

Unsupervised and Unstructured Machine Learning

BA820 – Mohannad Elhamod

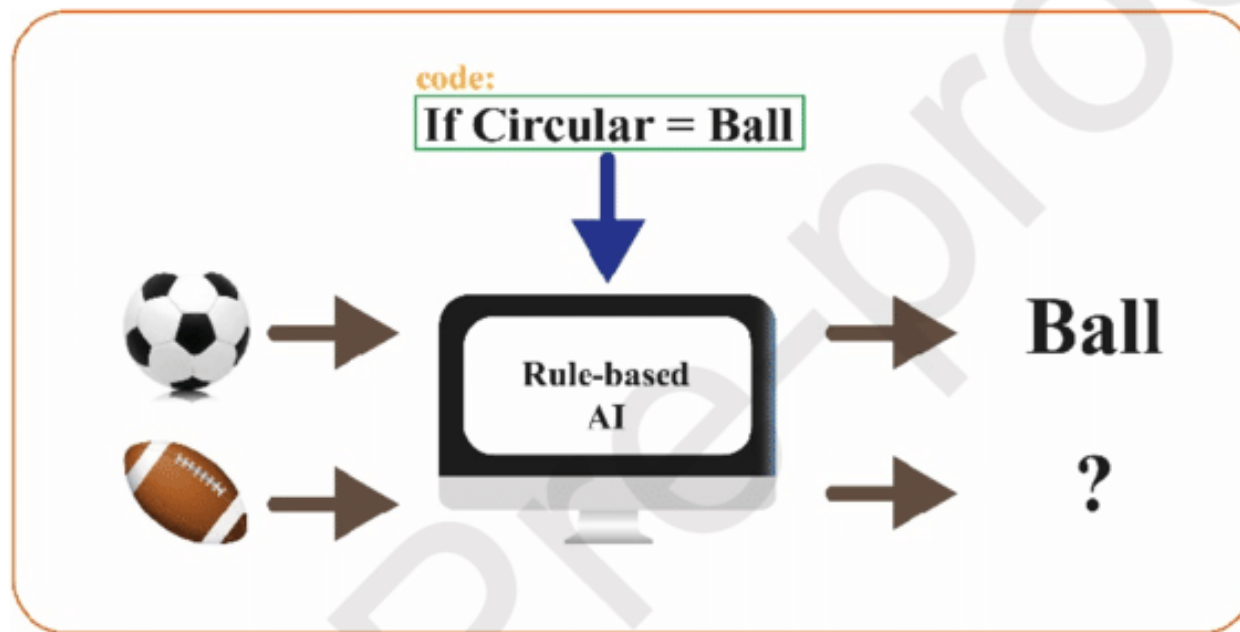
Motivation, Review, and Introduction

Some Magic

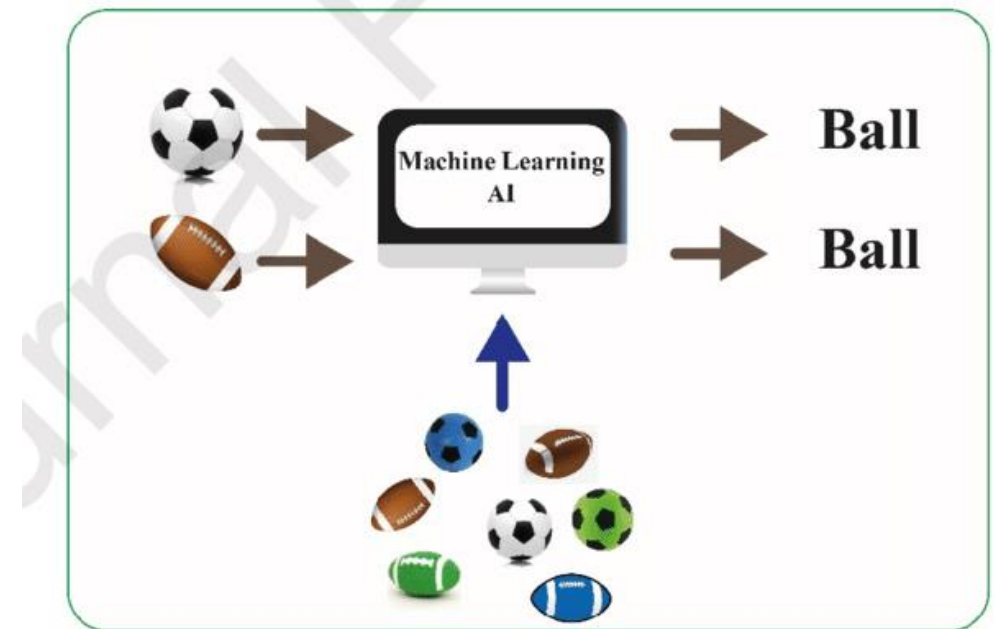
- Let's play...
- Data around us is high dimensional!

What is Machine Learning?

Elbadawi, Moe & McCoubrey, Laura & Gavins, Francesca & Ong, Jun Jie & Goyanes, Alvaro & Gaisford, Simon & Basit, Abdul. (2021). Harnessing Artificial Intelligence for the Next Generation of 3D Printed Medicines. *Advanced Drug Delivery Reviews*. 175. 10.1016/j.addr.2021.05.015.



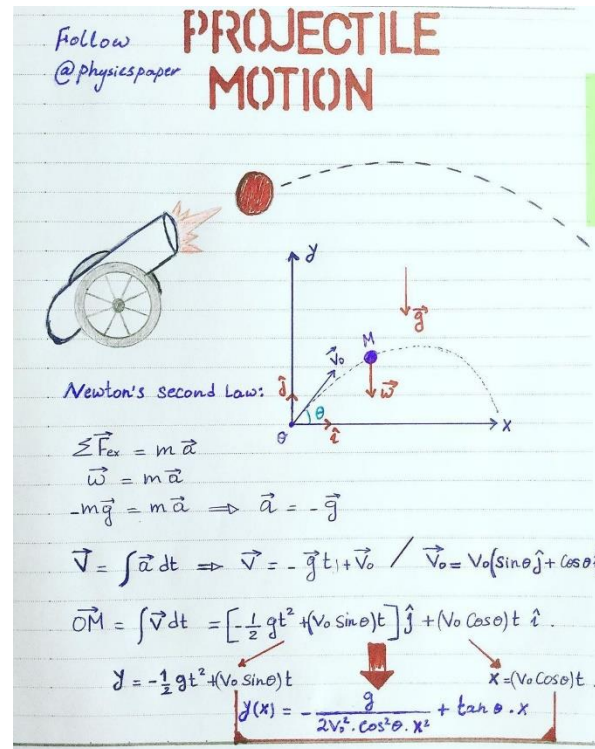
Knowledge-based modeling



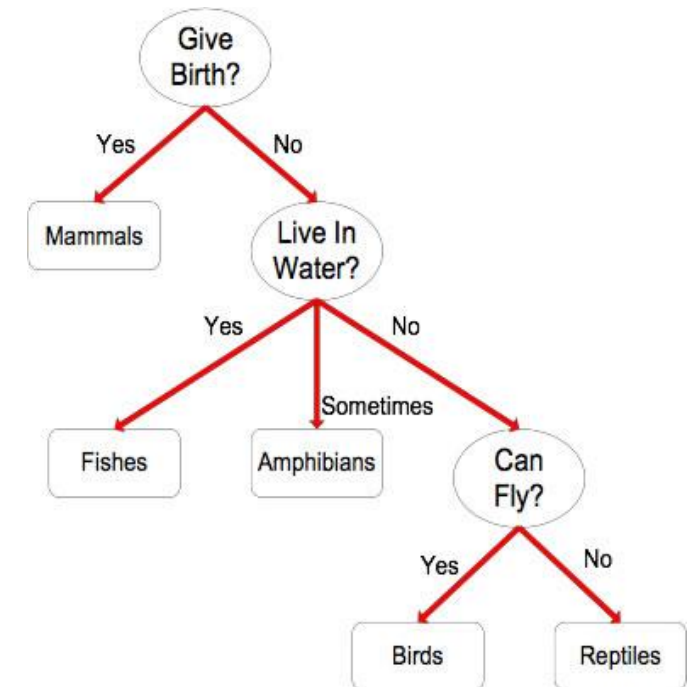
Data-driven modeling

Knowledge-based Modeling

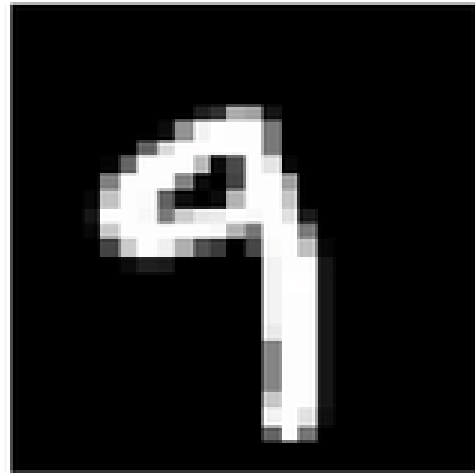
- What challenges you find with this approach?



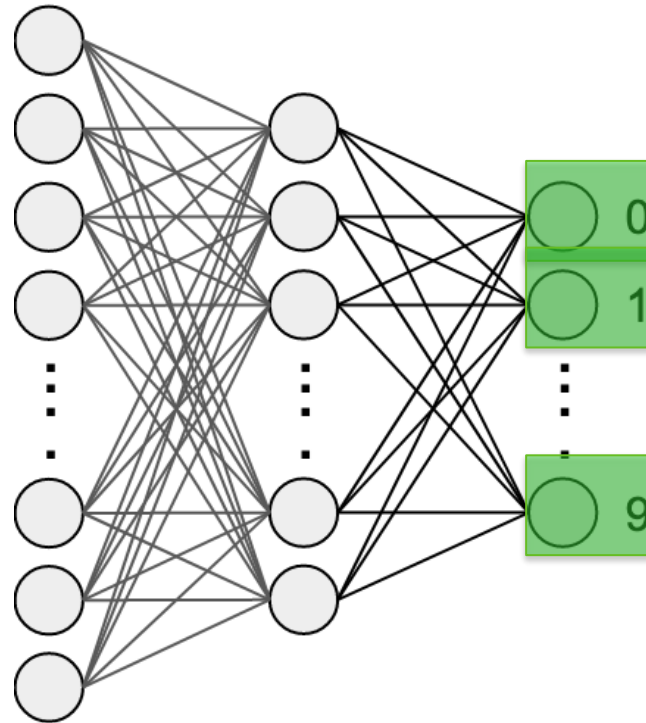
<http://jcsites.juniata.edu/faculty/rhodes/ml/rulebasedClass.htm>
<https://www.pinterest.com/pin/598626975454754006/>



Supervised Learning

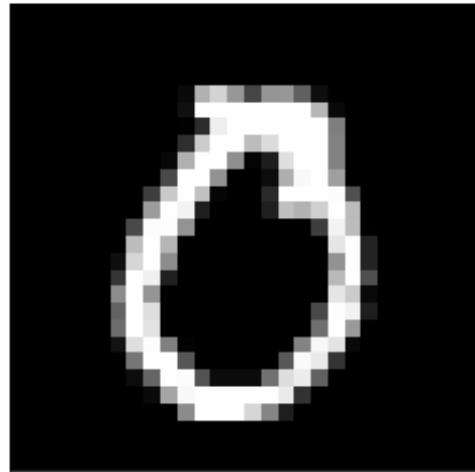


MNIST Dataset

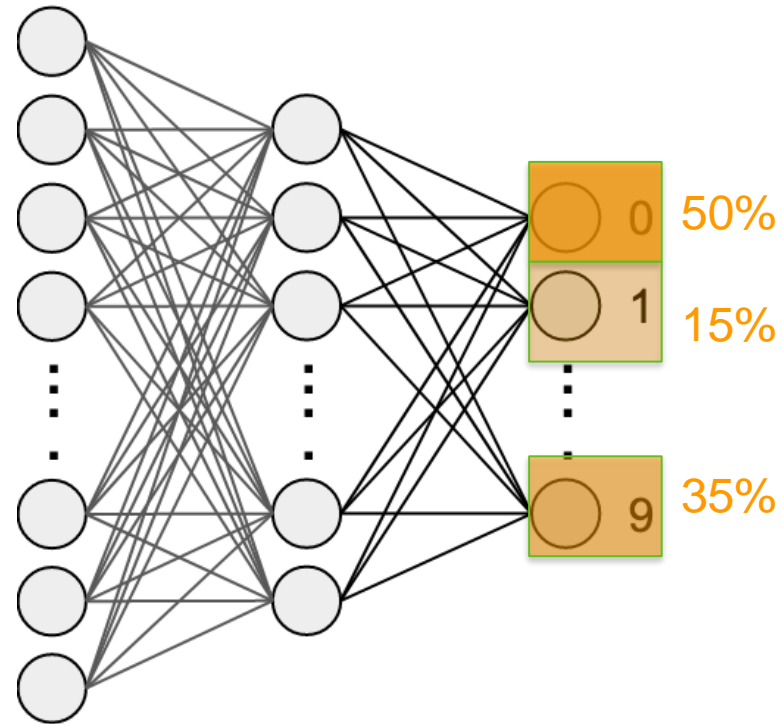


Phase 1: Training

Supervised Learning

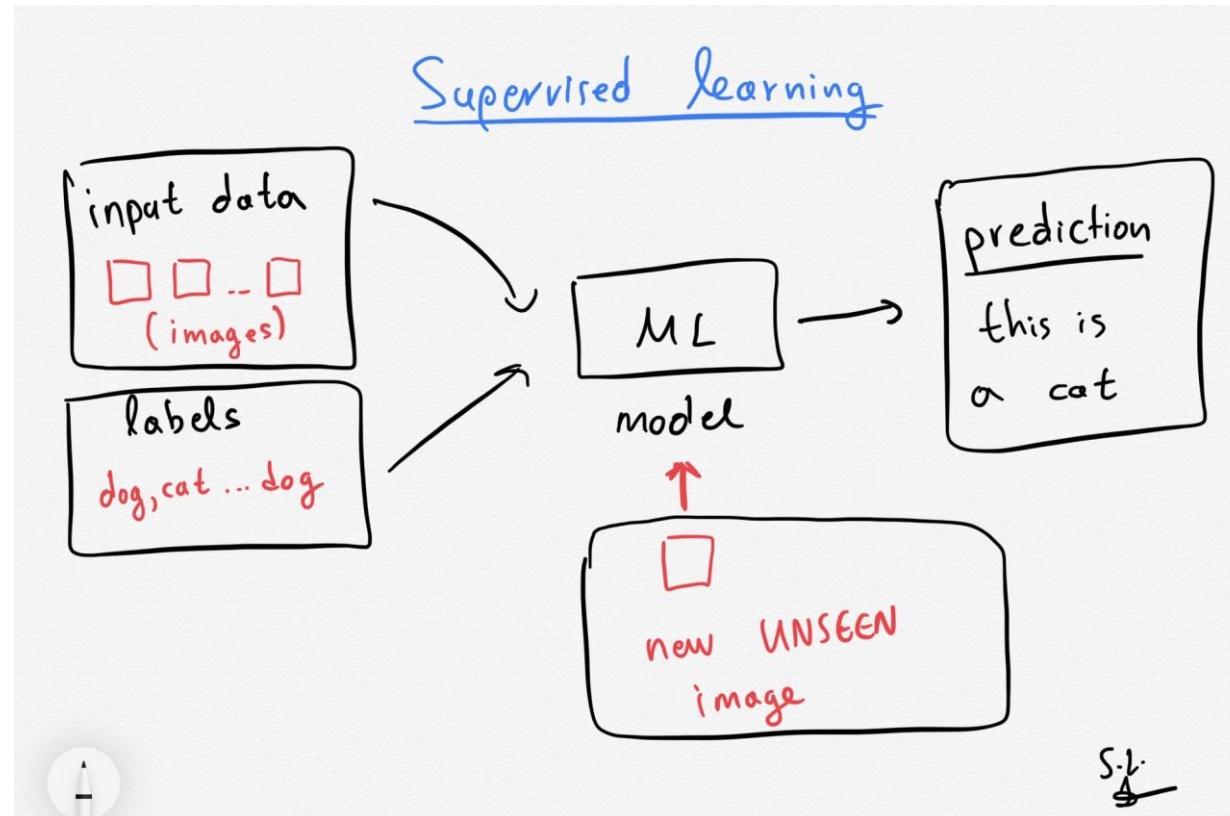


MNIST Dataset



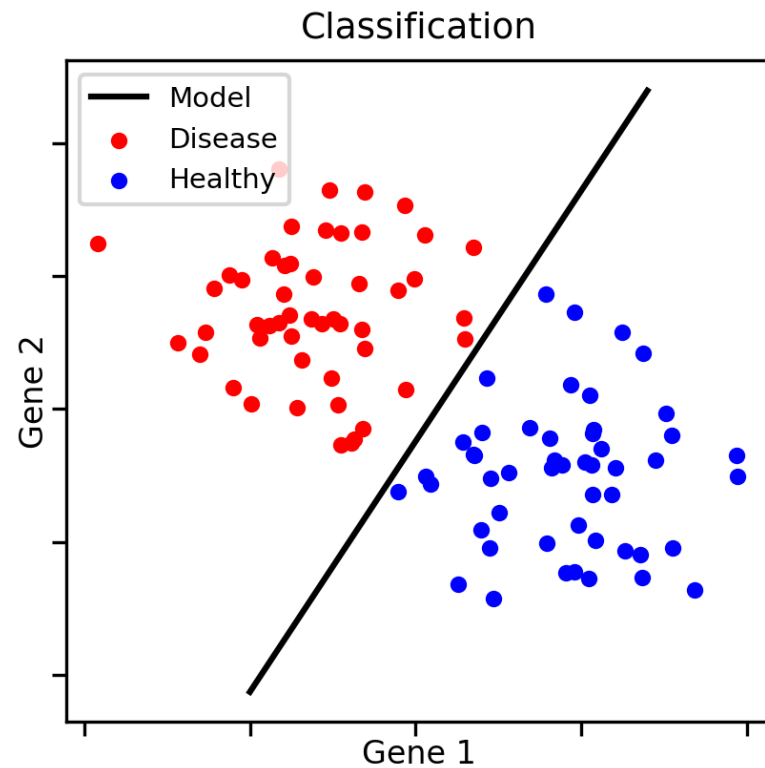
Phase 2: Validation/Testing

Supervised Learning



<https://towardsdatascience.com/what-is-machine-learning-a-short-note-on-supervised-unsupervised-semi-supervised-and-aed1573ae9bb>

Supervised Learning - Model Types



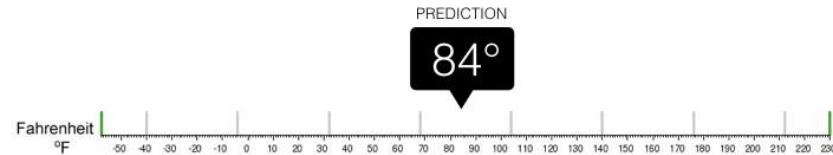
<https://aldro61.github.io/microbiome-summer-school-2017/sections/basics/>

Supervised Learning - Model Types



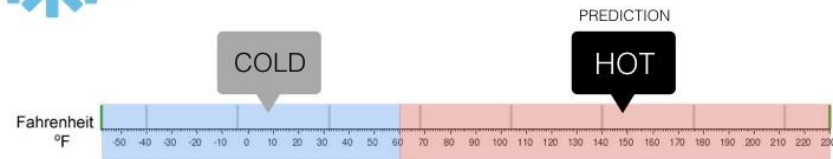
Regression

What is the temperature going to be tomorrow?



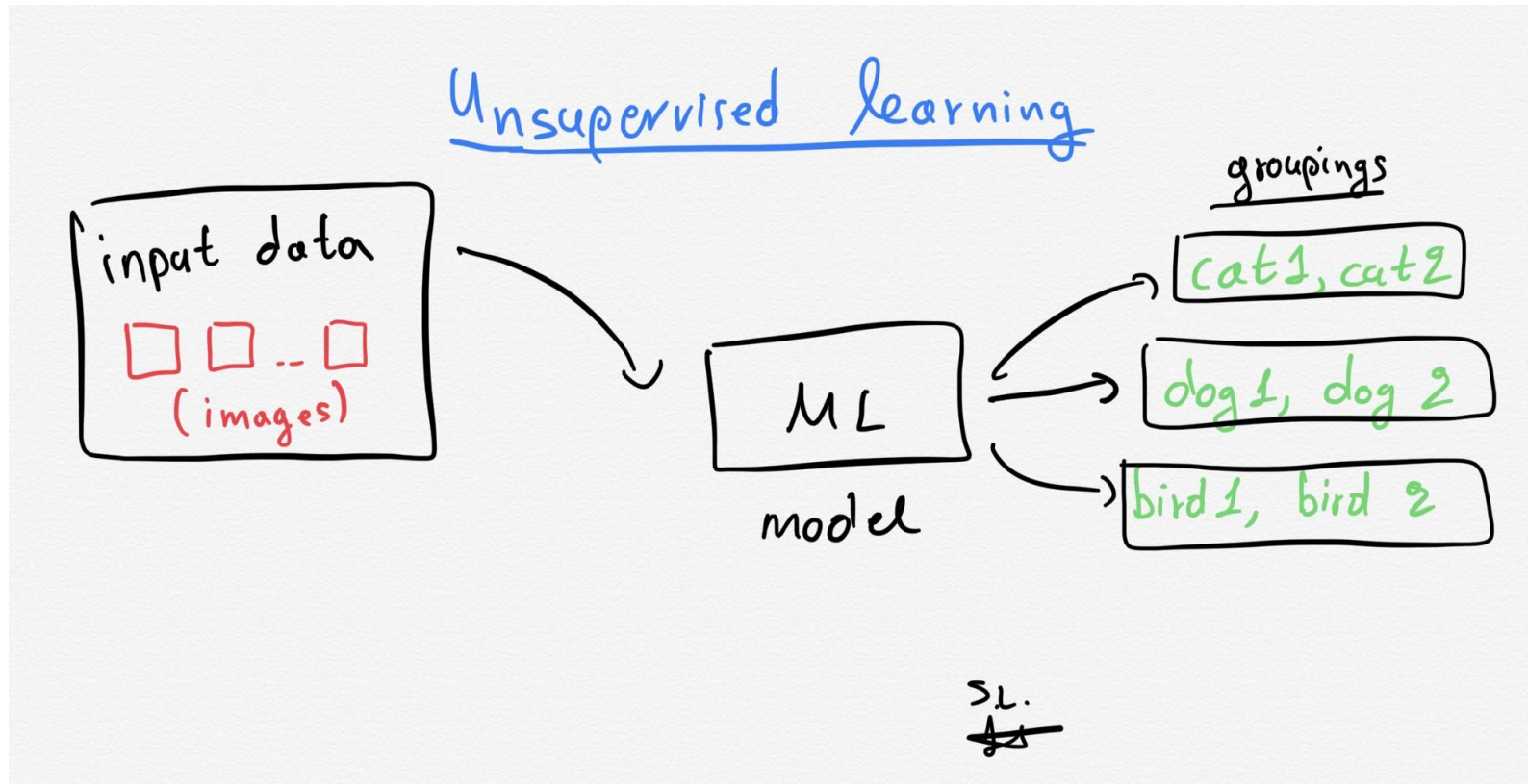
Classification

Will it be Cold or Hot tomorrow?



https://medium.com/@ali_88273/regression-vs-classification-87c224350d69

Unsupervised Learning



<https://towardsdatascience.com/what-is-machine-learning-a-short-note-on-supervised-unsupervised-semi-supervised-and-aed1573ae9bb>

Logistics

Put Your Own Subtitle In This Box

Why are you here?

- I am sure it eventually leads to money....
- Maybe it is just a required class?
- Nonetheless, understanding how things work is essential for making and innovation.



Someone who had begun to [study] geometry asked Euclid, 'What shall I get by learning these things?' Euclid called his slave and said, 'Give him [some money], since he must make gain out of what he learns'.

(Heath, 1981, loc. 8625)



Euclid

Fundamentals are important!

- The more foundational knowledge you skip, the more fundamental errors you will make.
- Work hard. **Be patient!**



Zen Speaks: Shouts of Nothingness

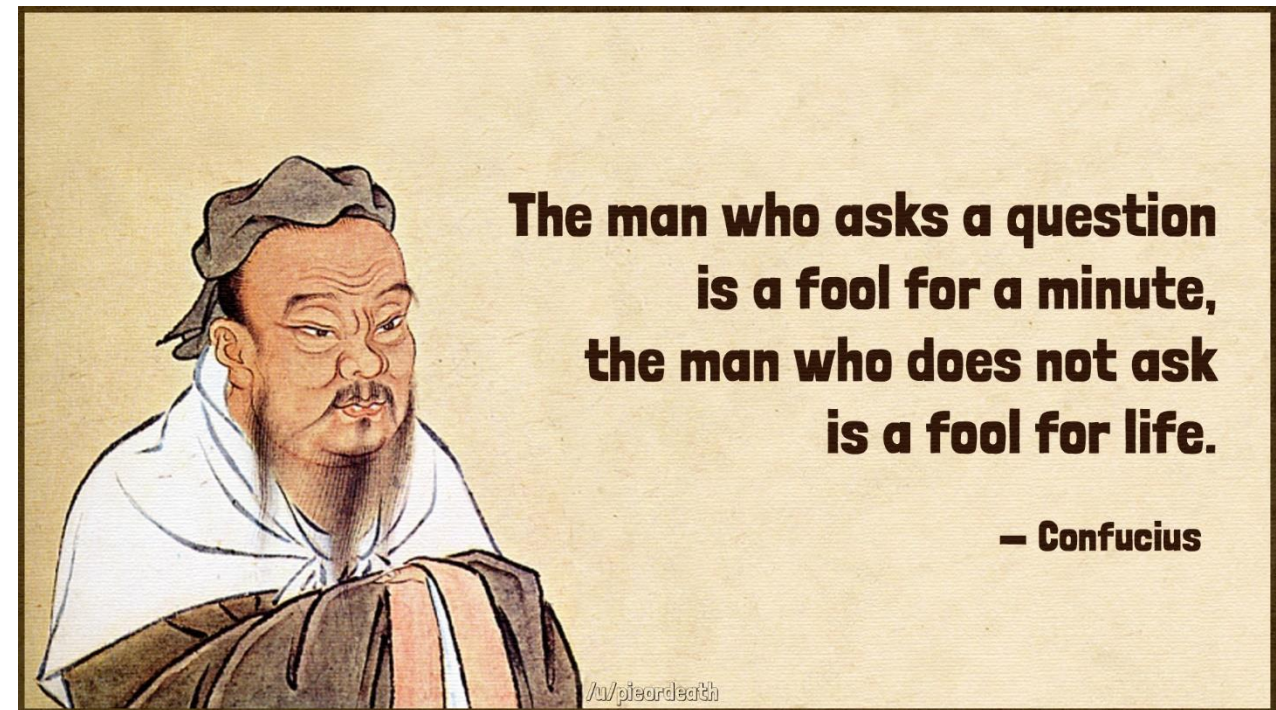
Your professor is not a God

- Machine learning is a fast-growing domain.
- The internet nowadays has all kinds of learning material.
- Your professor is **NOT** here as a walking encyclopedia. He is here to guide your learning experience and build you a solid foundation, so you could continue learning on your own later.



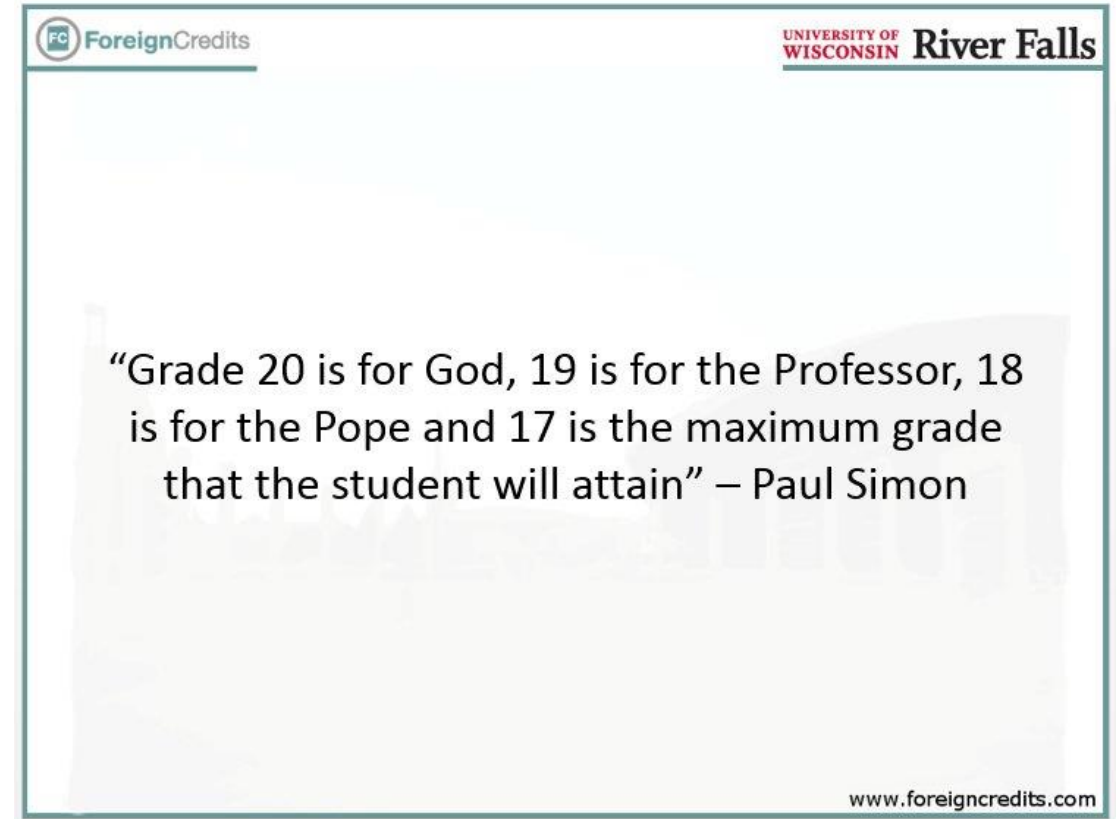
No Question is Foolish

- Other might have the same question.
- Knowledge is hierarchical.



Can I get an A?

- [Questrom policy](#)
- But you will get your fair chance.



Syllabus

- [Here](#)
 - Pay attention to [Piazza](#)!
 - Attendance and participation.
 - You cannot avoid the technical stuff.
 - Zero tolerance for cheating (AI or peers).