ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Digital Education

“They couldn't even code!”

Digital illiteracy as a major societal risk factor

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EPFL Extension School
@marcelsalathe

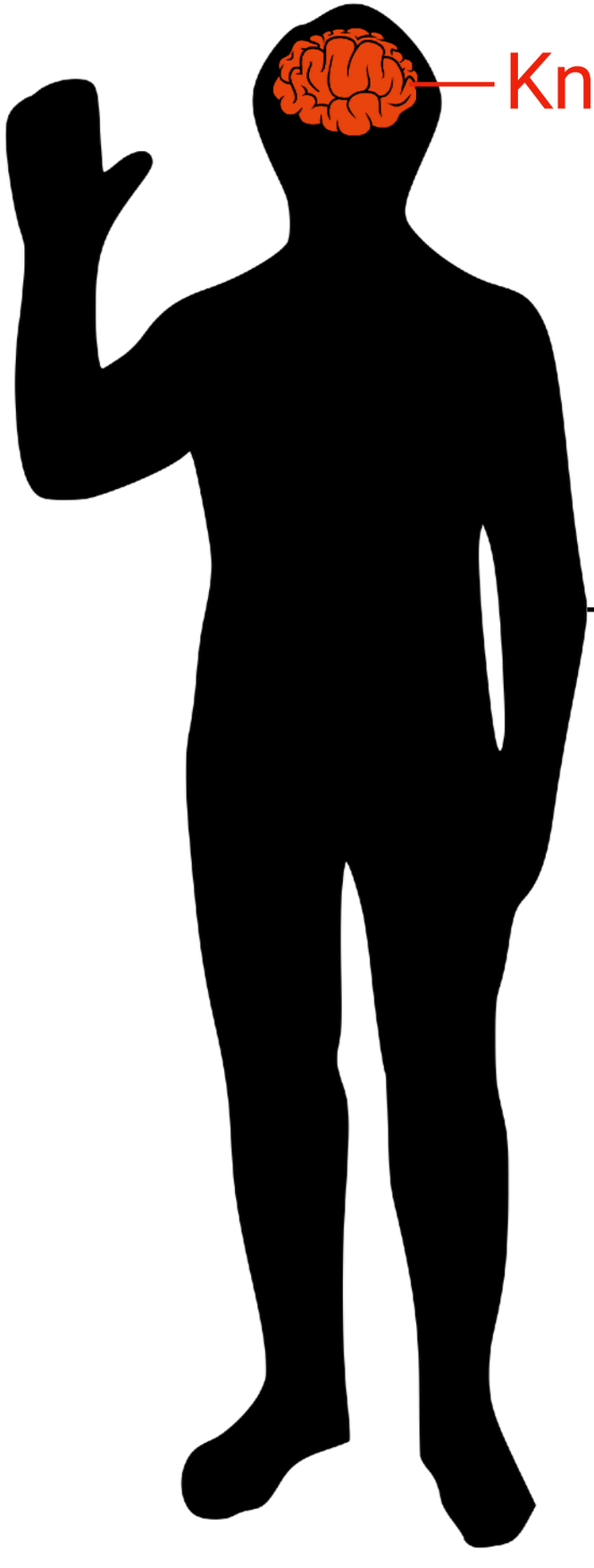

“They couldn’t even code!”


PRICE $8.99
THE
NEW YORKER
OCT. 23, 2017
KIKUO

Computational skills are advanced skills.

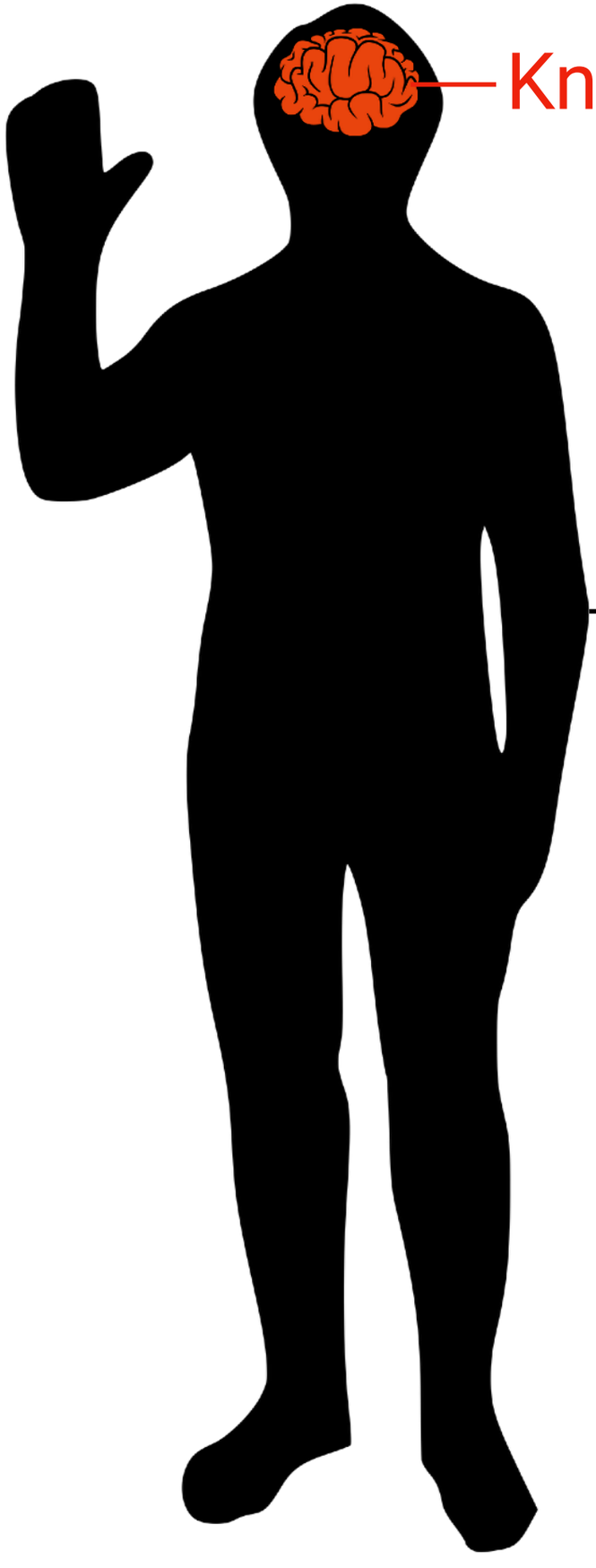
basic

Computational skills are ~~advanced~~ skills.



Knowing what needs to be done

Having the operational skills to do it



Knowing what needs to be done

Having the operational skills to do it

● ●	Productive
●	Zombie
●	Brain-in-a-Jar

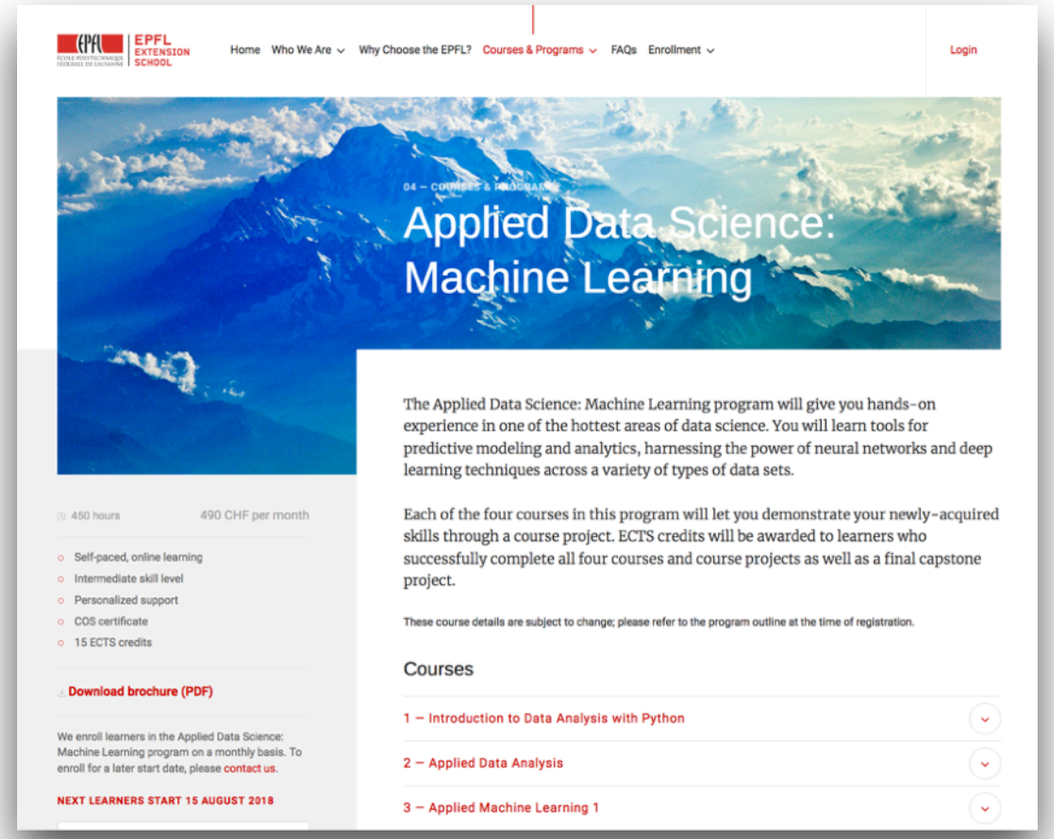
EPFL Extension School

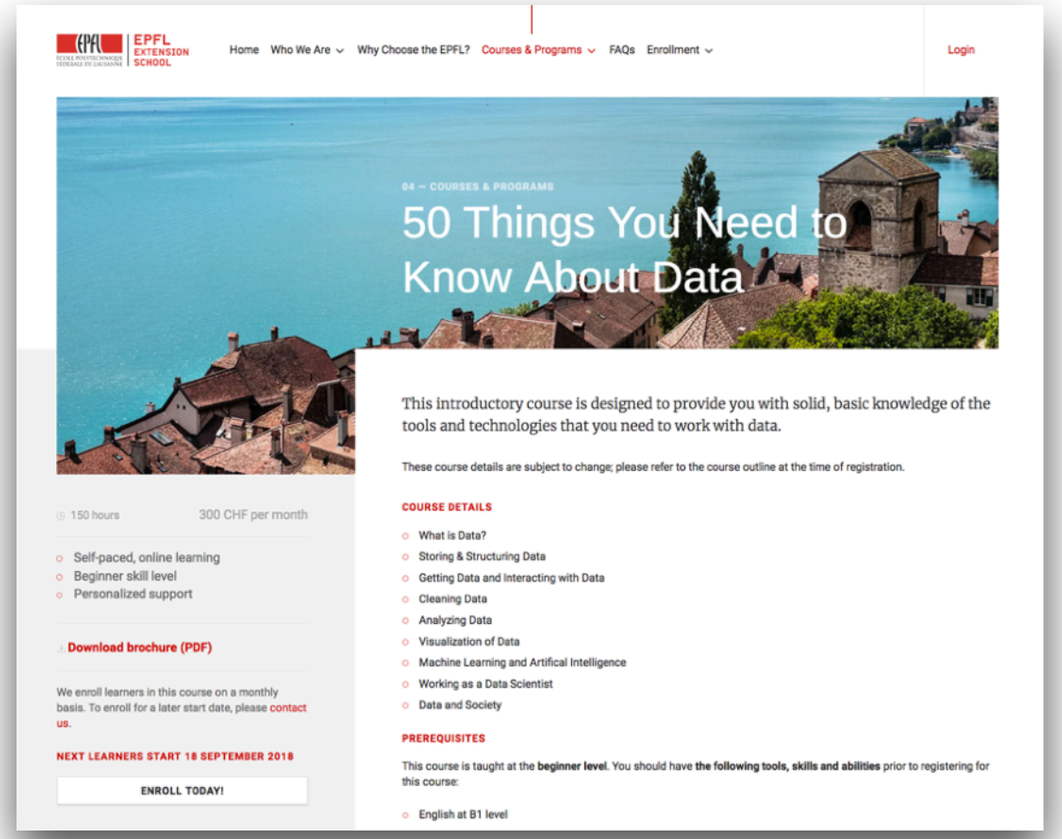
Fully **online**, with **personal** support

Open to **everyone**, programs **accredited (COS)**

Vocational training - heavy focus on **application**

exts.epfl.ch





COURSES & PROGRAMS QUICK FACTS

- 100% online
- Fully self-paced
- 1-on-1 support from instructors
- Personalized capstone project
- Cost-effective monthly pricing
- No academic prerequisites
- Applied, hands-on learning
- World-class EPFL quality

EPFL delivers Switzerland's first Certificates of Open Studies

Why?

THE LARGEST COMPANIES BY MARKET CAP

The oil barons have been replaced by the whiz kids of Silicon Valley

Top 5 Publicly Traded Companies (by Market Cap)

Tech

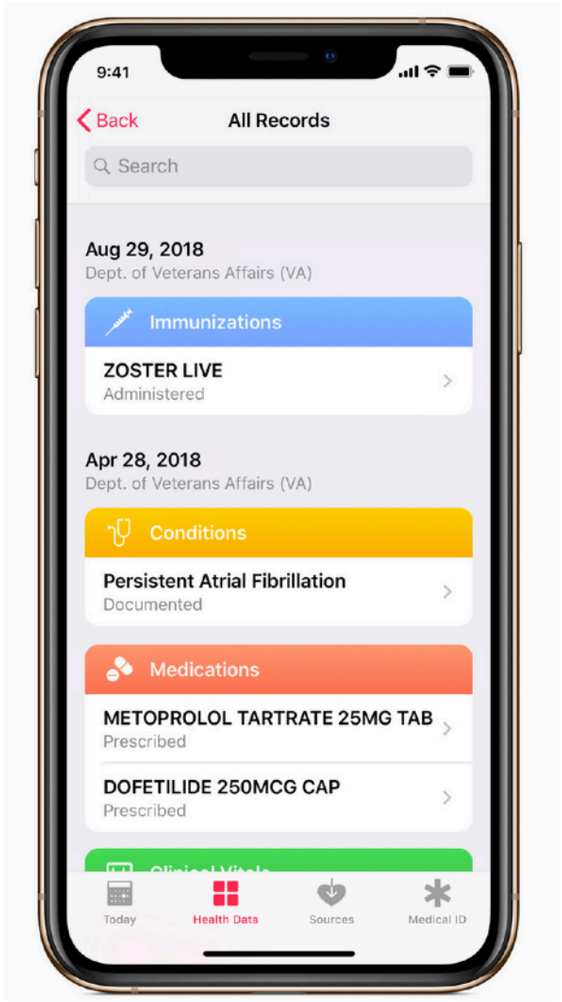
Other

	#1	#2	#3	#4	#5
2001	GE $406B	Microsoft $365B	EXXON $272B	Citi $261B	Walmart $260B
2006	EXXON $446B	GE $383B	TOTAL $327B	Microsoft $293B	Citi $273B
2011	EXXON $406B	Apple $376B	PetroChina $277B	Shell $237B	ICBC $228B
2016	Apple $582B	Alphabet $556B	Microsoft $452B	amazon $364B	facebook $359B
2019:	805B	781B	820B	804B	471B

visualcapitalist.com

UPDATE
February 11, 2019

Apple announces Health Records feature coming to veterans



Customers at a Whole Foods Market in Midtown Manhattan.
John Taggart for The New York Times

```
132     public static String buildMACAsBase64String(String input) {
133         return base64encoder.encodeToString(buildMAC(input));
134     }
135
136     /**
137      * Builds the mac of the input string and returns it as a string,
138      * applying a generated {@link #SALT_SIZE_BYTES} bytes salt on the message.
139      *
140      * @param input message to be MACed.
141      * @return the concatenation of the {@link #SALT_SIZE_BYTES} bytes salt and the MAC in base64
142      */
143     public static String buildSaltedMACAsBase64String(String input) {
144         final byte[] salt = SaltUtils.generateSalt(SALT_SIZE_BYTES * 8);
145         final byte[] mac = buildMAC(input, salt);
146         return base64encoder.encodeToString(mac);
147     }
148
149     /**
150      * Computes the unsalted MAC of the input
151      *
152      * @param input any string
153      * @return the MAC (using algorithm defined in the {@link #config}) of the input string
154      */
155     public static byte[] buildMAC(String input) {
156         return buildMAC(input, null);
157     }
158
159     /**
160      * Computes a salted MAC of the input
161      *
162      * @param input any string
163      * @param salt  the salt to be used by the MAC
164      * @return the MAC (using algorithm defined in the {@link #config}) of the input string, using the provided sa
```

Entity	Year	Records	Organization type	Method
Yahoo	2013	3,000,000,000	web	hacked
Marriott International	2018	500,000,000	hotel	hacked
Yahoo	2014	500,000,000	web	hacked
Friend Finder Networks	2016	412,214,295	web	poor security / hacked
Massive American business hack including 7-Eleven and Nasdaq	2012	160,000,000	financial	hacked
Adobe Systems	2013	152,000,000	tech	hacked
Under Armour	2018	150,000,000	Consumer Goods	hacked
eBay	2014	145,000,000	web	hacked
Equifax	2017	143,000,000	financial, credit reporting	poor security
Heartland	2009	130,000,000	financial	hacked
Quora	2018	100,000,000	Question & Answer	hacked
Rambler.ru	2012	98,167,935	web	hacked
TK / TJ Maxx	2007	94,000,000	retail	hacked
MyHeritage	2018	92,283,889	genealogy	unknown
AOL	2004	92,000,000	web	inside job, hacke
Anthem Inc.	2015	80,000,000	healthcare	hacked
Sony PlayStation Network	2011	77,000,000	gaming	hacked
JP Morgan Chase	2014	76,000,000	financial	hacked
National Archives and Records Administration (U.S. military veterans' records)	2009	76,000,000	military	lost / stolen medi

Politics in the Computational Age

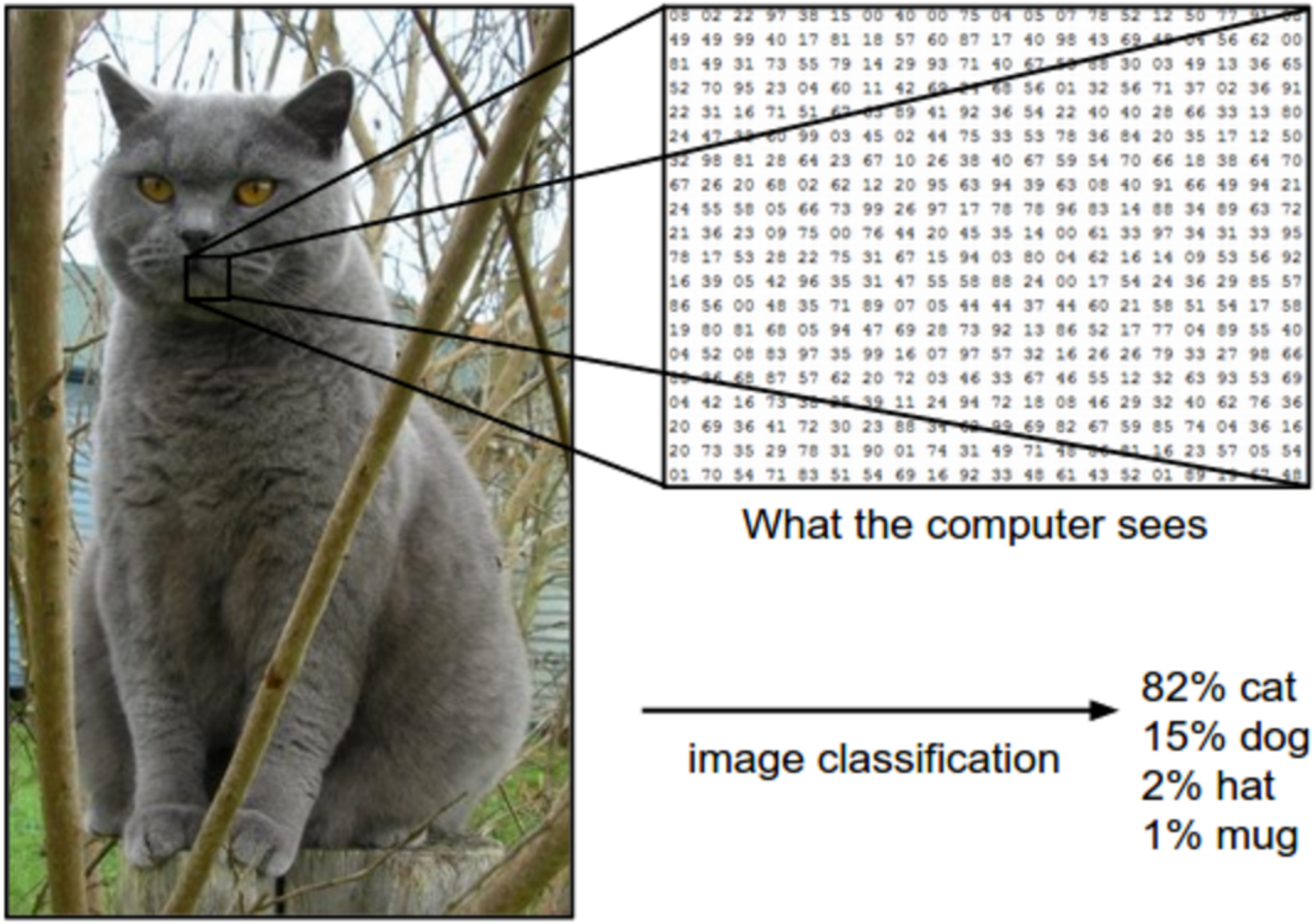
“There are two types of politicians: those who know how to use Facebook, and those who loose elections.”

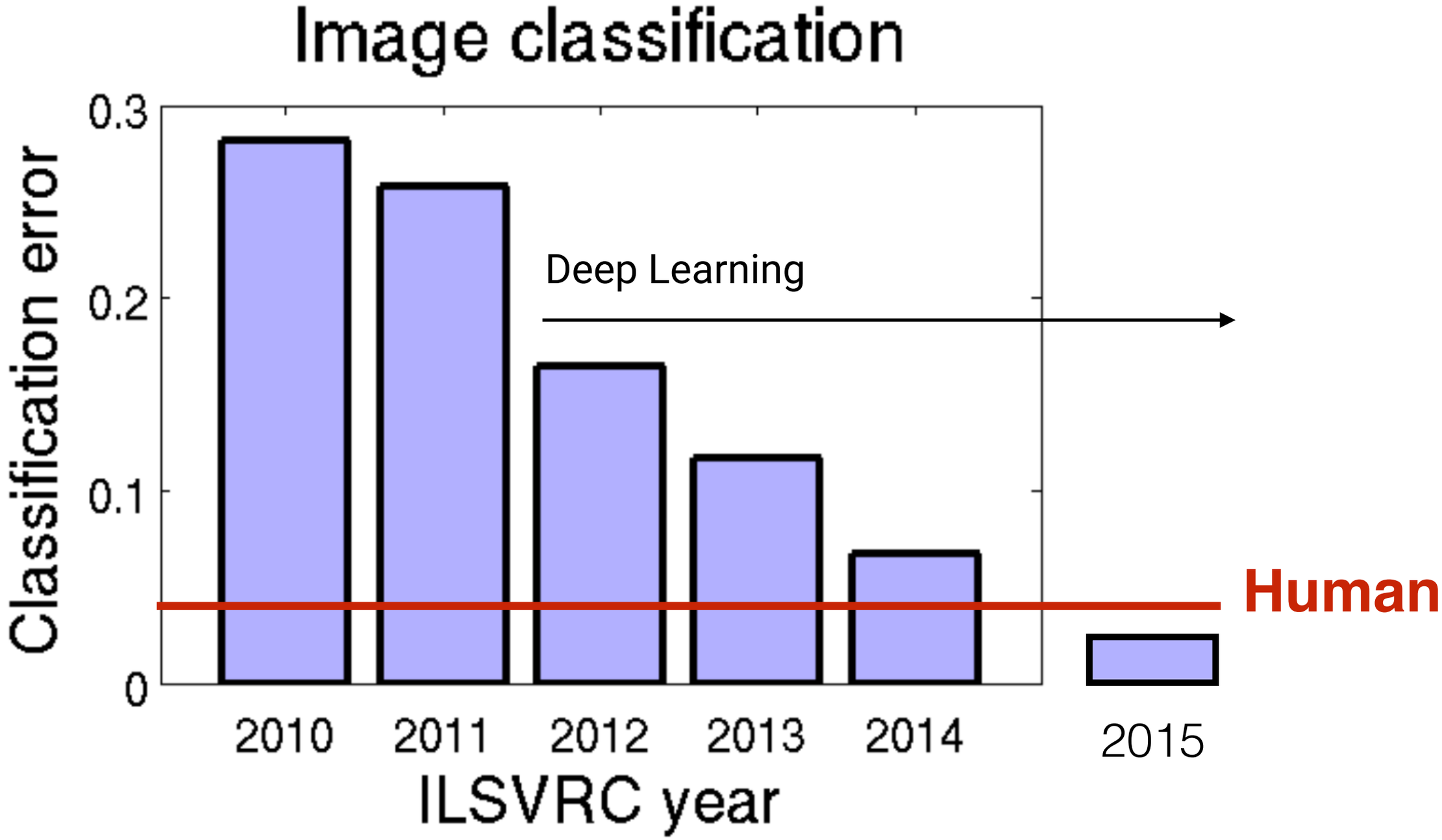
Centralized vs decentralized infrastructure

E-voting

Fake vs Real

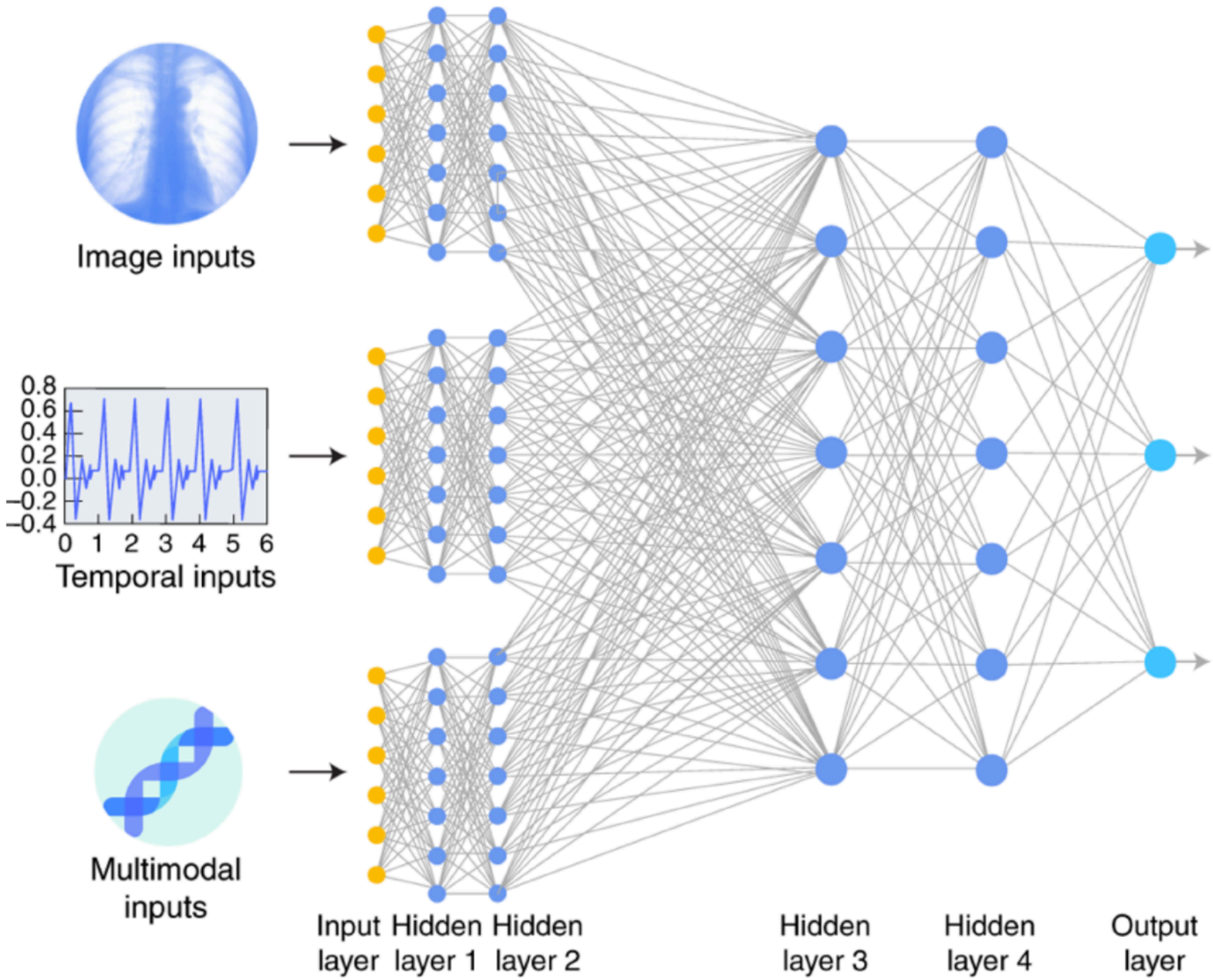
Artificial Intelligence


What the computer sees
image classification
82% cat
15% dog
2% hat
1% mug



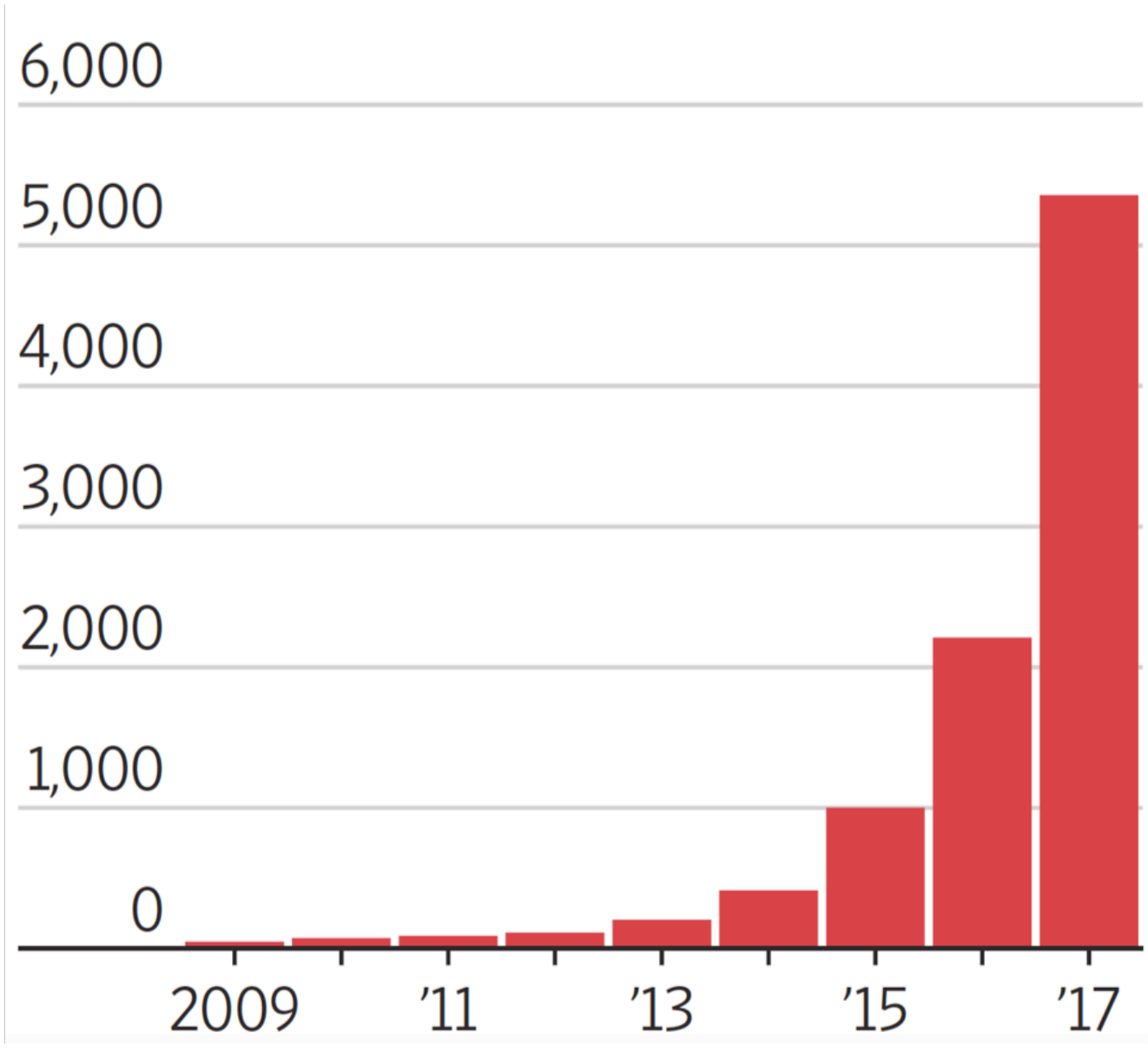
https://arxiv.org/pdf/1409.0575v3

Deep Learning



Esetva et al. *Nature Medicine* **25** (2019)

Deep Learning - it works



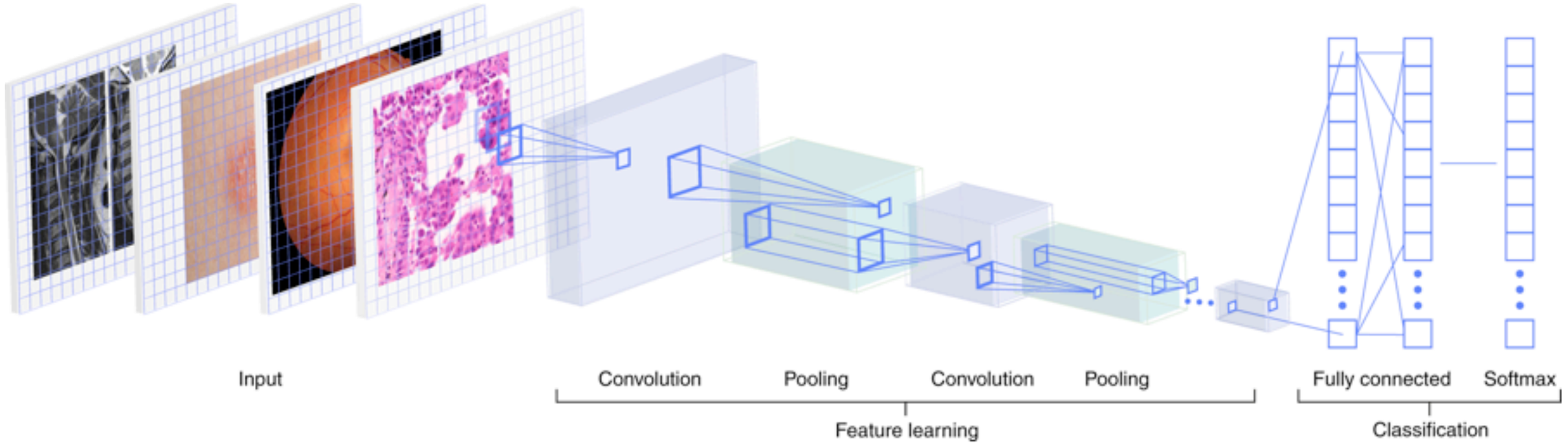
Number of papers with “Deep Learning” in the title or abstract (excluding preprints)

Source: Wall Street Journal

The Case of Image Recognition

Training requires many annotated images

Learning is end-to-end: from image to classification



Esetva et al. *Nature Medicine* **25** (2019)

The Case of Image Recognition

Basic observations:

1. The more data, the better the outcome.

Implications: Organizations become data hungry. Who has the data, has the power.

The Case of Image Recognition

Basic observations:

2. The learning is “end-to-end” - i.e. from input layer, to output layer, there is nothing else - no expertise.

Implications: All value is in the data and its labels. There is no domain expertise required anywhere else. But we do not understand what the network does - it just works.

The Case of Image Recognition

Basic observations:

2. The learning is “end-to-end” - i.e. from input layer, to output layer, there is nothing else - no expertise.

This is a complete reversal in science and engineering. Normally, we first understand something, and then use that knowledge to build better tools.

The Case of Image Recognition

Basic observations:

3. The network is learning on the data it has been given, and will only be able to learn patterns from that data.

If the data is biased, then the network will be biased. We are increasingly seeing cases of biased, discriminatory algorithms.

The Case of Image Recognition

Basic observations:

4. Companies like Google, Facebook, etc. are increasingly open sourcing their algorithms and frameworks (e.g. TensorFlow, PyTorch, etc.)

The AI software frameworks are accessible to all. It is the data that is the limiting factor / competitive advantage.

Deep Learning

Domains where deep learning has made substantial progress:

- Image Recognition
- Natural Language Processing
- Decision Making in Complex Environments

These are extremely broad domains, which is why AI is suddenly everywhere.

Will AI replace [insert job]?

No. [insert job] with AI will replace [insert job] without AI.

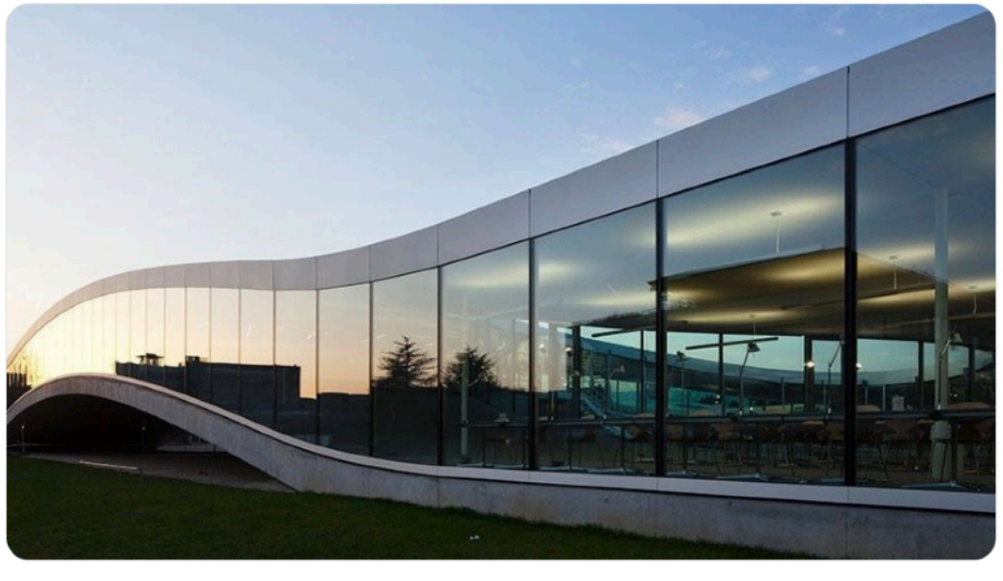
Michael Baeriswyl
@michaelbaeris

Following

We will educate over 1000 employees in the modern ways of working with #data and applying #AI.

@Swisscom_de partners with @epfl_exts to access top-tier classes and #learning resources about data, analytics and AI.

Thank you, @marcelsalathe @EPFL @MartinVetterli!



9:00 PM - 13 Dec 2018

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Vision 2024: Educate!

In 5 years: 50% of the employable Swiss population (2.5M people) shall have basic technological competences and some programming skills.

Everything is in place - **it is 100% a question of political will.**

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