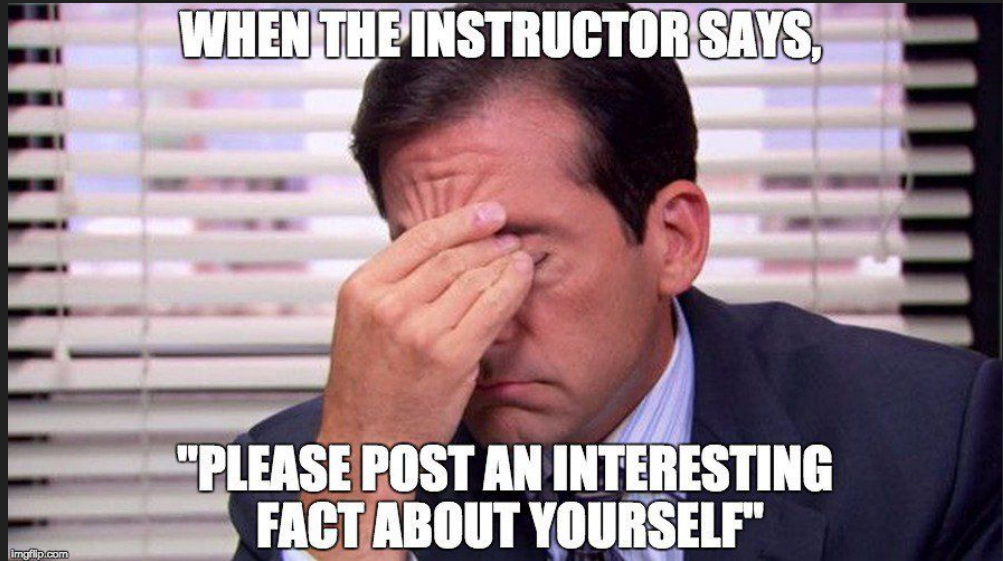


# L01

Intro

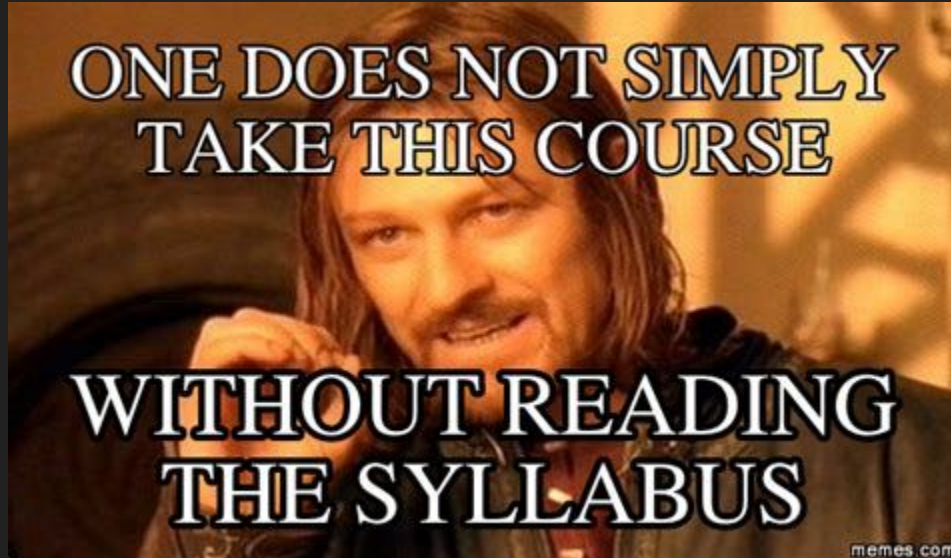
# Introduce Yourself

1. Name
2. Background
3. The Goal

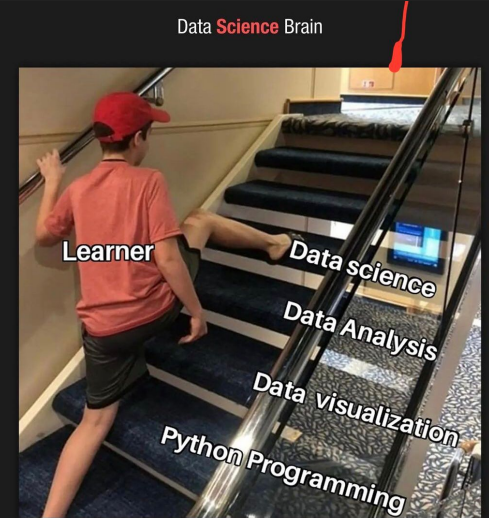
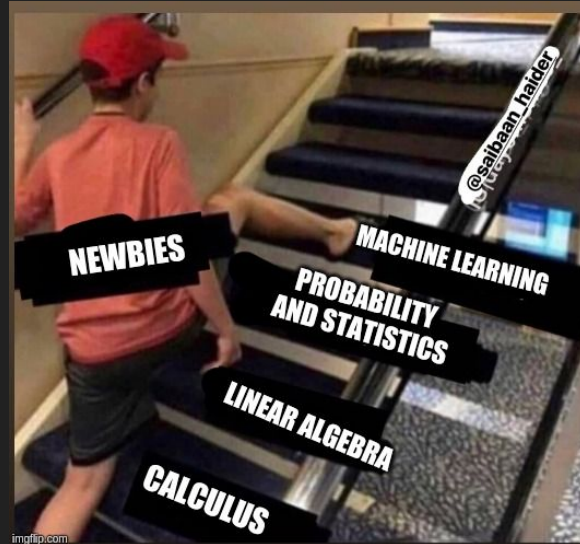


# Course Structure

<https://online.ithillel.ua/courses/machine-learning>



# ML Engineer Stairs



Skipping steps is injurious to learning

# Lesson Goal

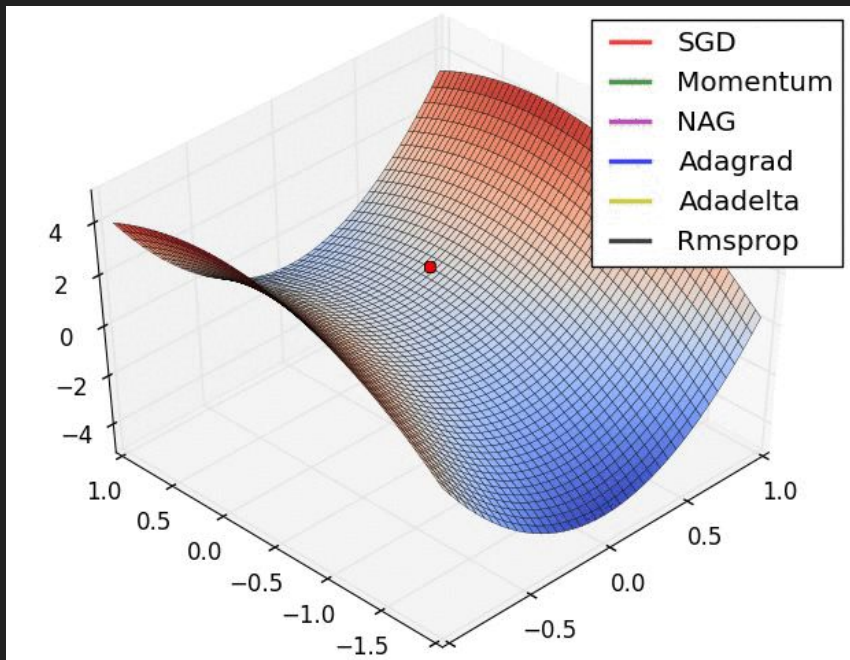
What branches of mathematics are needed in ML?

How do you think?

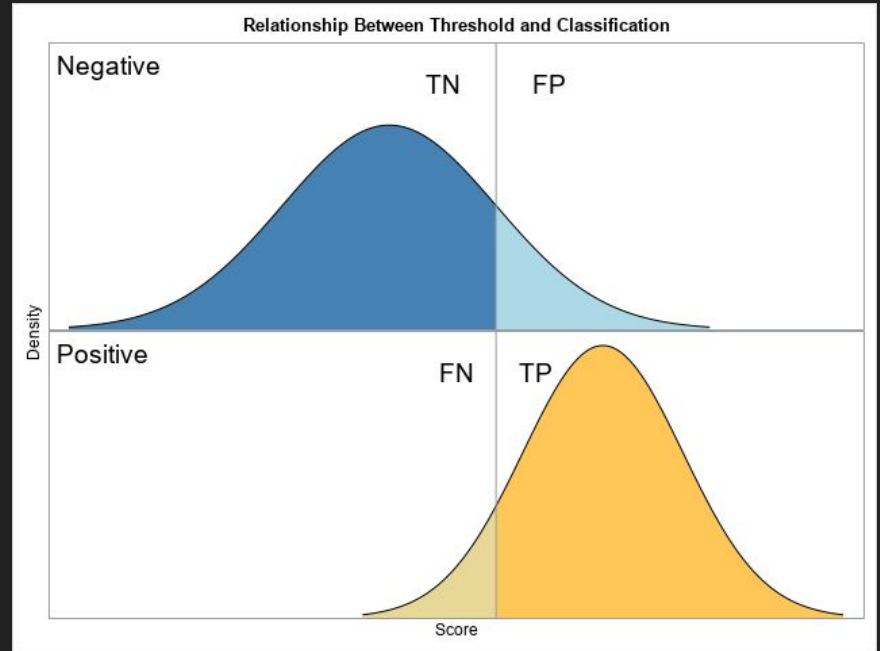
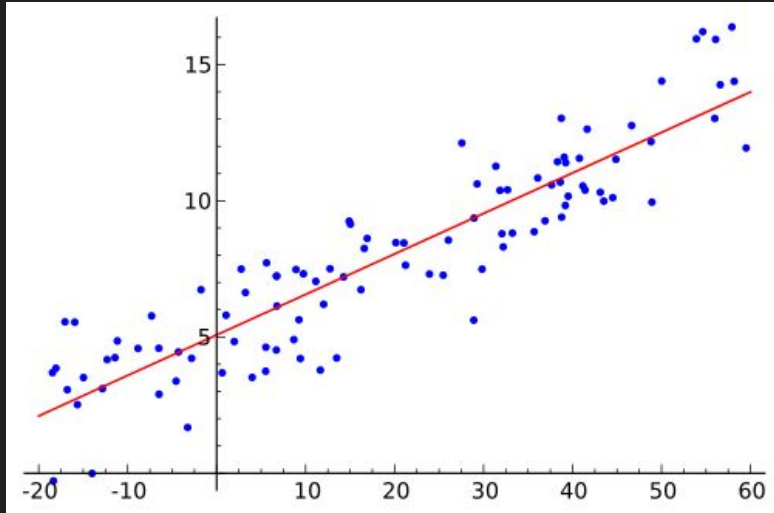
# Lesson Goal

What branches of mathematics are needed in ML?

1. Calculus (Матан)
2. Linear Algebra
3. Statistics
4. Mathematical optimization

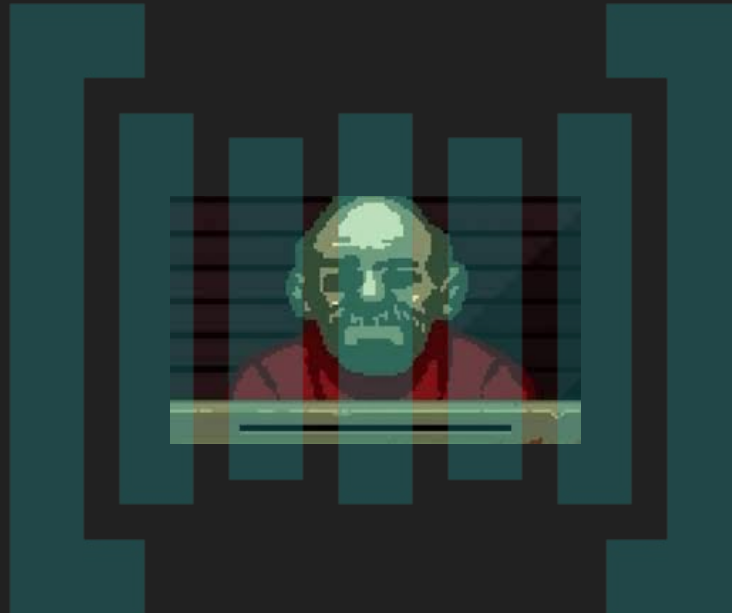


# Machine Learning Task



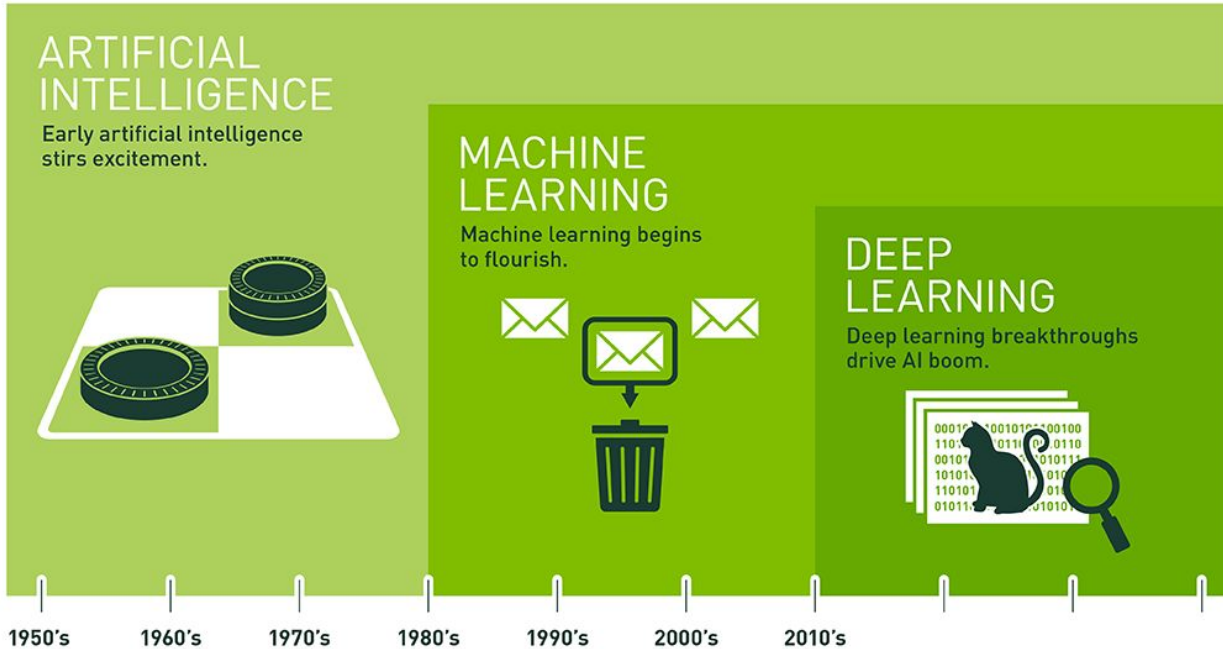
# Papers with code

<https://paperswithcode.com/>



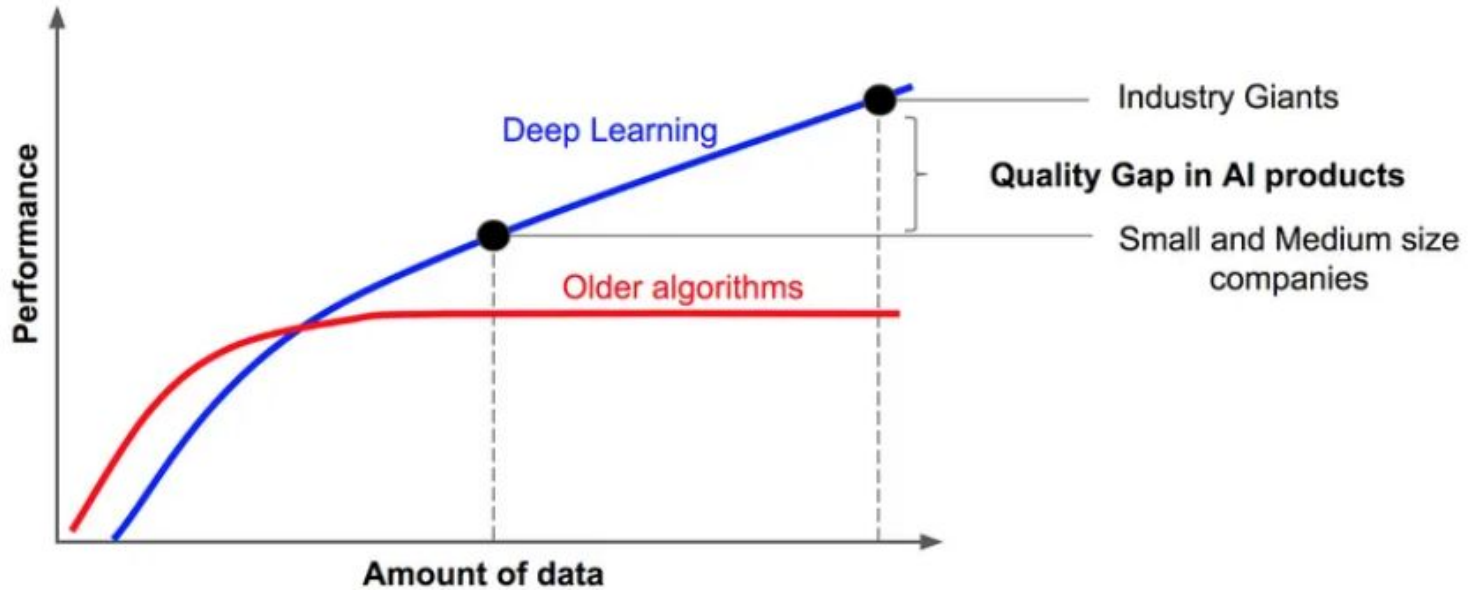


# AI vs ML vs DL



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

# ML vs DL



Data dependencies of domains

# DL Frameworks / Languages

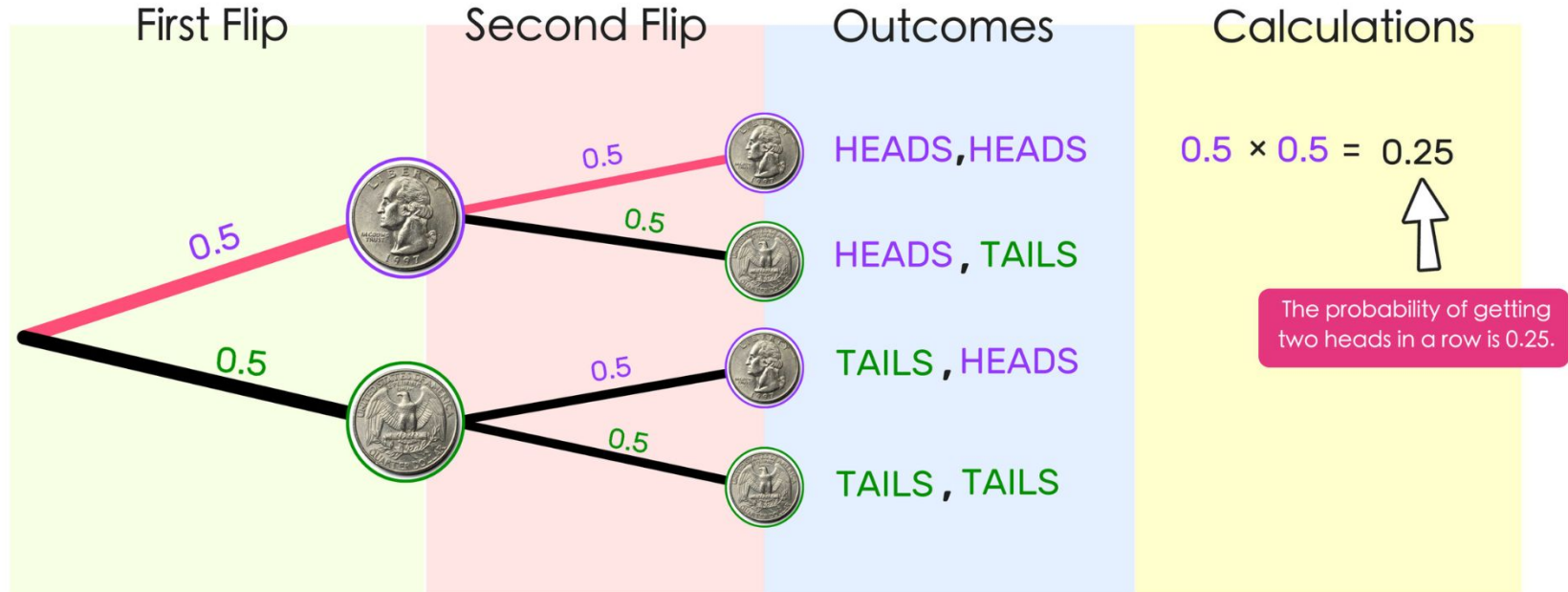


# Statistics Based on Probability Interpretations

[https://en.wikipedia.org/wiki/Probability\\_interpretations](https://en.wikipedia.org/wiki/Probability_interpretations)

# “Physical” Probability. Classical (frequentist) statistics

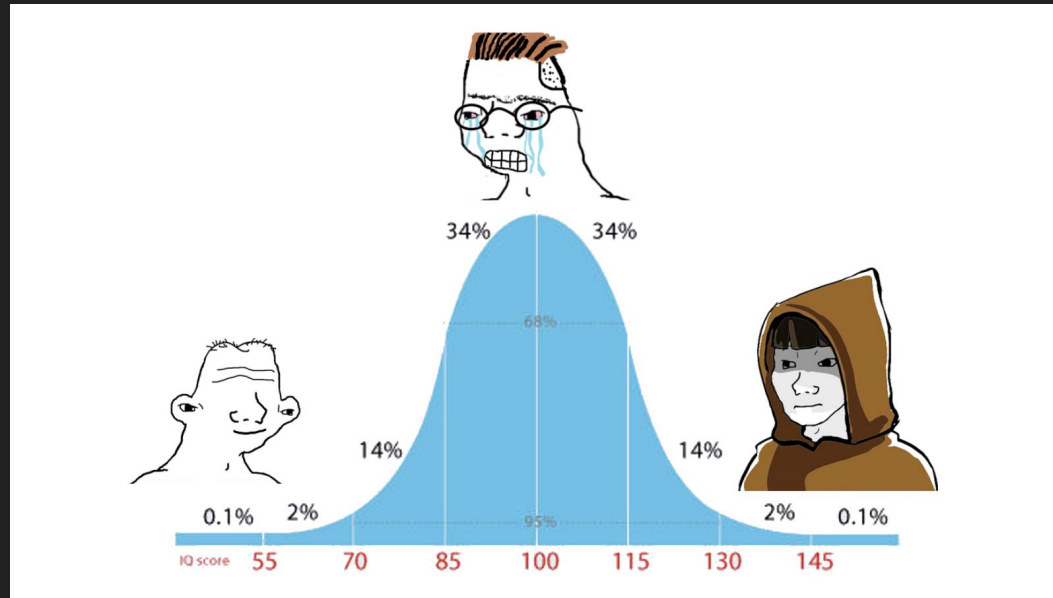
**PROBABILITY RULE** To find the probability of an outcome, multiply the probabilities of the branches.



# “Evidential” Probability / Conditional Probability (Bayesian Statistics)

<https://towardsdatascience.com/bayes-theorem-the-holy-grail-of-data-science-55d93315defb>

<https://setosa.io/ev/conditional-probability/>



# Consequences

Can have different approaches for composing cost (loss) function to be minimized.

1. “Physical” Probability → Error minimization (MSE, RMSE, etc.)
2. “Evidential” Probability → Maximum likelihood minimization

Visualizations:

1. <https://www.geogebra.org/m/xC6zq7Zv>
2. <https://rpsychologist.com/likelihood/>

Visualization for combination of 2 normal distributions

<https://www.geogebra.org/m/wt5qdsKB>

# HW

Range of flight:

$$L = \frac{v_0^2 \sin(2\alpha)}{g}$$

Experiment:

- Set distributions for  $v$  and  $\alpha$  (normal, uniform)
- Get distribution plot for  $L$
- Params in json format
- Prepare report with plots
- Make zip archive with report, code and json config

Must watch: <https://www.youtube.com/watch?v=Dn6b9fCIUpM>