CSCI4353
Intro to Deep Learning

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Fall 2023

Dr. Dongchul Kim
Department of Computer Science
UTRGV

Course Introduction

Please, download the syllabus from blackboard

Auditing is not allowed

Instructor

Instructor: Dr. Dongchul Kim

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Office Hours: Wednesday 10:30~11:30 am

Teaching Assistant

TA Name: Gaukhar Nurbek

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Office: EIEAB 3.212

Office Hours: TBA

Prerequisite

Programming Skills:

Language: Python (all class assignments)

Note: Experience in languages such as C, C++, Matlab, or Javascript should aid in transition to Python

Mathematical Foundations:

Calculus & Linear Algebra: Comfort with derivatives, matrix vector operations, and notation

Probability and Statistics: Understanding of probabilities, Gaussian distributions, mean, standard deviation, etc.

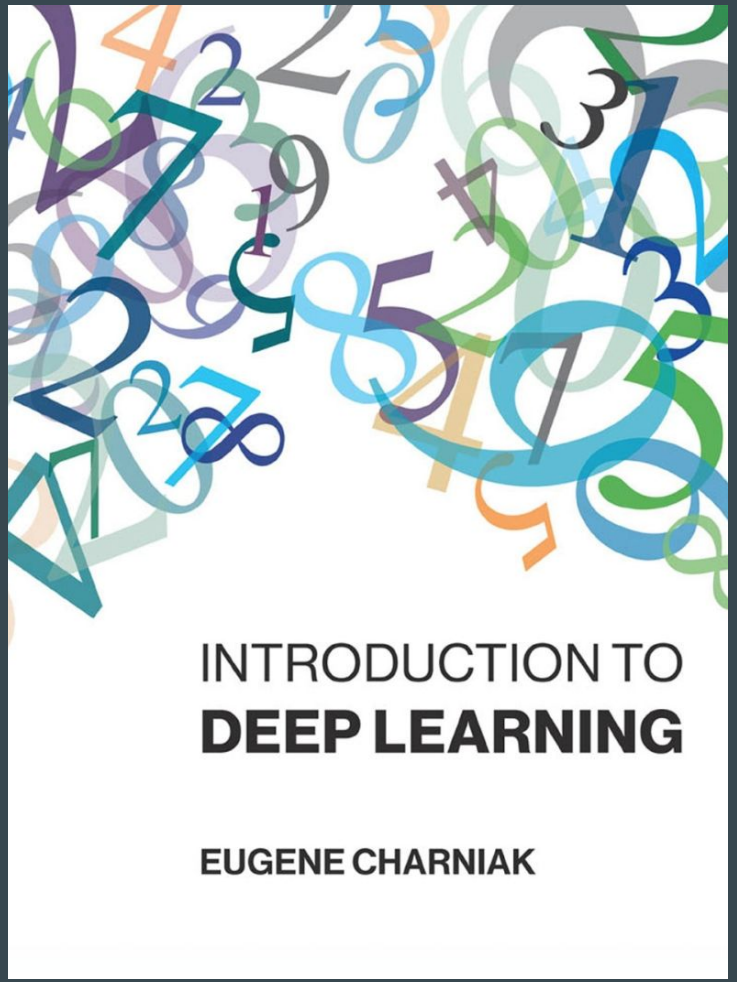
Reference books

Title: Introduction to Deep Learning

Author: Eugene Charniak

Publisher: The MIT Press (Jan. 2019)

ISBN-13: 978-0262039512



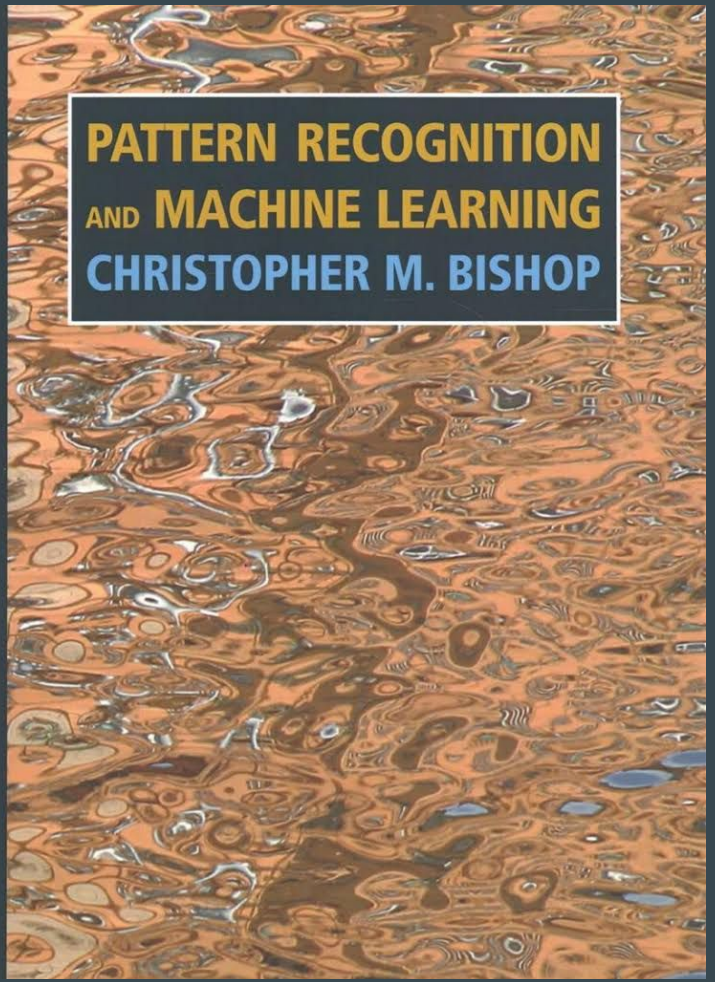
Reference books

Title: Pattern Recognition and Machine Learning

Author: Christopher Bishop

Publisher: Springer (October 1, 2007)

ISBN-13: 978-0387310732



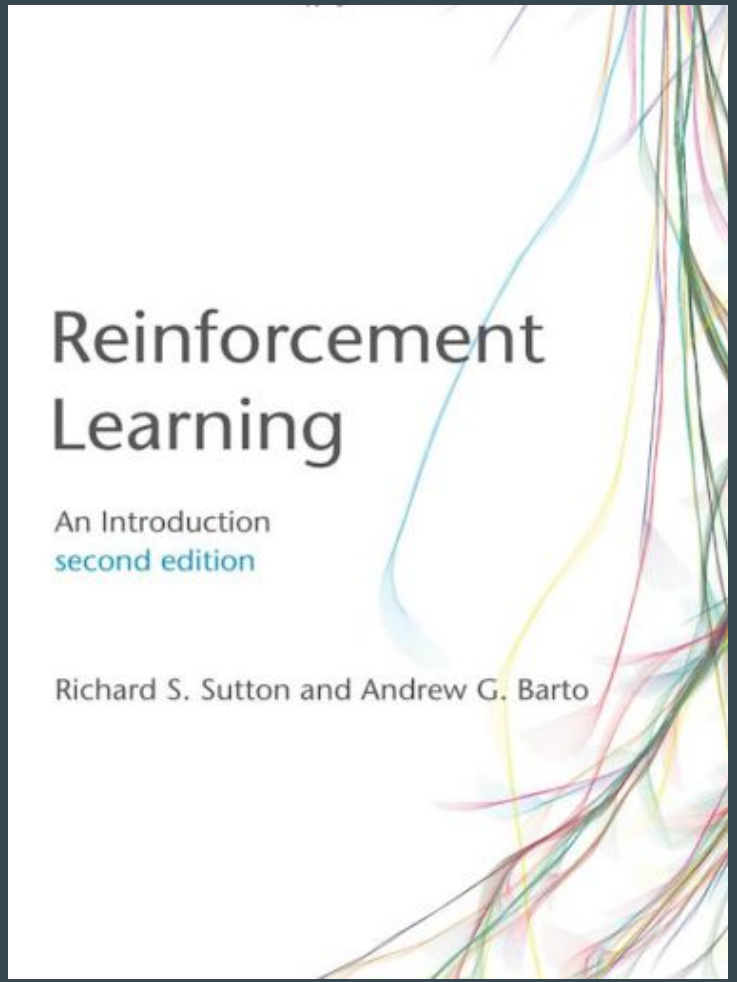
Reference books

Title: Reinforcement Learning

Author: Richard S. Sutton and Andrew G. Barto

Publisher: A Bradford Book, second edition edition (November 13, 2018)

ISBN-13: 978-0262039246



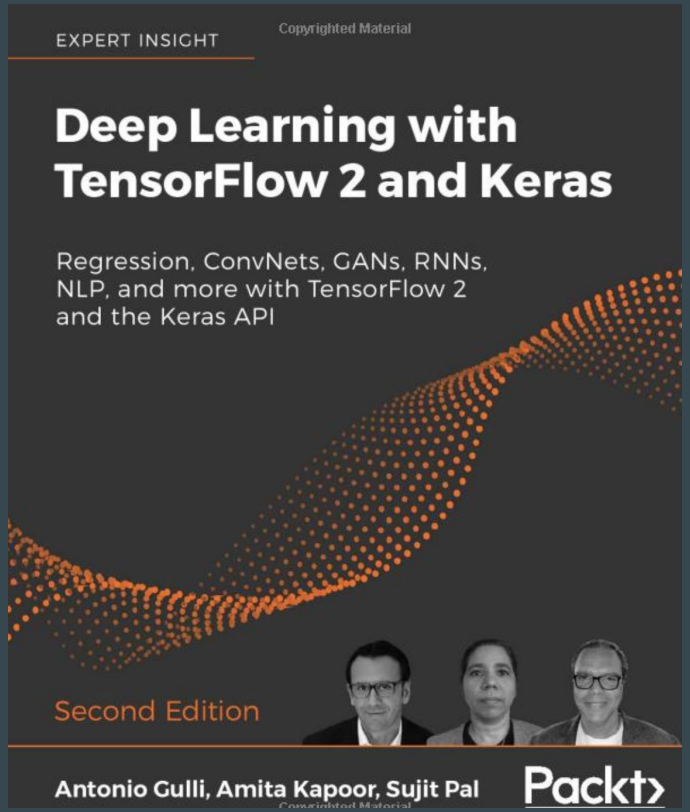
Reference books

Title: Deep Learning with TensorFlow 2 and Keras

Author: Gulli, Kapoor, and Pal

Publisher: Packt Publishing (December 27, 2019)

ISBN-13: 978-1838823412



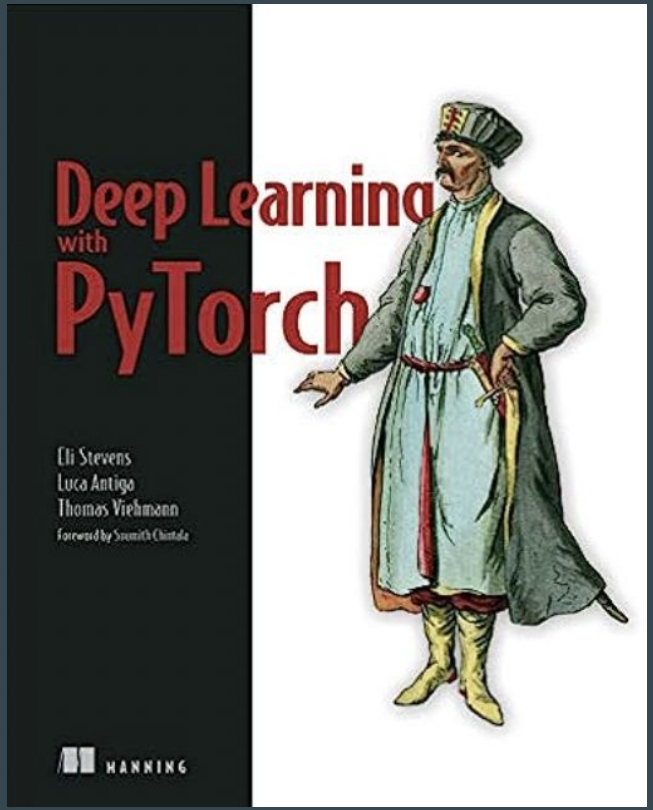
Reference books

Title: Deep Learning with PyTorch: Build, train, and tune neural networks using Python tools

Author: Eli Stevens, Luca Antiga, Thomas Viehmann

Publisher: Manning; First Edition (August 4, 2020)

ISBN-13: 978-1617295263



Textbook (Lecture notes)

Lecture notes will be posted in blackboard or provided through Github.

Evaluation Criteria

- Attendance 10%
- CEO presentation 5%
- Assignments 50%
- Team Project 35%
- Extra credits

Deep Learning Topics

1. Linear Regression
2. Linear Classifier
3. Logistic Regression
4. Softmax and Cross Entropy
5. Neural Network
6. **Convolutional Neural Network**
7. **Recurrent Neural Network**
8. **Generative Adversarial Network**
9. **Reinforcement Learning**

Possible Machine Learning Topics

1. Knn
2. Naive Bayes Classifier
3. Decision Tree
4. Adaboost
5. PCA
6. LDA
7. K-means
8. SVM
9. Recommender System
10. EM algorithm
11. Network Inference algorithms
12. Searching algorithms

Coding Environments

Python

Pytorch

GPU

Google colab

Pycharm

Linux

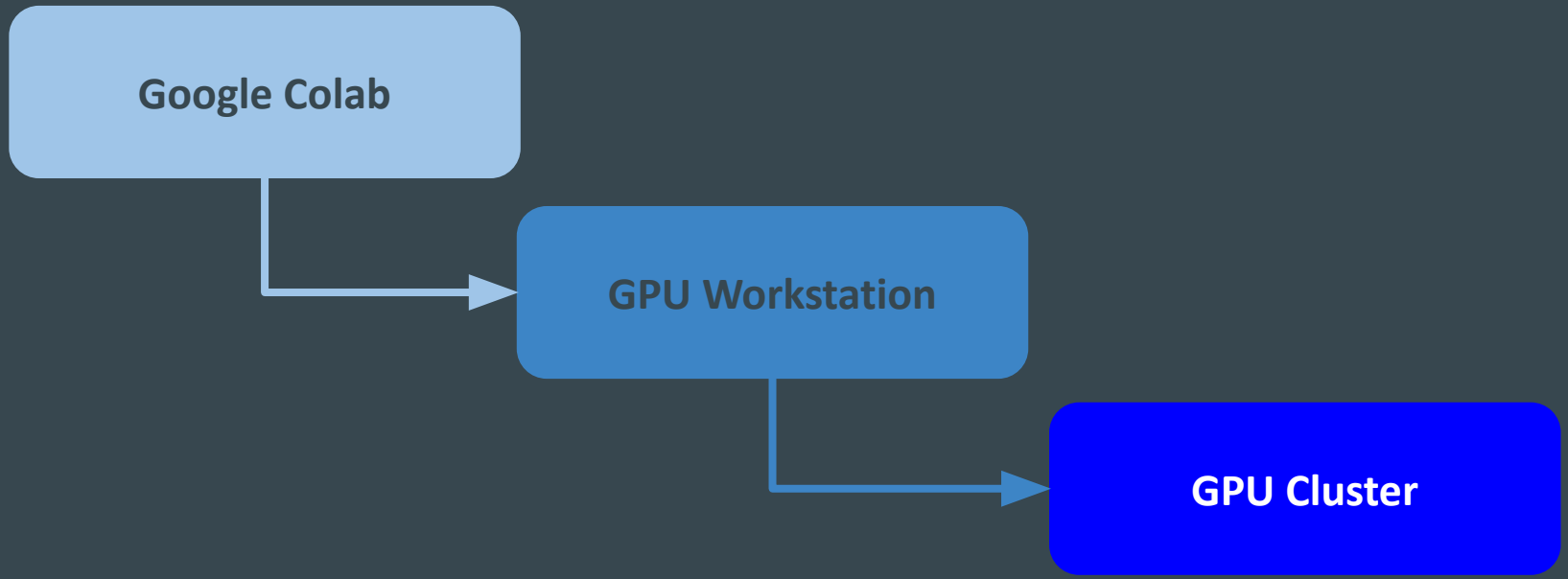
GPU Cluster

SSH

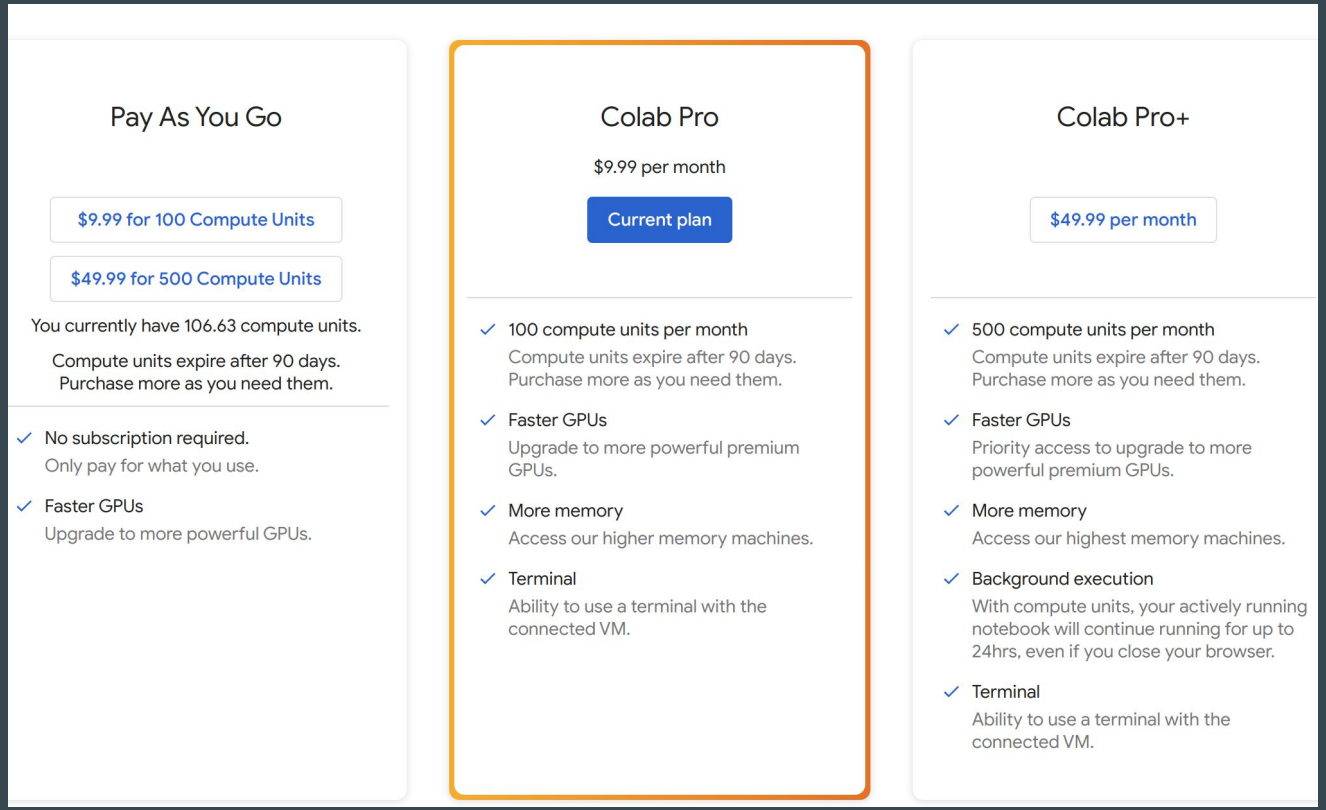
venv

And so on

Computing Resources



Google Colab



Pay As You Go

$9.99 for 100 Compute Units

$49.99 for 500 Compute Units

You currently have 106.63 compute units.

Compute units expire after 90 days.
Purchase more as you need them.

- ✓ No subscription required.
  Only pay for what you use.
- ✓ Faster GPUs
  Upgrade to more powerful GPUs.

Colab Pro

$9.99 per month

Current plan

- ✓ 100 compute units per month
  Compute units expire after 90 days.
  Purchase more as you need them.
- ✓ Faster GPUs
  Upgrade to more powerful premium GPUs.
- ✓ More memory
  Access our higher memory machines.
- ✓ Terminal
  Ability to use a terminal with the connected VM.

Colab Pro+

$49.99 per month

- ✓ 500 compute units per month
  Compute units expire after 90 days.
  Purchase more as you need them.
- ✓ Faster GPUs
  Priority access to upgrade to more powerful premium GPUs.
- ✓ More memory
  Access our highest memory machines.
- ✓ Background execution
  With compute units, your actively running notebook will continue running for up to 24hrs, even if you close your browser.
- ✓ Terminal
  Ability to use a terminal with the connected VM.

UTRGV GPU Cluster

https://hpc.utrgv.edu/

Students will learn how to use in class.

Team Project

Build a team of 2 students asap.

It's a great idea to invite classmates who haven't met before, come from different areas of study or expertise, and have different cultural backgrounds (if you can).

Look for team members who are kind and ready to put in effort as a team. It's also good if they're open to learning from one another.

How to build a team

Method 1 - Share Your Idea:

If you have a cool project idea, just send me an email with a short description of it as soon as you can. I'll then put it on the blackboard. That way, students who are interested in your project can get in touch with you.

Method 2 - Team Up with a Friend:

If you're already planning to work with a friend, please give me the list of your team members.

Method 3 - Go Solo:

If you want to work on your project alone, that's perfectly fine! Just let me know.

Method 4 - Easiest Option:

If you don't submit your team member list by the deadline, don't worry. We'll place you in a team randomly.

Team Research Project

Choosing a Topic (5)

You get to choose a subject and identify a challenge to solve.

Checking Your Progress (5)

We'll have group gatherings where I'll assess how far you've come during our discussions.

Giving a Talk (45)

Get ready with slides and a demonstration (lasting 20~30 minutes). Talk about why this topic matters, what the problem is, what environment, states, actions, and reward are, what others have done, the information you've gathered, your approach, how you put it into action, how you tested it, what you learned from the research, your findings, and where you got your information from.

Creating a Poster (45)

Put together a visual poster and talk about it during a session where people and faculty members (who will judge) are invited.

Rules in Dr. Kim's class

1. I might use either Linux(Ubuntu) or MacOS, but I suggest Ubuntu more. However, you can pick any operating system you like.
2. Feel free to visit me if you need help or have any issues.
3. You can also ask the TA for assistance. Don't hesitate – all questions are welcome, and there's no such thing as a silly question.
4. Please avoid cheating.
    a. Remember that if your job performance is unsatisfactory, even if your GPA at UTRGV is high, it could potentially affect the reputation of the institution. This might lead people to overlook the impressive GPAs of other UTRGV students.
    b. So, treat your classmates with respect and make good use of your time.
5. Remember to regularly check your UTRGV email and blackboard for updates. To stay updated in real-time, you can set up an email app on your smartphone.

Rules in Dr. Kim's class

1. Please come on time.
2. Begin the group project and homework early. Begin today, not tomorrow.
3. Please don't ask me to allow makeup submission in the end of semester
    a. I don't want to be a bad person. So, complete the assignment promptly rather than waiting until the last minute.
4. I'm sure you're familiar with basic elementary school math. The value 89.9999 corresponds to a B grade! No curve!
5. Have fun learning about DL!
6. The class schedule may be changed if needed.

Rules in Dr. Kim’s class

1. If we're having a class on the internet, a link to join a Zoom meeting will show up on Blackboard 10 minutes before the class starts.
2. When you're in the online class, it would be nice if you could turn on your camera. I'd like to be able to see who's in the class, and it's just a small respectful thing to do for your teacher.
3. I'll mark you as present when your camera is on.
4. Once the class begins, please make sure your microphone is muted.
5. There might be a point in the middle of the class where I check who's here.

Rules in Dr. Kim’s class

1. Please try to arrive on time.
2. You're welcome to ask a question whenever you want.
3. Remember to unmute yourself before you ask.
4. Try not to get distracted by things that aren't related to what we're doing. Please avoid playing games or watching YouTube during this time.
5. Let's treat each other with kindness and consideration.

Make sure TA office hours and email

Please stop by the TA's office hours to say hi and tell them about yourself. If you're confused about something, feel free to ask the TA in the office hours or Discord. If the TA doesn't know the answer, they'll pass your question on to me.

Discord channel: TBA

Lab1 - *Join our discord channel*

- Your assignment is to join our class Discord channel, which serves as a platform for discussion and peer support.
- After receiving the invitation link via email (or posted in blackboard), please set up your profile using your real name and an appropriate picture. Then, participate in the dialogue by posting a class or course-related question.
- https://discord.gg/YVxjXeXvEN
- Please, contribute to our learning community by responding to your classmate's questions. Remember, our class Discord channel is a professional space where respectful and kind interactions are expected.

Questions?

Ok, let's get into Deep Learning!