26. ML Advice
STA3142 Statistical Machine Learning

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Assignment 5 (Final Exam Replacement)

- Due **Friday 6/14, 11:59pm**

- Topic: Convolutional Neural Networks
  - Derive gradients for NN layers
  - Implement layers for CNNs
  - Train a CNN classifier for MNIST digit recognition

- Please read the instruction carefully!
  - Submit one pdf and one zip file separately
  - Write your code only in the designated spaces
  - Do not import additional libraries
  - …

- If you feel difficult, consider to take option 2.

Announcement

About delayed release of assignment grades & plagiarism

- We expect to release grading results starting from the next week.

- Don't worry about plagiarism if you are honest and you did your own work. (Note: we know most students are honest.)

- If not, please carefully check the assignment policy in Lecture 1 and go through the link below.

  - https://www.classum.com/main/course/113295/community/40

ML Advice: How to Read Papers

Source: Andrew Ng

ML Conferences/Journals

- ML: NeurIPS, ICML, ICLR*, …

- AI: AAAI, IJCAI, AISTATS, …

- CV: CVPR, ICCV, ECCV, …

- NLP: ACL, EMNLP, NAACL, …

- Journal: TPAMI, JMLR, TMLR*, IJCV, TIP, TACL, …

- Acceptance rate is about 20~30%.

- *: made recently; publication record is often not counted in Korea

How much popular?

- As of Jun 12, 2024

- ML/CV conferences

- Journals accepting ML papers

- ICCV @ 26th place

- AAAI @ 33rd place

- ACL @ 45th place

- TPAMI @ 56th place
  - The most prestigious journal in ML

	Categories ▾		English ▾
	Publication	h5-index	h5-median
1.	Nature	467	707
2.	The New England Journal of Medicine	439	876
3.	Science	424	665
4.	IEEE/CVF Conference on Computer Vision and Pattern Recognition	422	681
5.	The Lancet	368	688
6.	Nature Communications	349	456
7.	Advanced Materials	326	415
8.	Cell	316	503
9.	Neural Information Processing Systems	309	503
10.	International Conference on Learning Representations	303	563
11.	JAMA	286	476
12.	Science of The Total Environment	273	375
13.	Nature Medicine	268	459
14.	Proceedings of the National Academy of Sciences	268	394
15.	Angewandte Chemie International Edition	266	362
16.	Chemical Reviews	264	459
17.	International Conference on Machine Learning	254	463
18.	Chemical Society Reviews	248	390
19.	Journal of Cleaner Production	246	321
20.	Nucleic Acids Research	238	539
21.	European Conference on Computer Vision	238	390

How to read papers

- Complete list of papers
  - Conference
  - Journal
  - Twitter, Medium, blog posts, friends
- Initially skim and quickly check the high-level idea of the papers
- Go into more depth into more relevant/important papers
- Update paper list (cited papers, follow ups, etc.)
- Go into deeper into more details for relevant ones

How a general paper is organized

- Title, author info

- Abstract

1. Introduction

2. Related work

3. Approach

4. Experiments/Discussion

5. Conclusion

- Reference

- Appendix

Reading a paper

Do multiple passes

- Title / Abstract / Figures

- Intro / Conclusions / Figures + skim the rest
    - (Skim related work)

- Read but skip/skim math

- Read math and try to understand the key technical ideas

- Read the whole paper but skip parts that don't make sense

Reading a paper

Try to answer these questions while reading paper

- What did the authors try to accomplish?

- What were the key elements of the approach?

- What can you use yourself?

- What other references do you want to follow?

Reading a paper: technical details

Math

- Re-derive math from scratch

Code

- Run open-source code
- Read the details of the code
- Re-implement from scratch

Reading a paper: consistency is important

- Steady, consistent reading N papers a week is much better than reading lots of papers in short bursts

- This is true for any learning!

ML Career Advice

Source: Andrew Ng

ML Career Advice

- Short-term goal:
  - Job (big company or startup)
    - International: Adobe, Amazon, DeepMind, Facebook (Meta), Google, IBM, Intel, Microsoft, NVIDIA, Qualcomm, …
    - Domestic: Kakao, LG, Line, Naver, Samsung, SK T-brain, …
  - MS
  - PhD
- Overall, you want to do important works.

- Specific questions:
  1. How to get jobs?
  2. Selecting a position

ML Career Advice

Recruiters look for:

- Technical skills (ML knowledge and skills: quiz, coding, etc.)
- Meaningful / significant work
  - Making things work
  - Applications
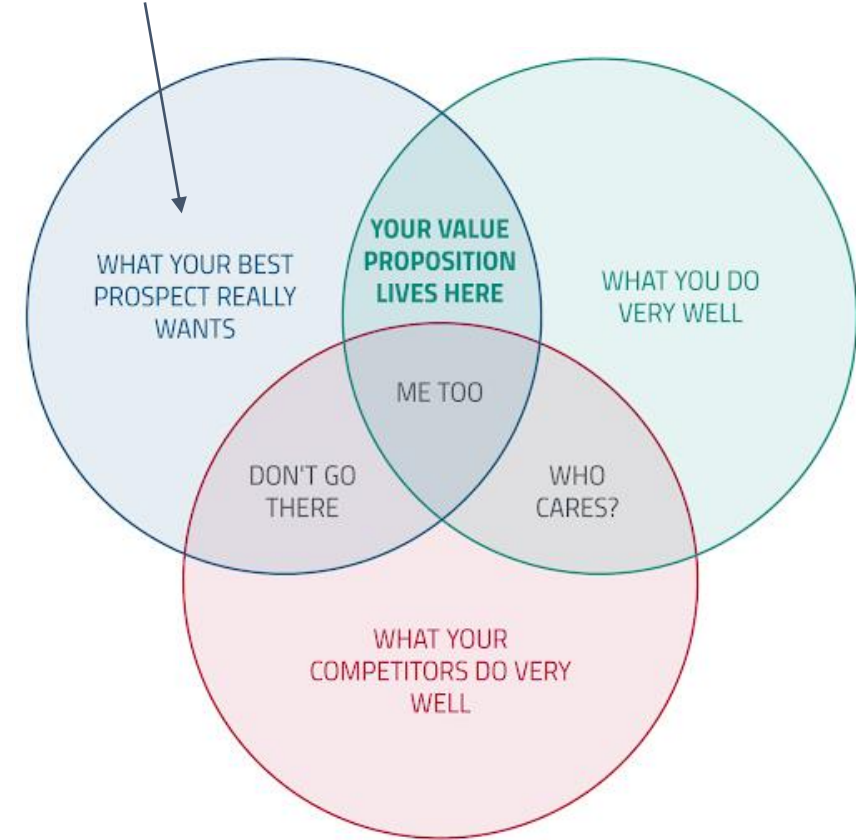 - Show evidence that you can do important works

ML Career Advice

Unique Value Proposition (UVP)

- A clear statement that describes the benefit of your "expertise and skills", how you solve your customer's needs and what distinguishes you from others (e.g., "competition").

Examples of prospects / customers:

- Company
- Research Community
- Academia/Schools

ML Career Advice: Breadth vs. Depth

Ideally you want to have **T-shaped expertise** (both breadth and depth)

- Breadth:
  - ML Areas: ML, DL, Vision, NLP, RL, etc.
  - Breadth within DL: NN, Optimization, CNN, RNN/LSTM, Unsupervised Learning, Generative Models, Deep RL, etc.

- Depth:
  - Projects
  - Open-source
  - Research
  - Internship

ML Career Advice: Breadth vs. Depth

Ideally you want to have **T-shaped expertise** (both breadth and depth)

- Non-ideal cases:
  - Only breadth but no depth
  - Only depth but no breadth
  - Breadth + many small projects without significant results

ML Career Advice: Breadth vs. Depth

How to expertise?

- Breadth: Foundational skills
  - Coursework
  - Reading papers
- Depth:
  - Focused work on relevant projects
  - Try your best to achieve significant results
    - Solving problems, new applications, improving performance, open-source code, publishing papers, etc.

Selecting a job

Key factor: Work with great people on important projects
- Focus on the team that you will interact with (10-30 people)
- Manager
- Not on "brand"

Ultimately, your ideal end-goal (career-wise) should be making impacts.

Other tips:
- Talk to people; do internships

Selecting a job: decision making

- List key aspects/criteria of the job (some examples, but not limited to)
    - Team (colleagues, manager, etc.)
    - Projects
    - Potential impact
    - Growth potential (company, team, etc.)
    - Learning (personal growth)
    - Compensation
    - Family
    - Work-life balance
    - Culture
- Rate the importance of these criteria (1-10 scale)
- Rate individual scores for different job options
- Calculate the weighted average

The End!