL HWs, ~20% each)
- Final project + poster presentation + code, etc. **(35%)**
- **Bonus points**
 - Course participation (e.g., Q&A)
 - Extra challenges & points in HWs 2-4
 - Excellent performance for final project (e.g., competitions, publications, etc.)
- *Cash Prize (optional)*
 - Selected final projects might be sponsored by industries.
 - Details to be announced.



Final Grade

Letter Grading System	Definition	Grade Points	Conversion Scale
A+	All goals achieved beyond expectation	4.3	90-100
A	All goals achieved	4.0	85-89
A-	All goals achieved, but need some polish	3.7	80-84
B+	Some goals well achieved	3.3	77-79
B	Some goals adequately achieved	3.0	73-76
B- (passing grade for graduate students)	Some goals achieved with minor flaws	2.7	70-72
C+	Minimum goals achieved	2.3	67-69
C	Minimum goals achieved with minor flaws	2.0	63-66
C- (passing grade for undergraduate students)	Minimum goals achieved with major flaws	1.7	60-62
F	Minimum goals not achieved	0	59 and below
X	Not graded due to unexcused absences or other reasons	0	0
W	Withdrawal		
NG	No grade reported		
IP	In progress		
TR	Transfer credit		
EX	Exempted		

About Course HWs/Projects

- About HW late policy
 - In case you have dates, midterms, HW dues for other course, etc.
如期中考、專題、社團、約會、~~找不到人抄~~
 - For HWs 2~4, up to **THREE free late days** this semester
(e.g., 1min ~ 23hr 59min all count as **ONE** late day.)
 - After that, a penalty to **30%** per day.
 - Once late days are used, the decisions are final.
However, we'll maximize your final score based on each HW score and the late days used.
 - **No** late submission for the final project

About Course HWs/Projects



- About Final Project
 - 3~4 (max) people per group
 - Project proposal/progress/final report* + poster & oral presentation
 - Selected topics possibly come with cash prizes.
 - Details to be announced after mid semester.
 - Evaluated by **instructor**, **TAs**, and possibly **guest judges**
 - **(Intra/inter-group) peer evaluation will be conducted.**
 - Snack/drinks will be provided during final presentation (week of 1/18).



Academic Integrity

- Can discuss HW with peers, but DO NOT copy and/or share code
 - **Plagiarism is against the university policy.**
 - **ANY violation (HWs, etc.) would result in F!**
 - Seriously, we gave at least five **Fs** in previous semesters based on these cases.
- Do not directly use code from Internet unless you have permissions.
 - If not sure, ask!
 - If so, do specify in your HW/project.
- Do **NOT** use your published work as your final project.
 - However, you are encouraged to extend your previous works.
 - Also, you are encouraged to turn your high-quality projects into publications.

DOs and DONTs for the TAs (& Instructor)

- ✓ • Do NOT send **private** messages to the TAs via Facebook.
 - TAs are here to help, but they are not your tutors 24/7.
- ✓ • TAs will **NOT** debug for you, including addressing coding, environmental, library dependency problems.
- ✓ • TAs do **NOT** answer questions not related to the course.
 - If you cannot make the TA hours, please email the TAs to schedule an appointment instead of stopping by the lab directly.

How to Sign Up If Not Already In?



- **Capacity**

- Classroom capacity: ~~140~~¹⁴⁷; currently registered: 80
- Only additional **60** students allowed due to capacity

- **Priority**

- EECS > Engr. w/ relevant backgrounds > Sci. > others
- Based on seniority, backgrounds, programming skills, etc.
- If you are still interested in this course and plan to enroll, please fill in the following form by 9/15 Tue 23:59:
<https://ppt.cc/fipA0x>
- We will announce the enrollment results via email no later than 9/18 Fri 5pm. All decisions are final.





Any Questions?

Course registration form (by 9/15 23:59 Taiwan time)
<https://ppt.cc/fipA0x>

