

رَبِّ الْعَالَمِينَ

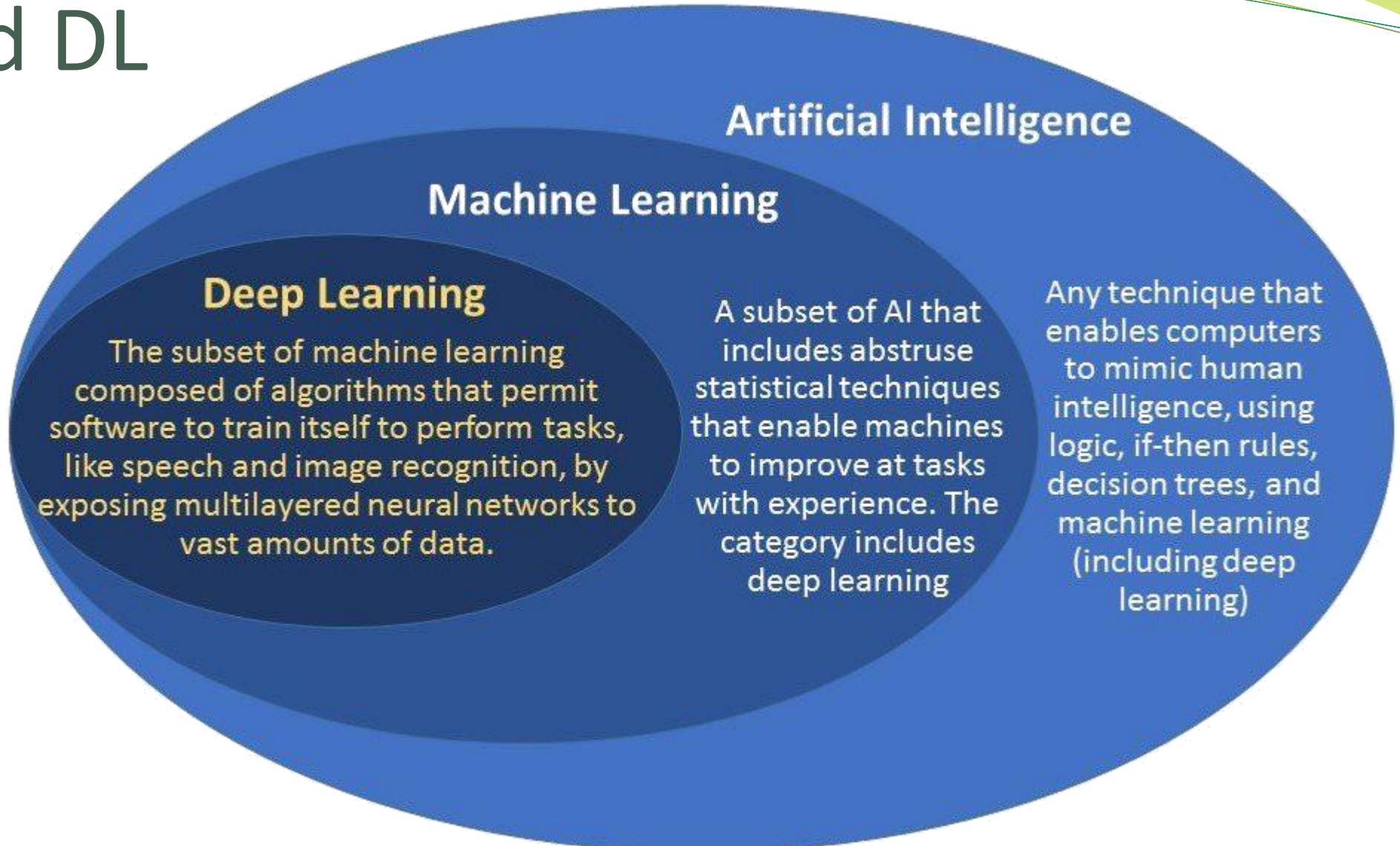
Deep Learning

Mohammad Reza Mohammadi

2021

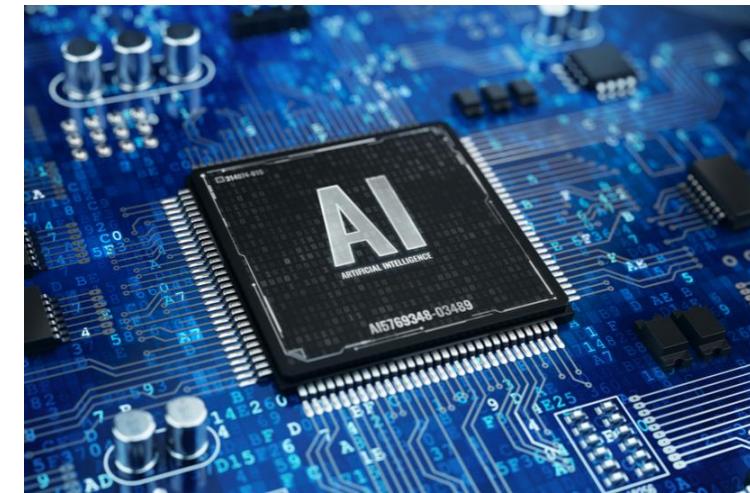
https://quera.ir/overview/add_to_course/course/7883

AI, ML, and DL

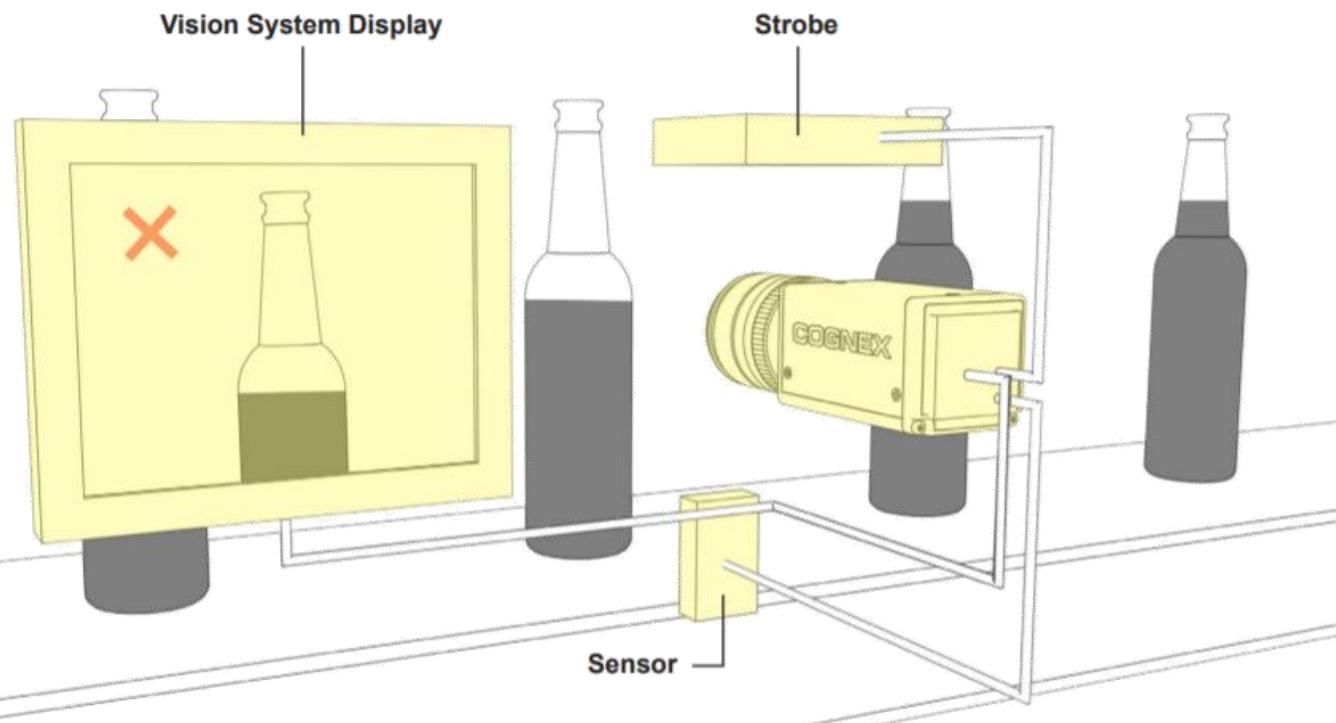


Artificial Intelligence

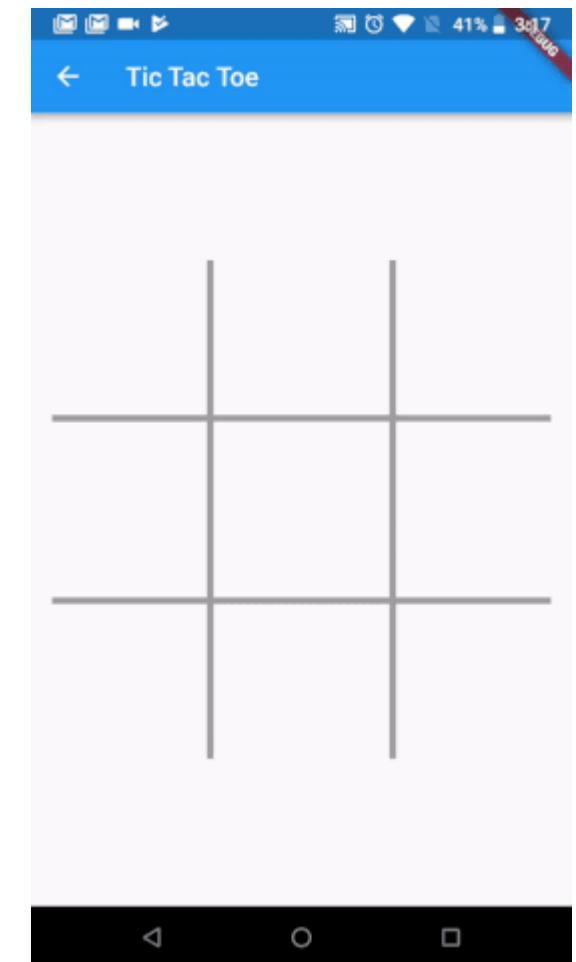
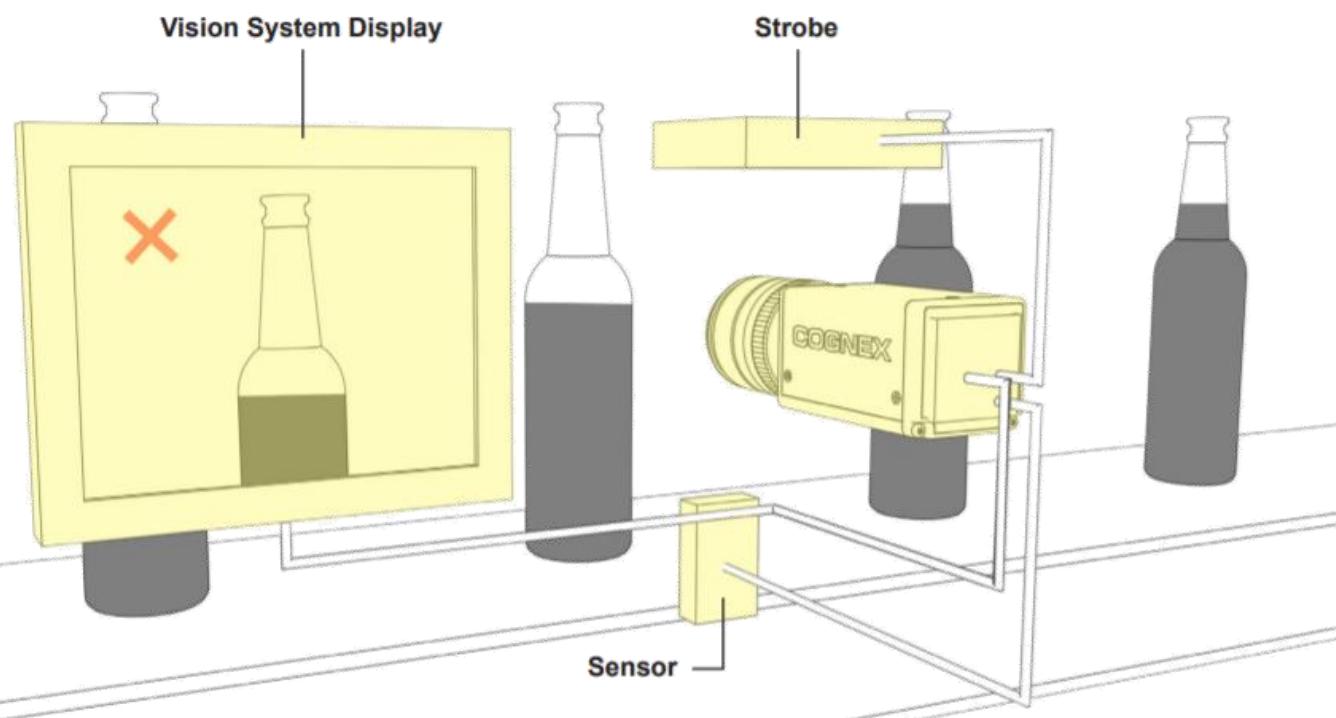
- Artificial intelligence was born in the 1950s
 - Computers could be made to “think”?
- A concise definition of AI:
 - The effort to automate intellectual tasks normally performed by humans
 - Not necessarily through learning
 - For instance, early chess programs with hardcoded rules
 - Symbolic AI, dominant from 1950s to 1980s



Symbolic AI

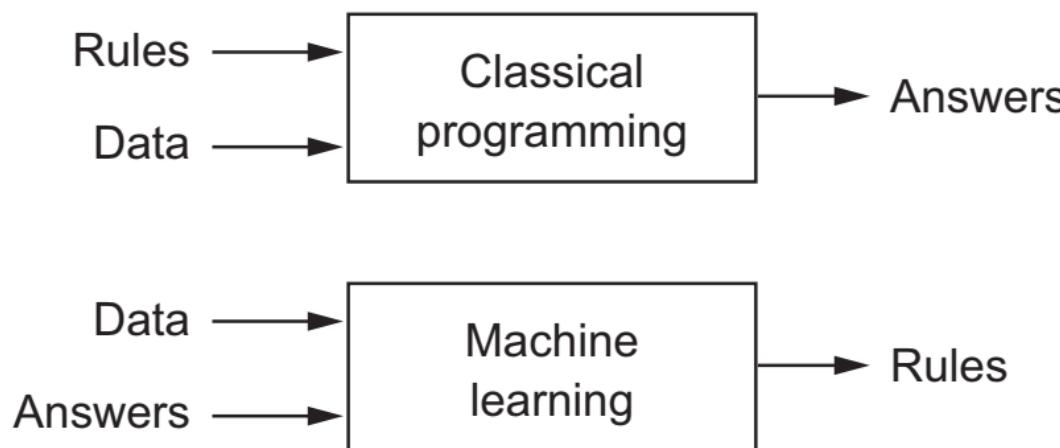


Symbolic AI



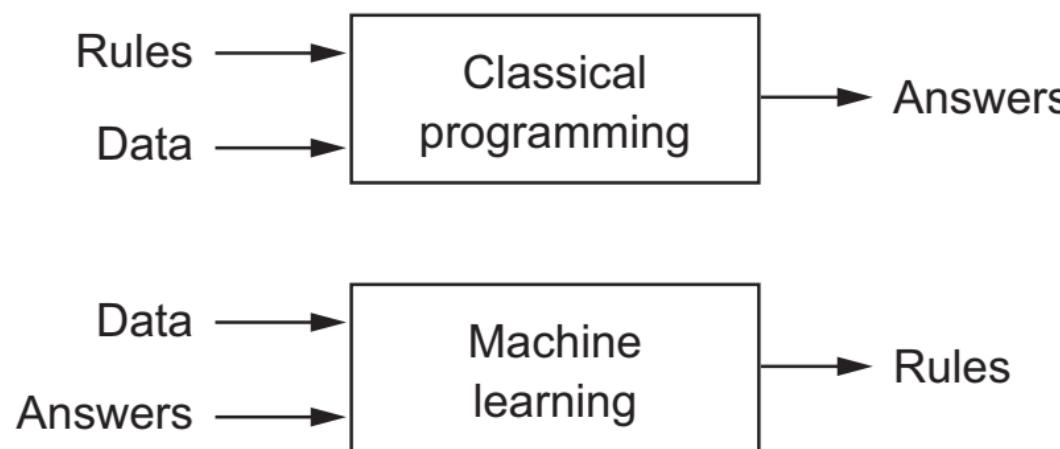
Machine Learning

- Symbolic AI: humans input rules (a program) and data to be processed according to these rules, and out come answers.
- Machine learning: input data as well as the answers expected from the data, and out come the rules
 - These rules can then be applied to new data to produce original answers.



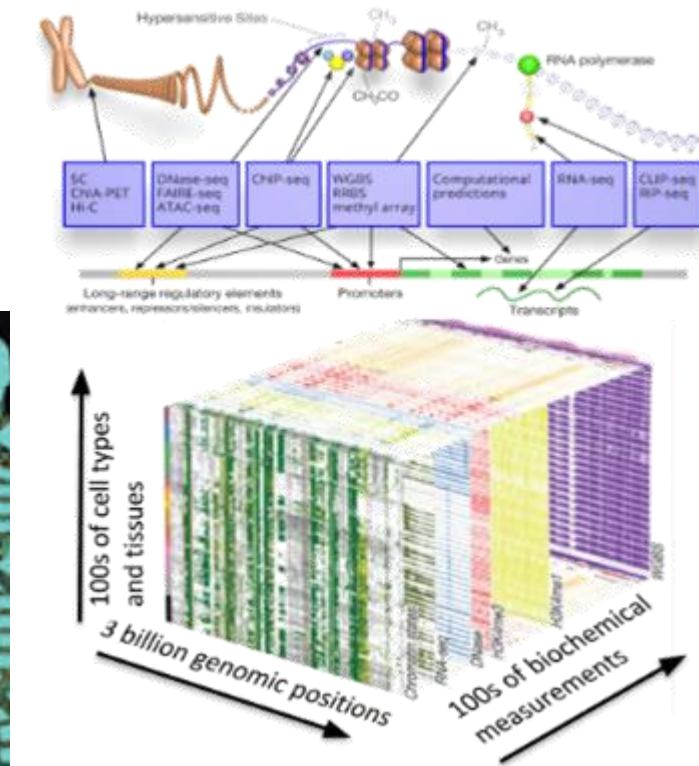
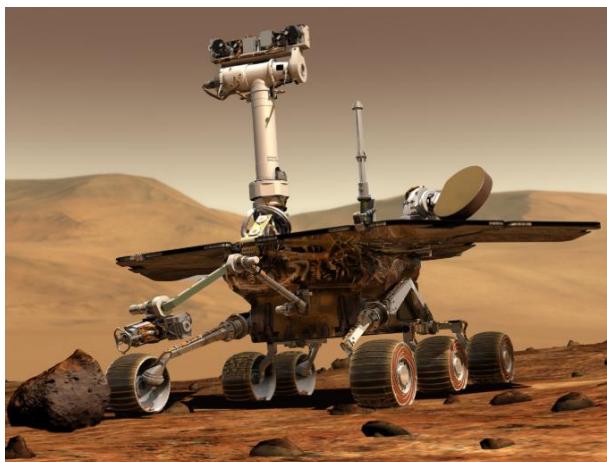
Machine Learning

- A machine-learning system is trained rather than explicitly programmed
- It's presented with many examples relevant to a task
 - It finds statistical structure in these examples that eventually allows the system to come up with rules for automating the task



Machine Learning

- ML is used when:
 - Human expertise does not exist (navigating on Mars)
 - Humans can't explain their expertise (speech recognition)
 - Models must be customized (personalized medicine)
 - Models are based on huge amounts of data (genomics)



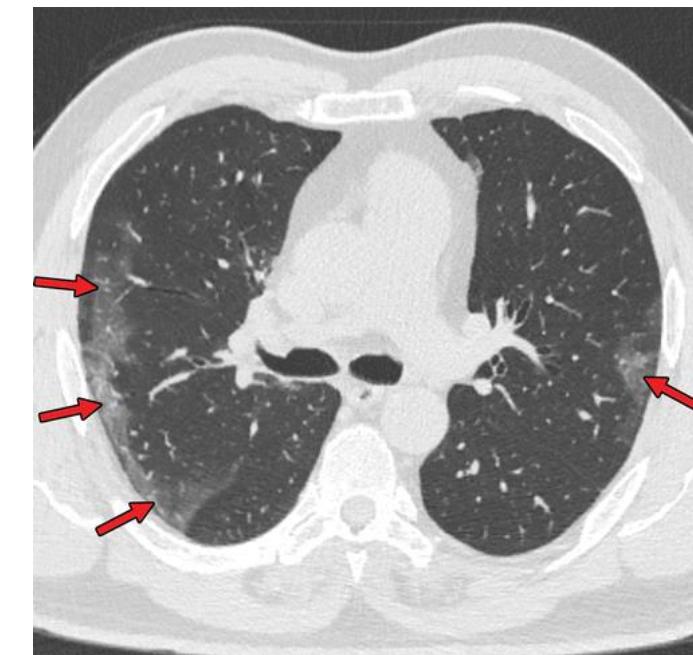
Learning Associations

- Basket analysis: finding associations between products bought by customers
 - If people who buy X typically also buy Y , and if there is a customer who buys X and does not buy Y , he or she is a potential Y customer
- In finding an association rule, we are interested in learning a conditional probability of the form $P(Y|X)$
- We may want to make a distinction among customers and toward this, estimate $P(Y|X, D)$ where D is the set of customer attributes, for example, gender, age, and so on



Medical Diagnosis

- In medical diagnosis, the inputs are the relevant information we have about the patient and the classes are the illnesses
- The inputs contain the patient's age, gender, past medical history, medical images, and so on
- Some tests may not have been applied to the patient, and thus these inputs would be missing
- Tests take time, may be costly, and may inconvenience the patient so we do not want to apply them unless we believe that they will give us valuable information



Sentiment Analysis

ایران پتک با کیفیت‌ترین اجناس، رو تولید می‌کننده قیمت‌شمش بخاطر کیفیت‌شده حقشه ازش حمایت شه



از اینکه تولید داخل هست و باید از تولید داخل حمایت کرد شکی نیست ولی کاش سازنده ان برای اطمینان بهتر و فرو را

بیشتر گارانتی میدادن. کیفیتش خوبه. افتخار واسه ایران هست ولی مثل جنیوس نمی‌شه. عیب اجناس ایرانی اینه که تا بازار



فروش خوب شد کیفیت پایین میارن

۵۸,۹۰۰ تومان

ایران پتک بренд خوبیه



می باشد که اصلاً جواب نمیده



یکی از بهترین انبر قفلی هایی هست که توی بازار در دسترس هست و با توجه به کیفیت با این قیمت ارزش خرید بالایی دارد

در مقام مقایسه یک پله از انبر قفلی آمریکایی به دلیل بالاتر بودن کیفیت فک های انبر آمریکایی پایین تر است



نمی‌شه گفت محصول کارامدی نیست ...

ولی برای من با اولین پیچ 2تا دندونش صاف شد....

حالا شاید من درست کار نکردم باهاش ،

ولی فشاری که من وارد کردم اصلاً در حد صاف شدن این دندونه ها نبود

موفق باشید



انبر قفلی ایران پتک مدل 1010 HB سایز 10 اینچ

Iran Potk HB 1010 Locking Pliers 10 Inches

برند: ایران پتک
دسته‌بندی: انبر

گارانتی اصالت و سلامت فیزیکی کالا

فروشنده: سارامون

رضایت خرید: % ۸۸

آماده ارسال

Machine Translation

(src)="13"> But on the other side of that , though , we were big readers in our house .

هر چند ، اما از طرف دیگه تو خونه ما زیاد کتاب می خویندیم .

(src)="14"> And if the TV was on , we were watching a documentary .

و اگر تلویزیون روشن بود فیلمهای مستند نگاه می کردیم .

(src)="15"> And my dad is the most voracious reader I know .

پدرم حریص ترین کتابخونی بود که می شناسم .

(src)="16"> He can read a novel or two a day .

روزی یک یا دو تا رمان می خوند .

(src)="17"> But when I was little , I remember , he would kill flies in our house with my BB gun .

یادمه وقتی بچه بودم ، علاقه داشت که مگس های تو خونه را با تنگ بادی من بکشد .

(src)="18"> And what was so amazing to me about that -- well he would be in his recliner , would holler for me to fetch the BB gun , and I 'd go get it .

وقتی پدرم رو صندلیش داد می زد که تنگ بادیش رو ببرم -- خیلی نوق می کردم و براش می بردم .

(src)="19"> And what was amazing to me -- well it was pretty kickass ; he was killing a fly in the house with a gun -- but what was so amazing to me was that he knew just enough how to pump it .

کشن پشه تو خونه با تنگ بادی برام خیلی سرگرم کننده بود اما خیلی جالب بود که می دونست چقدر پمپ تنگ رو باد کنه .

(src)="20"> And he could shoot it from two rooms away and not damage what it was on because he knew how to pump it just enough to kill the fly and not damage what it landed on .

از دو تا اتاق اونور تر شلیک می کرد بدون اینکه به چیزی آسیب بزنه ، برای اینکه می دونست برای کشن پشه چقدر باید پمپ رو باد کنه و به چیزی آسیب نمی رسوند .

(src)="21"> So I should talk about art .

مثله اینکه قراره در مورد هنر حرف بزنم .

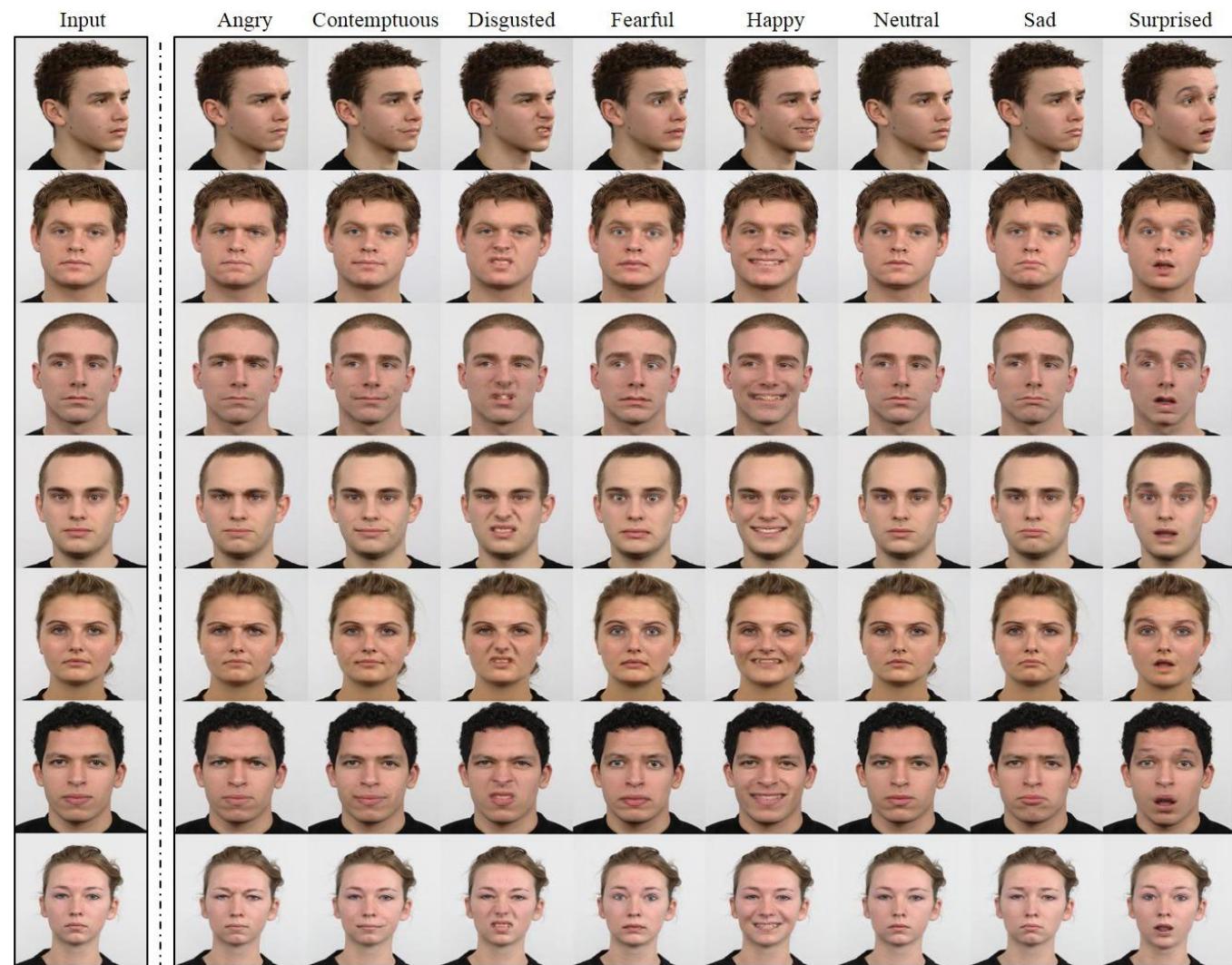
(src)="22"> Or we 'll be here all day with my childhood stories .

همه روز را می توانیم با قصه های بچگی می بگرانیم .

Instance Segmentation



Image Generation



Face2Face

Real-time Facial Reenactment



Live capture using a commodity webcam



Learning Representations

- Machine learning discovers rules to execute a data-processing task, given examples of what's expected
- To do machine learning, we need three things:
 - Input data points
 - Examples of expected output
 - A way to measure whether the algorithm is doing a good job



What a bright day

What a light day

Learning Representations

- A machine-learning model transforms its input data into meaningful outputs, a process that is “learned” from exposure to known examples of inputs and outputs
- The central problem in machine learning and deep learning:
 - meaningfully transform data
 - In other words, to learn useful representations of the input data at hand, representations that get us closer to the expected output

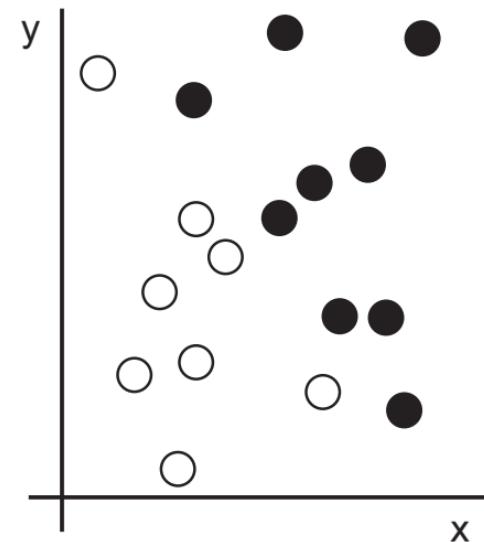
What's a representation?

- A different way to look at data, to represent or encode data
 - a color image can be encoded in the RGB format or in the HSV format or ...
- Machine-learning models are all about finding appropriate representations for their input data



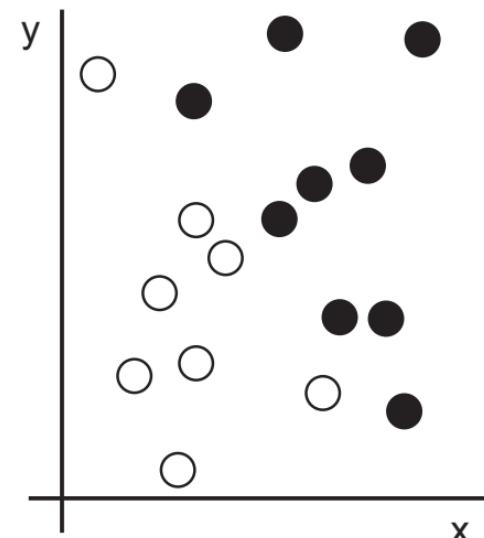
What's a representation?

- Consider an x-axis, a y-axis, and some points represented by their coordinates in the (x, y) system
- We want to develop an algorithm that can take the coordinates (x, y) of a point and output whether that point is likely to be black or to be white



What's a representation?

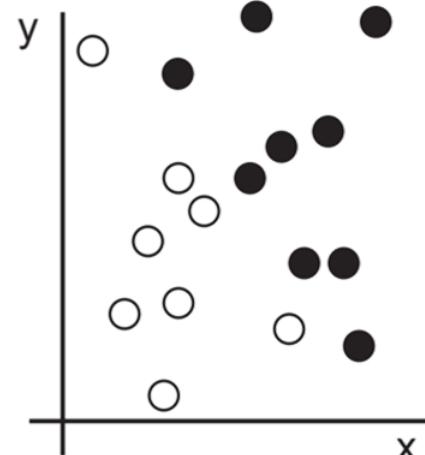
- To do machine learning, we need three things:
 - The inputs are the coordinates of our points
 - The expected outputs are the colors of our points
 - A way to measure whether our algorithm is doing a good job could be, for instance, the percentage of points that are being correctly classified



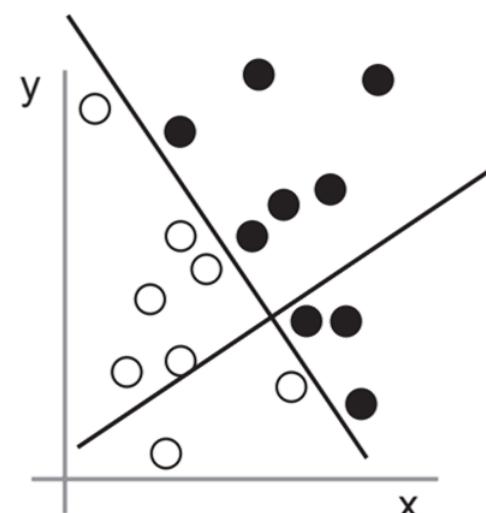
What's a representation?

- What we need here is a new representation of our data that cleanly separates the white points from the black points
- Learning, in the context of machine learning, describes an automatic search process for better representations

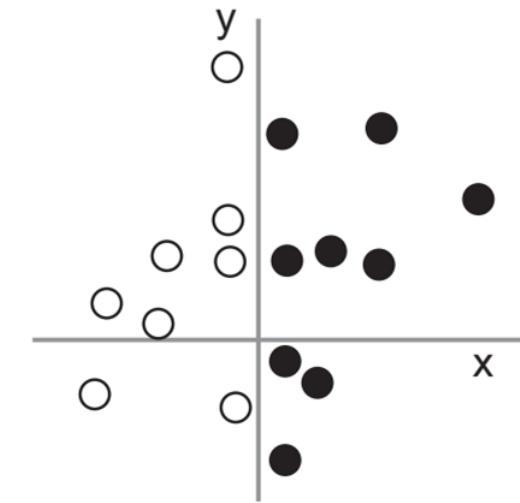
1: Raw data



2: Coordinate change



3: Better representation

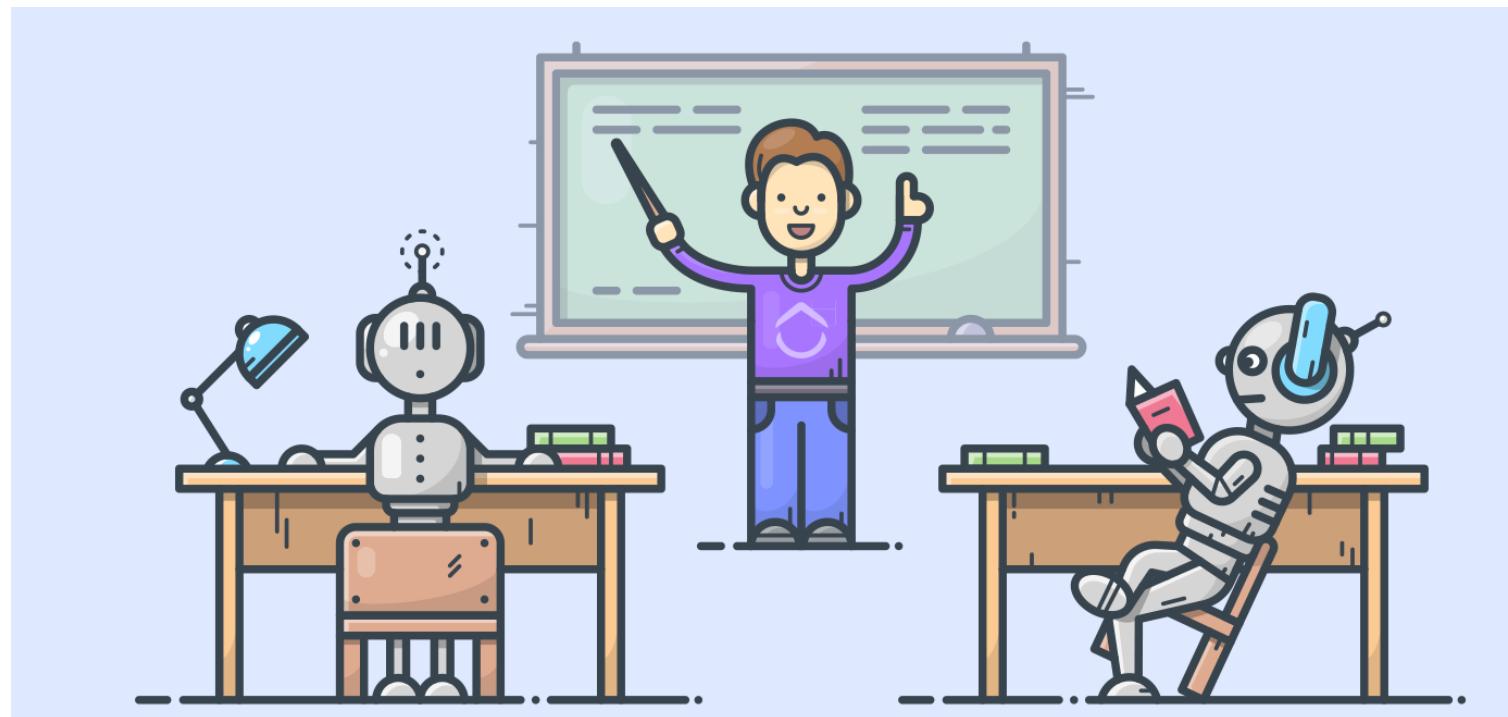


What's a representation?

- All machine-learning algorithms consist of automatically finding such transformations that turn data into more-useful representations for a given task
 - Coordinate changes, linear projections (which may destroy information), translations, nonlinear operations, etc.
- Machine-learning algorithms aren't usually creative in finding these transformations
 - They're merely searching through a predefined set of operations, called a hypothesis space.

Machine Learning

- Searching for useful representations of some input data, within a predefined space of possibilities, using guidance from a feedback signal



Deep Learning

- A specific subfield of machine learning that puts an emphasis on learning successive layers of increasingly meaningful representations
- Not necessarily a deeper understanding! Rather the idea of successive layers of representations
- Other machine learning approaches tend to focus on learning only one or two layers of representations (they're sometimes called shallow learning)



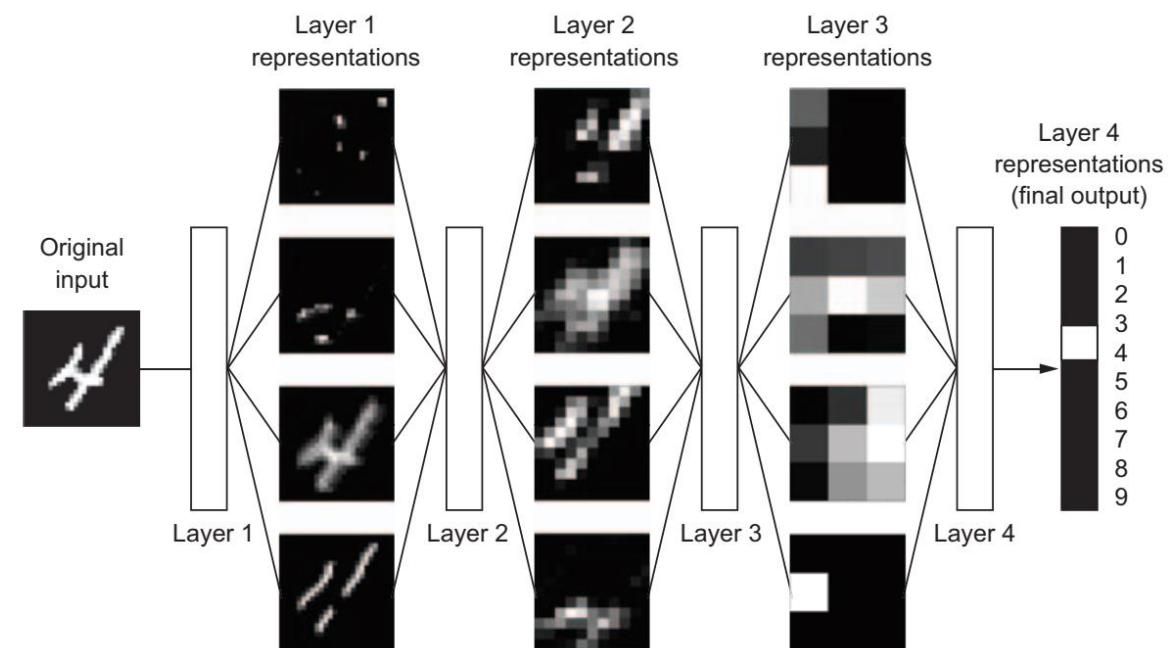
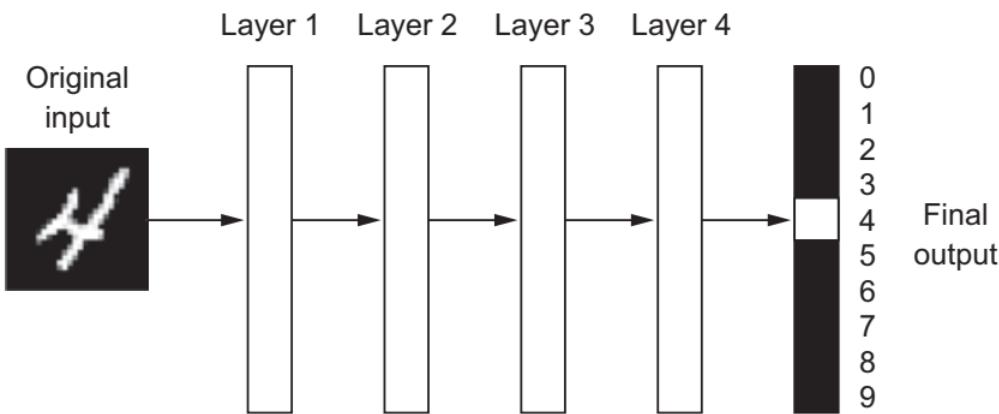
Deep Learning and Neural Networks

- In DL, layered representations are (almost always) learned via models called neural networks
- Deep-learning models are not models of the brain!
- Deep learning is a just mathematical framework for learning representations from data



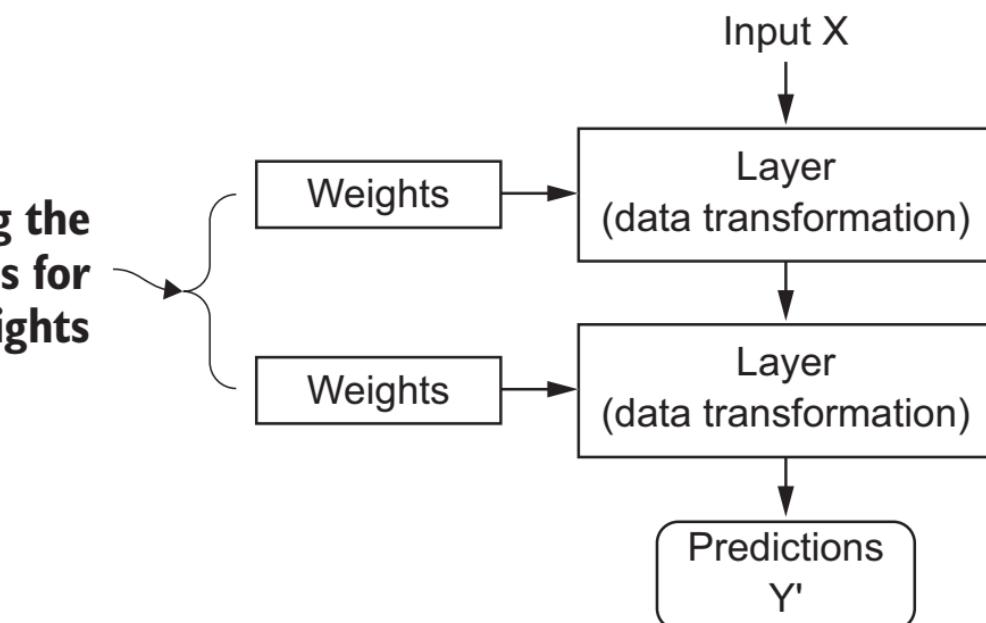
Deep learning: Representations

- What do the representations learned by a deep-learning algorithm look like?
- The network transforms the digit image into representations that are increasingly different from the original image and increasingly informative about the final result



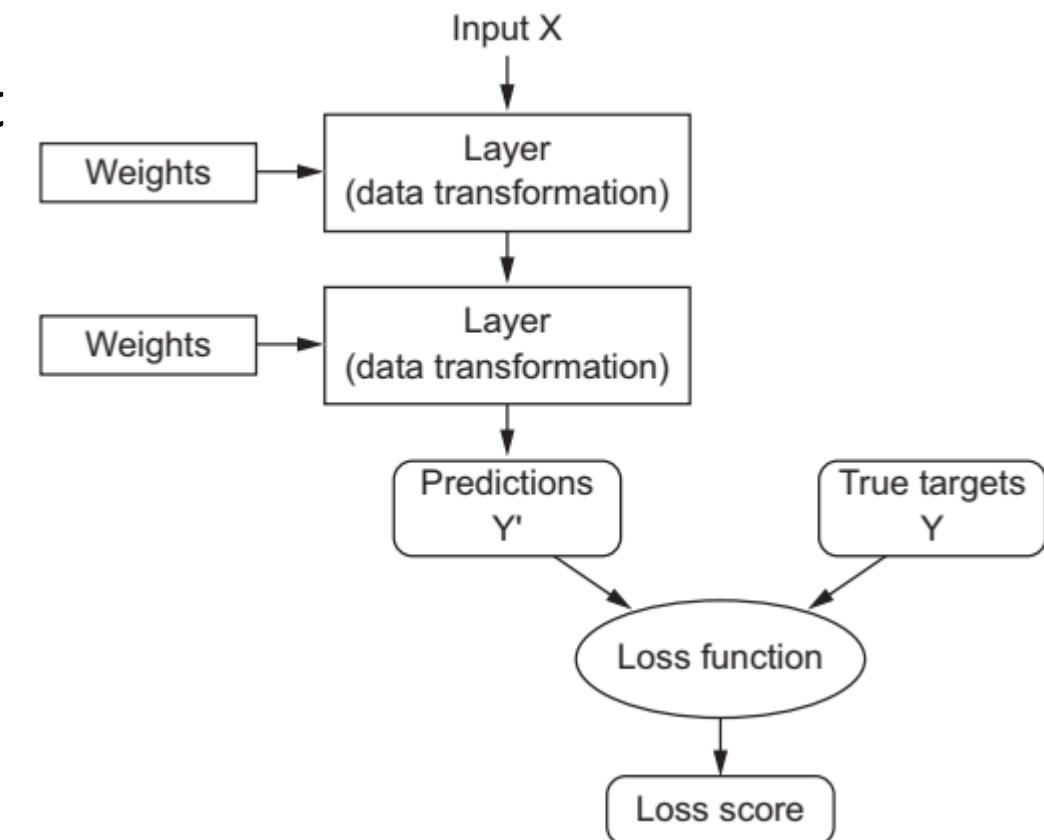
How deep learning works?

- Machine learning is about mapping inputs (such as images) to targets (such as the label “cat”), which is done by observing many examples of input and targets
 - Find a set of values for the weights of all layers in a network, such that the network will correctly map example inputs to their associated targets
- Goal: finding the right values for these weights**



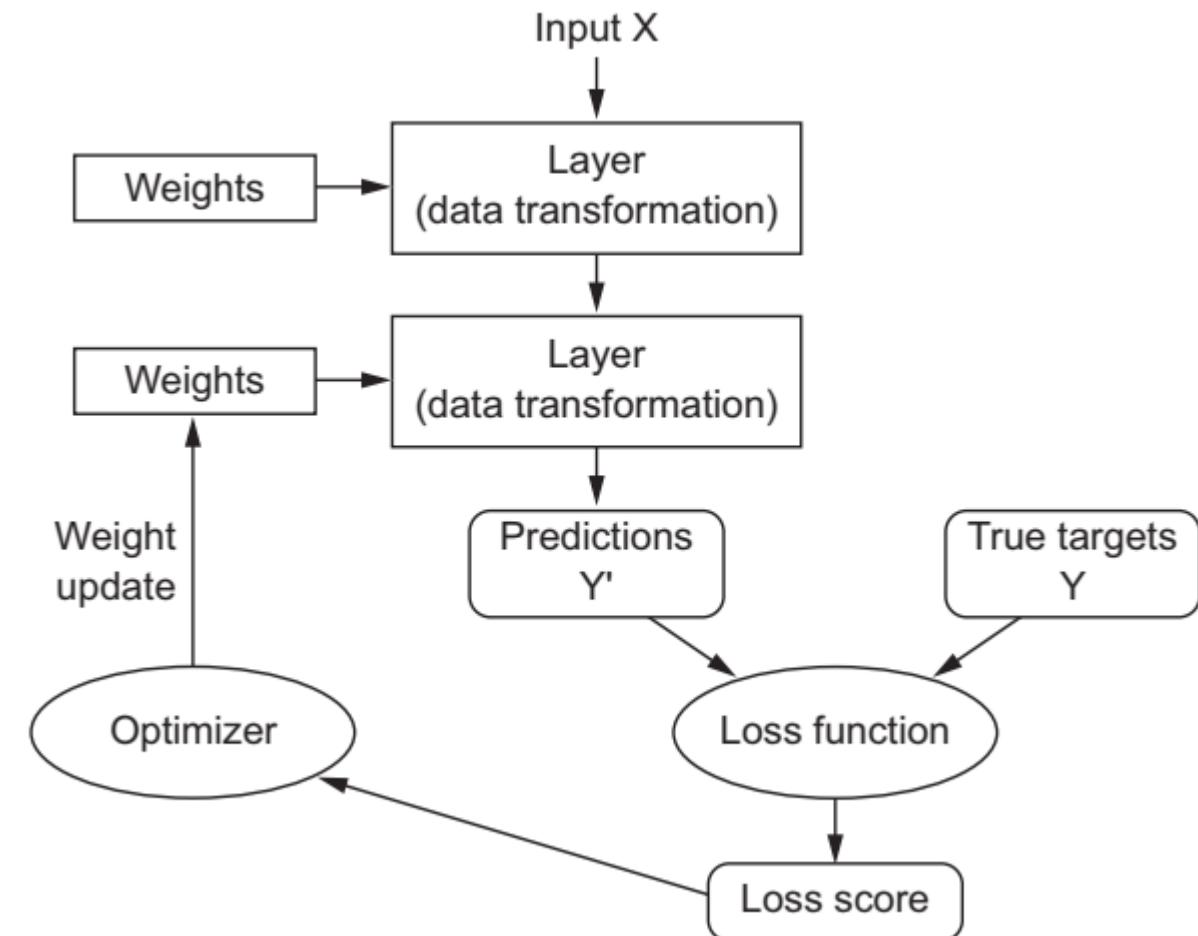
How deep learning works?

- Loss function (objective function): measures how far the output is from what you expected



How deep learning works?

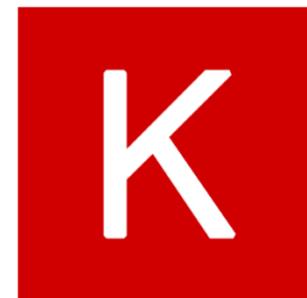
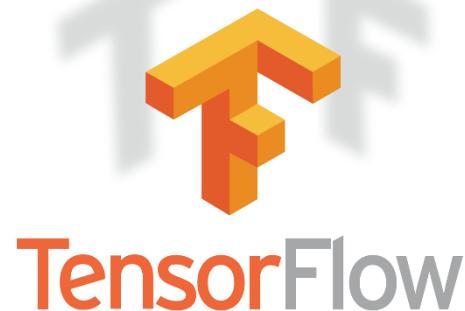
- Use the loss score as a feedback signal to adjust the value of the weights a little, in a direction that will lower the loss score for the current example
- Optimizer



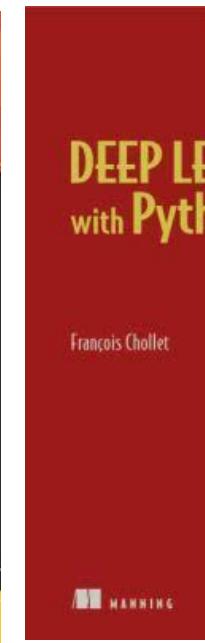
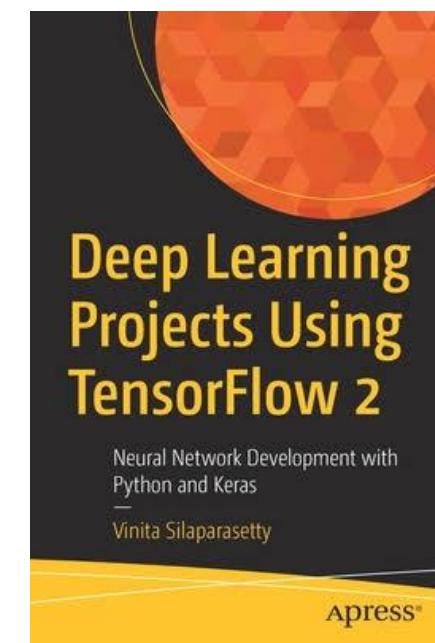
Textbooks

- Primary

- [1] F. Chollet, “*Deep learning with Python*”, Manning, 2018
- [2] V. Silaparasetty, “*Deep Learning Projects Using TensorFlow 2*”, Apress, 2020



Keras



Textbooks

- Secondary

[3] I. Goodfellow, et al., “*Deep learning*”, MIT press, 2016.

[4] E. Charniak, “*Introduction to deep learning*”, MIT Press, 2019.

[5] W. Samek, et al., “*Explainable AI: interpreting, explaining and visualizing deep learning*”, Springer, 2019

