

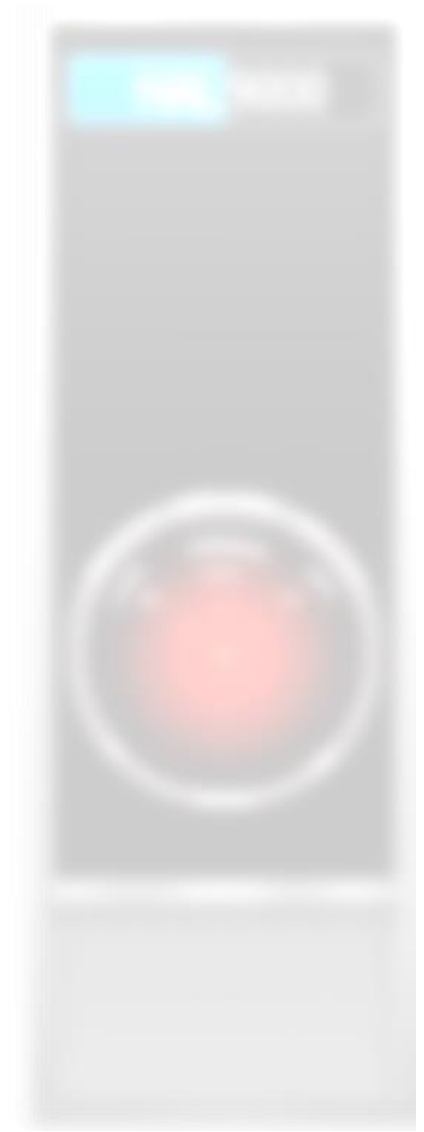
Artificial Intelligence: The Big Picture

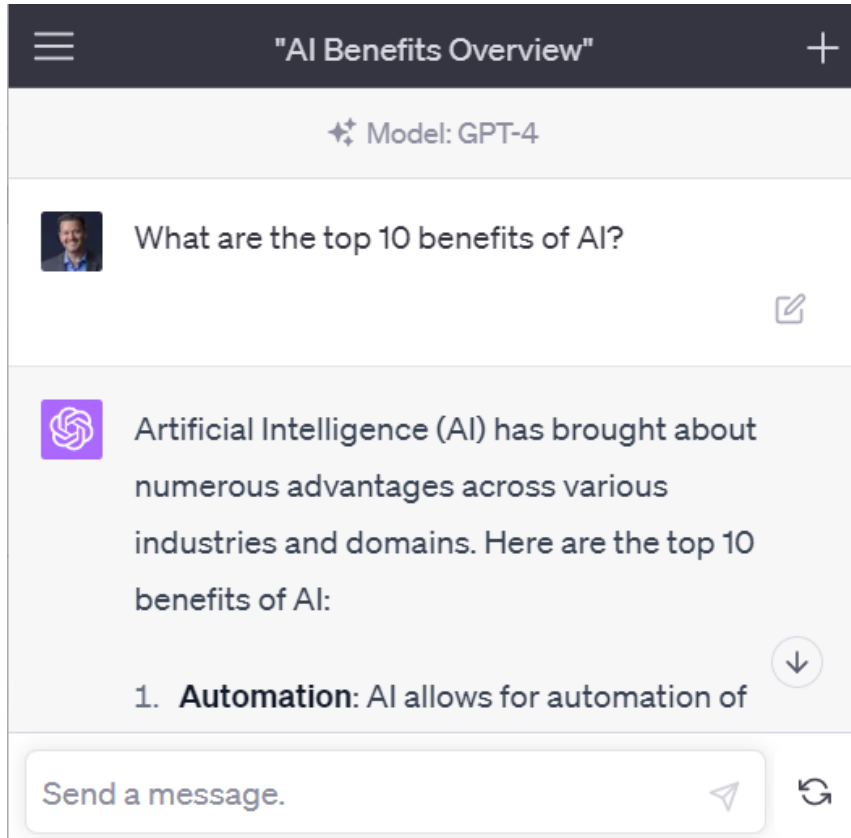
Matthew Renze
Renze Consulting



Source: Disney, VIACOM-CBS, MGM

General AI





Narrow AI

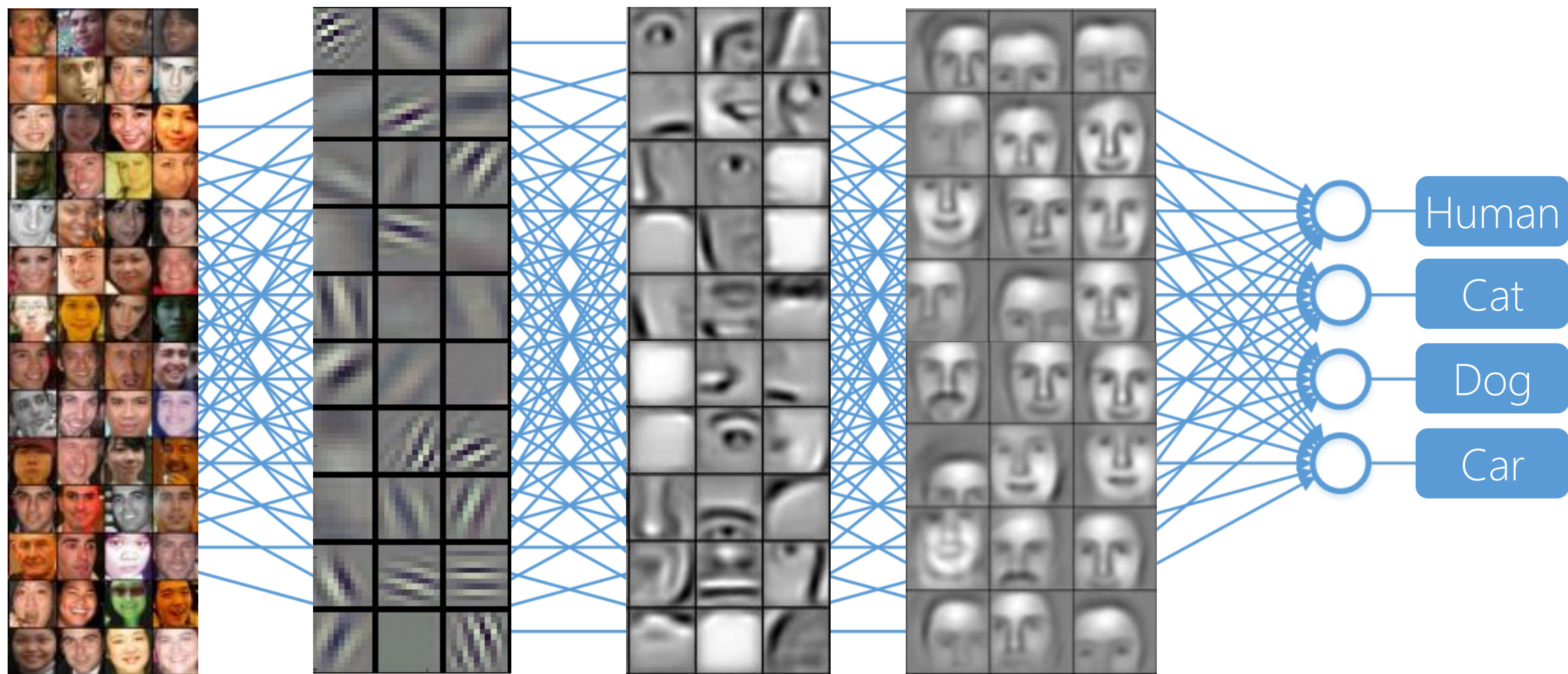




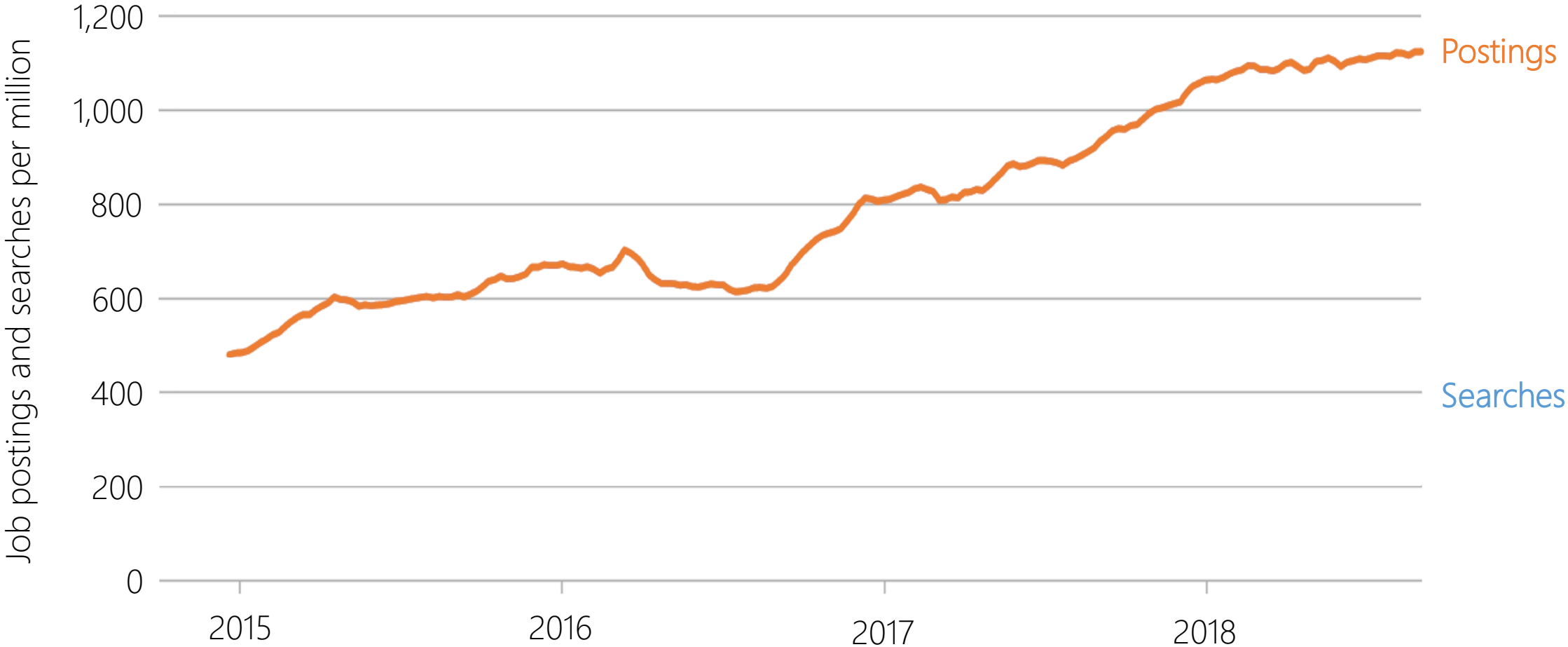


```
255 function updatePhotoDescription() {
256     if (descriptions.length > (page * 9) + (currentImageSubtring() - 1)) {
257         document.getElementById('bigImageDesc').innerHTML = descriptions[page * 9 + currentImageSubtring() - 1];
258     }
259 }
260
261 function updateAllImages() {
262     var i = 1;
263     while (i < 10) {
264         var elementId = 'foto' + i;
265         var elementIdBig = 'bigImage' + i;
266         if (page * 9 + i - 1 < photos.length) {
267             document.getElementById(elementId).src = 'images/min/' + photos[page * 9 + i - 1];
268             document.getElementById(elementIdBig).src = 'images/max/' + photos[page * 9 + i - 1];
269         } else {
270             document.getElementById(elementId).src = "";

```

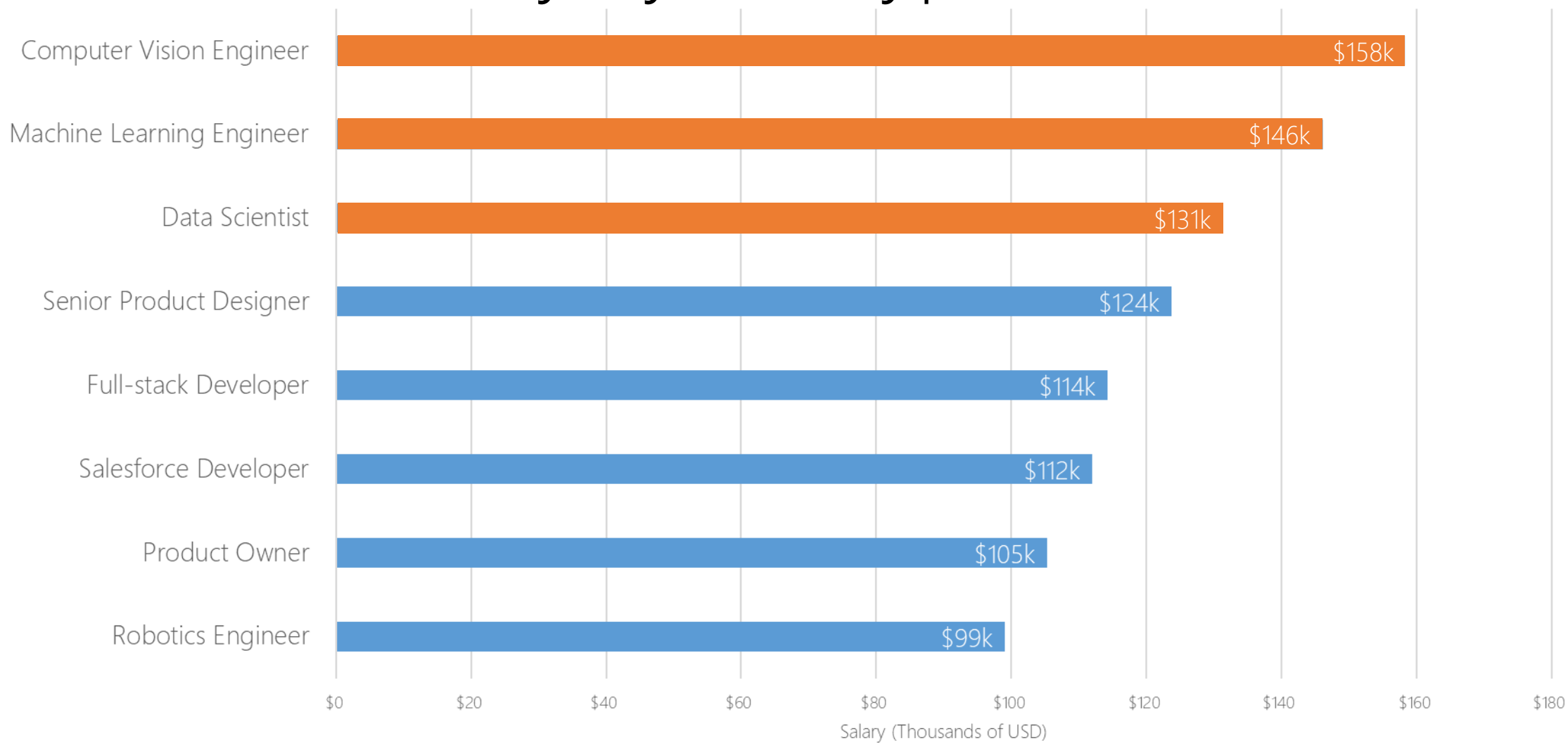



A.I. Job Postings vs. Searches



Original Source: Indeed.com, Reuters, Ann Saphir

Salary by Job Type (USA)



Source: Indeed's Best Jobs of 2019



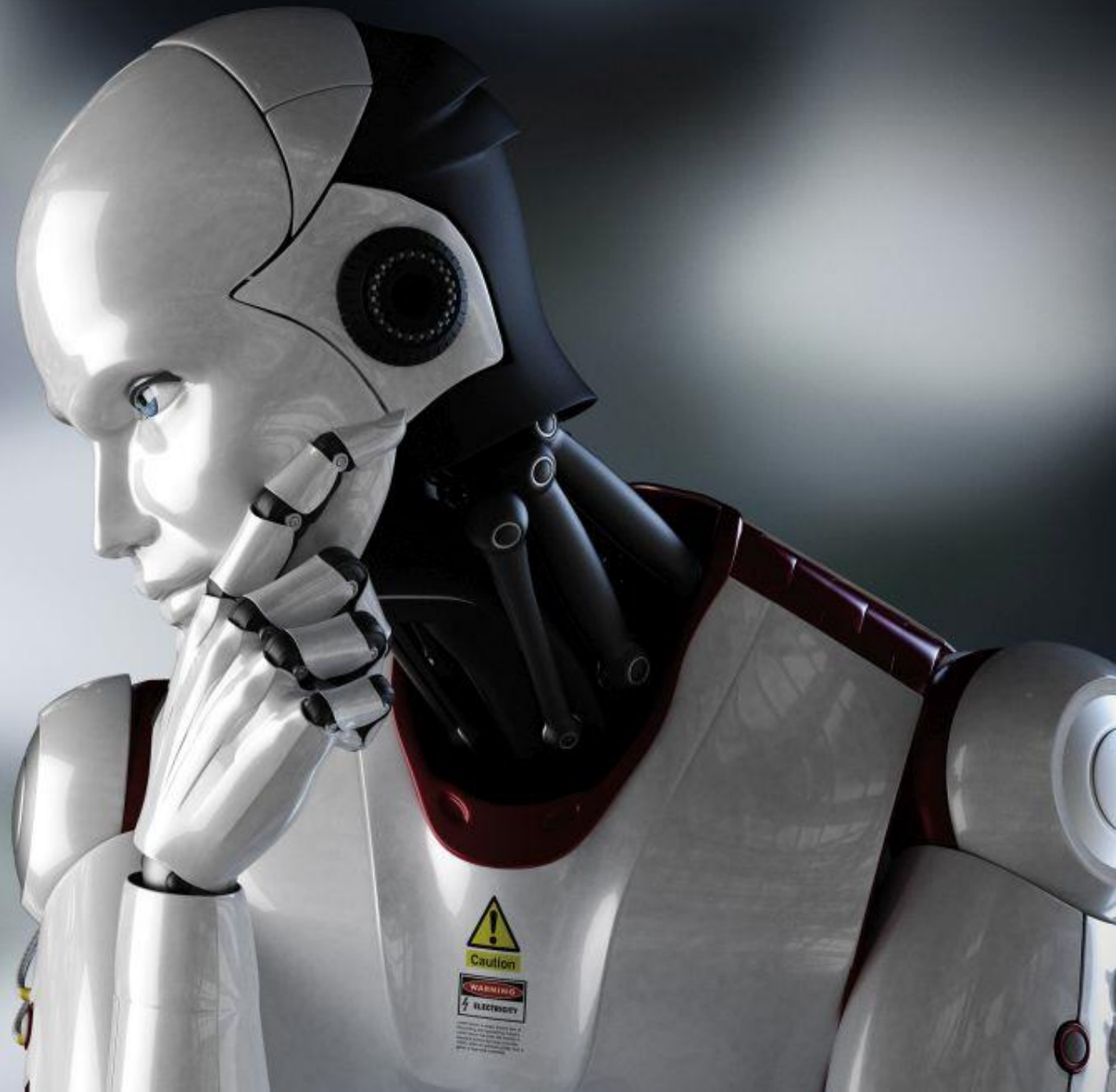


What is AI?

Why is it important?

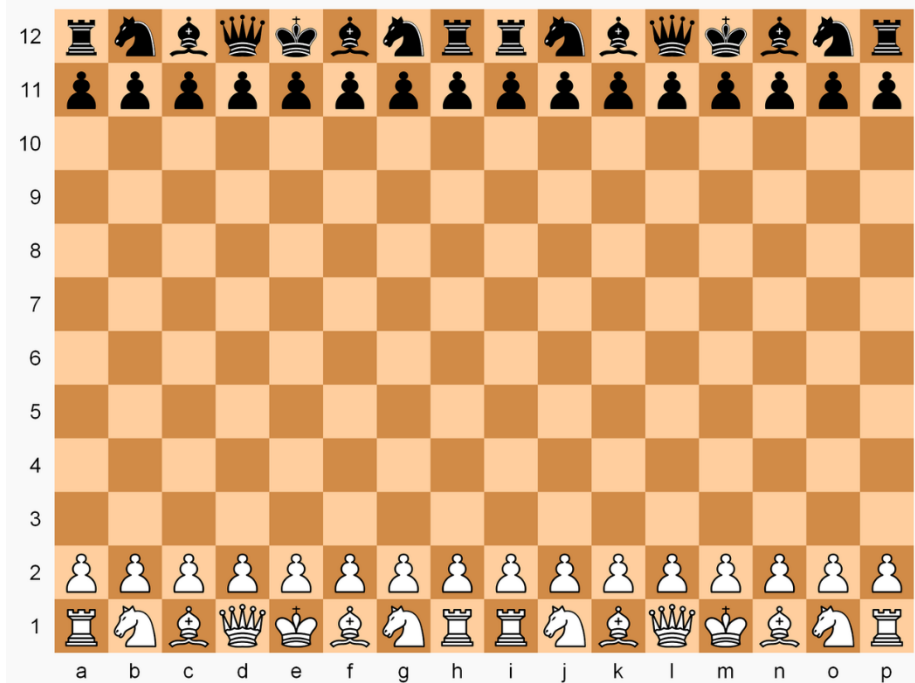
How will it affect you?

What is AI?



A machine that
perceives its environment
and chooses actions
that maximize the
expected likelihood
of achieving a goal







Examples of Modern AI







 PUDU

3+X

PUDU A1



+ New chat

Starting Small Business  

Overview of Superforecasting

Model Sizes in GB.


Filter BCC Emails.


Tabular Data and XAI


Tabular Data to Text.


Database and spreadsheet fun

Automated lecture slides.

 Clear conversations

 Dark mode

 My account

 Get help

 Log out

Model: Default (GPT-3.5)



How do I start a small business?



Starting a small business can be an exciting and rewarding experience, but it can also be daunting. Here are some steps to help you get started:



1. Conduct market research: Determine whether there is a market for your product or service. Research your target audience, competitors, and industry trends.
2. Develop a business plan: A business plan outlines your business goals, strategies, and financial projections. It serves as a roadmap for your business and helps you secure funding.
3. Decide on your legal structure: Determine whether you want to operate as a sole proprietorship, partnership, LLC, or corporation. Each structure has different tax implications and legal requirements.
4. Register your business: Register your business with your state and obtain any necessary licenses and permits.
5. Secure funding: Determine how much funding you need to start and run your business. You can seek funding from investors, loans, grants, or crowdfunding.
6. Set up your business: Set up your location, purchase equipment and inventory, and hire employees if necessary.

 Regenerate response

Send a message...





What is the capital of France?



The capital of France is Paris.



What is the population?



As of 2021, the population of Paris, the capital city of France, was estimated to be around 2.2 million people.

A photograph of an astronaut riding a horse on the moon.



Street style photography of a little girl standing alone holding a flower on the street of downtown Lisbon, no one on the street, lots of pigeons around, movie scene, Lomography Redscale XR 50–200, high contrast, 4k, --v 5



Source: <https://levelup.gitconnected.com/jaw-dropping-ai-images-from-midjourney-v5-with-prompts-e231b7f2cb4e>





Imagen Video



Imagen Video



Imagen Video



Imagen VI



Imagen Video



Imagen Video



Imagen Video



Imagen VI



Imagen Video



Imagen Video



Imagen Video



Imagen VI





Source: <https://research.nvidia.com/labs/toronto-ai/VideoLDM/>

```
39 def get_class(slide):
40     match = re.search(r"<!-- _class: ([a-zA-Z0-9-]+) -->", slide)
41     if match is None:
42         return None
43     return match.group(1)
44
45 # Create a function to get the title
46 def get_title(slide):
47     match = re.search(r"^# (.+)$", slide, flags=re.MULTILINE)
48     if match is None:
49         return None
50     return match.group(1)
51
52 def get_body(slide):
53     body = ""
54     skip = False
55     lines = slide.split("\n")
```



Why isn't my code matching on multiple lines?

```
def get_title(slide):  
    match = re.search(  
        r"^# (.*)", slide)  
    if match is None:  
        return None  
    return match.group(1)
```



If you want your regular expression to match on multiple lines, you need to include the "multiline" flag. You can do this by passing `re.MULTILINE` as the second argument to `re.compile()`, ...



... like this:

python

Copy code

```
import re  
  
pattern = re.compile(  
    r"^# (.*)",  
    re.MULTILINE)  
  
def get_title(slide):  
    match = pattern.search(slide)  
    if match is None:  
        return None  
    return match.group(1)
```



ChatGPT



Stable
Diffusion



GitHub
Copilot

Why is AI important?



ROGERS MAJESTIC
SILVER JUBILEE
Designed, Engineered and built in Canada's



ELECTRONIC
BRAIN

HUMAN
BRAIN

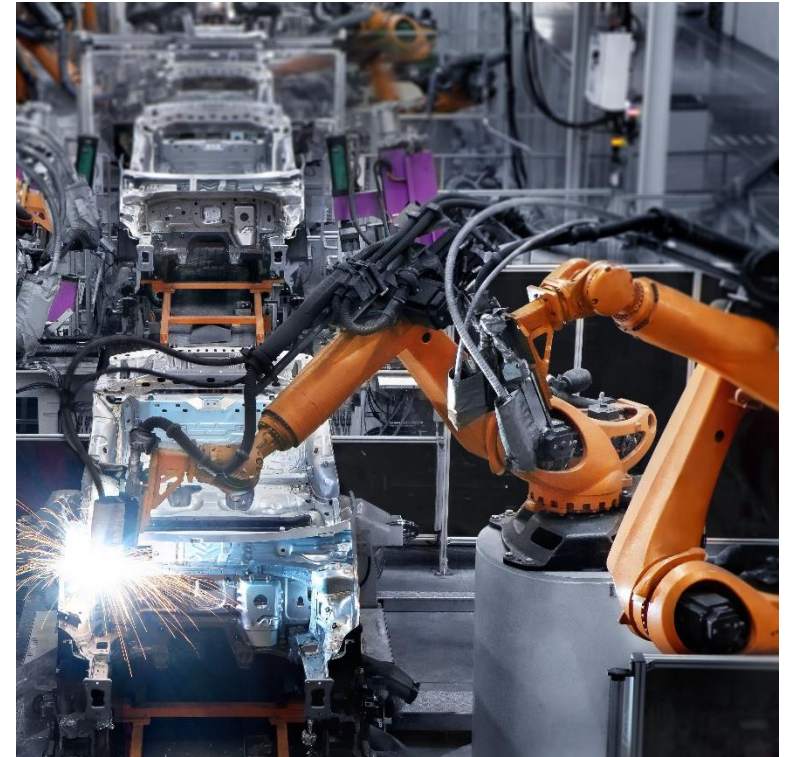
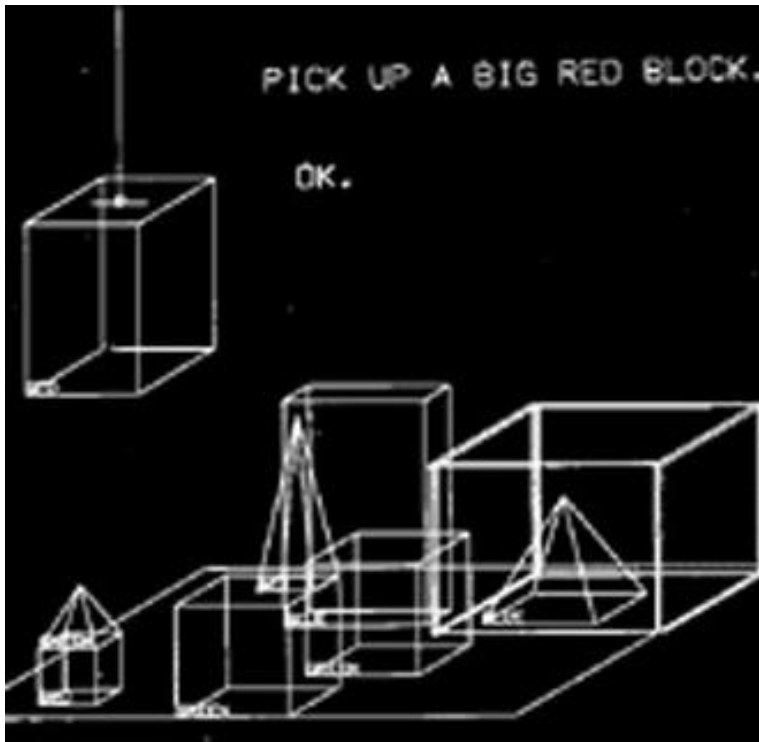
WIN

'BERTIE BRAIN'
by Rogers Majestic

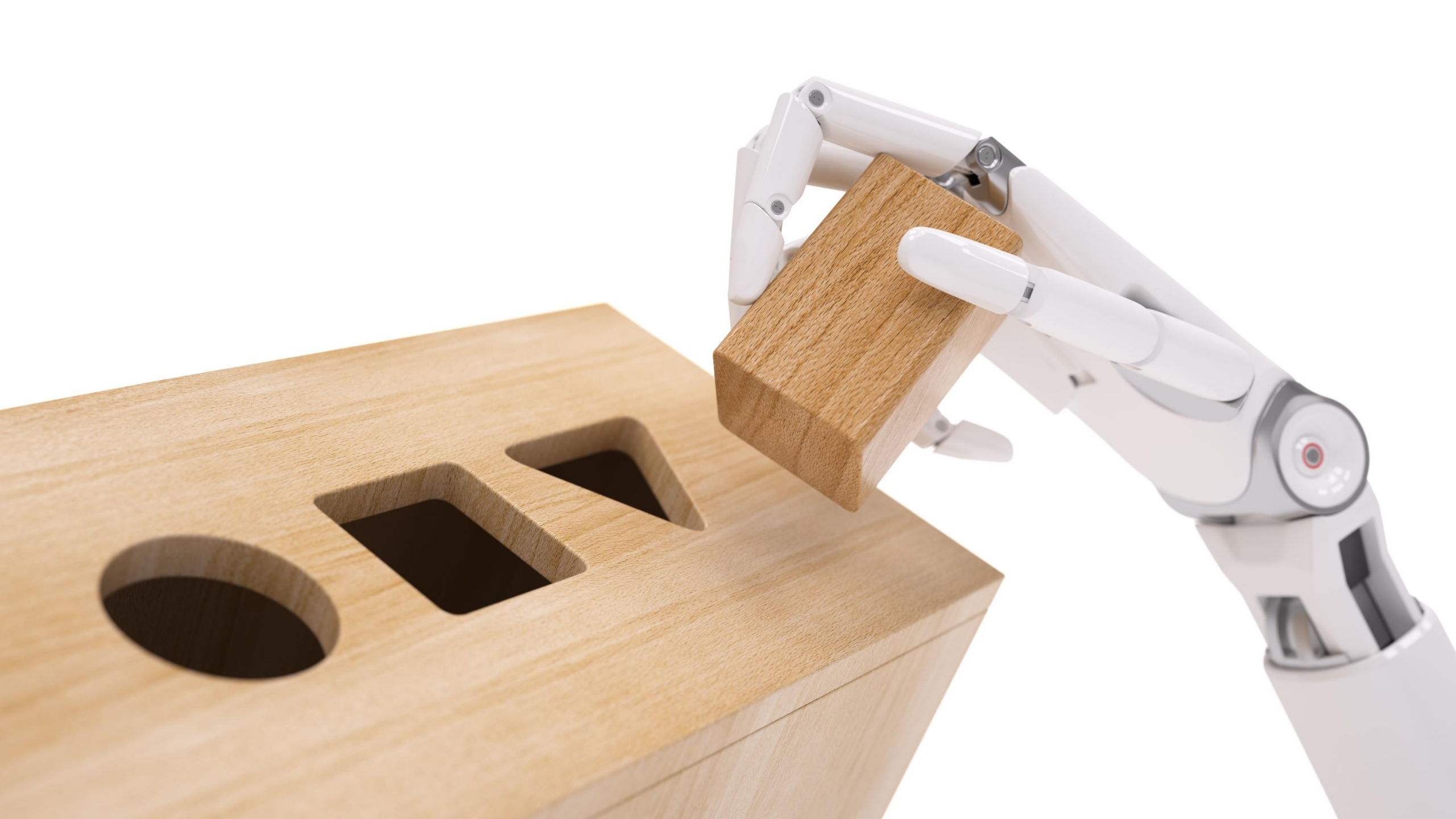
CHOOSE Rogers Majestic for LASTING SATISFACTION



Rogers Majestic
RADIO & TELEVISION TUBES
QUALITY & SATISFACTION



Source: Evan Amos








- AI Winter
1970s – 2000s





Machine
Learning

Deep
Learning

Reinforcement
Learning

A field of yellow daisies with a blue overlay box. The text 'More data' is centered in the box.

More
data

A field of yellow daisies with a blue overlay box. The text 'More compute' is centered in the box.

More
compute

A field of yellow daisies with a blue overlay box. The text 'Better algorithms' is centered in the box.

Better
algorithms

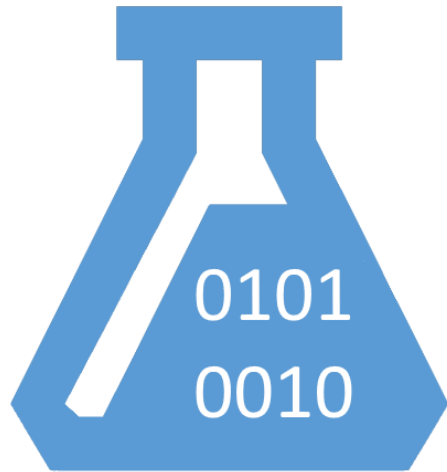
A field of yellow daisies with a blue overlay box. The text 'More discipline' is centered in the box.

More
discipline

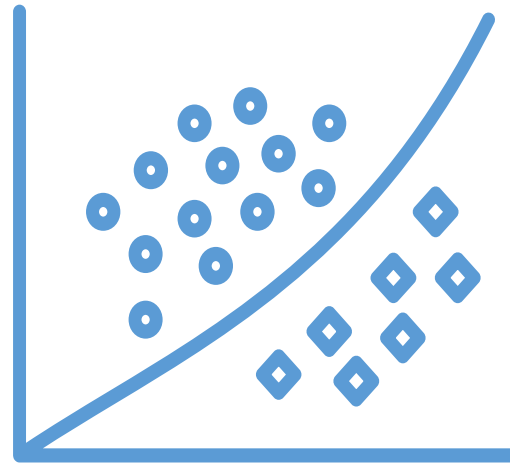


Source: Takashi Hososhima

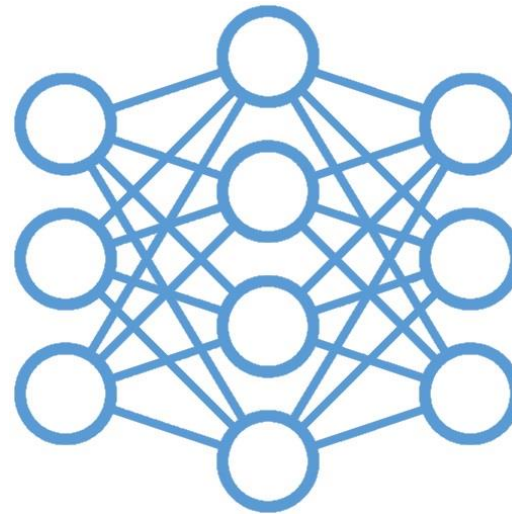
Data-driven AI Trends



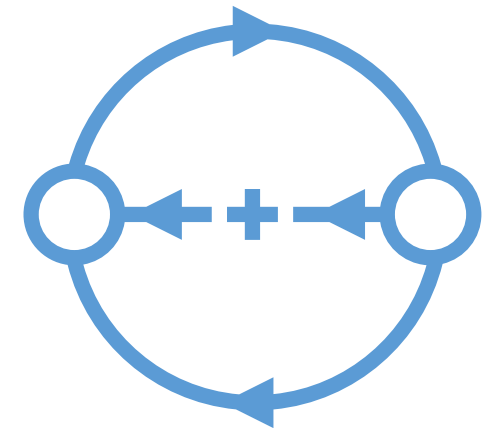
Data
Science



Machine
Learning

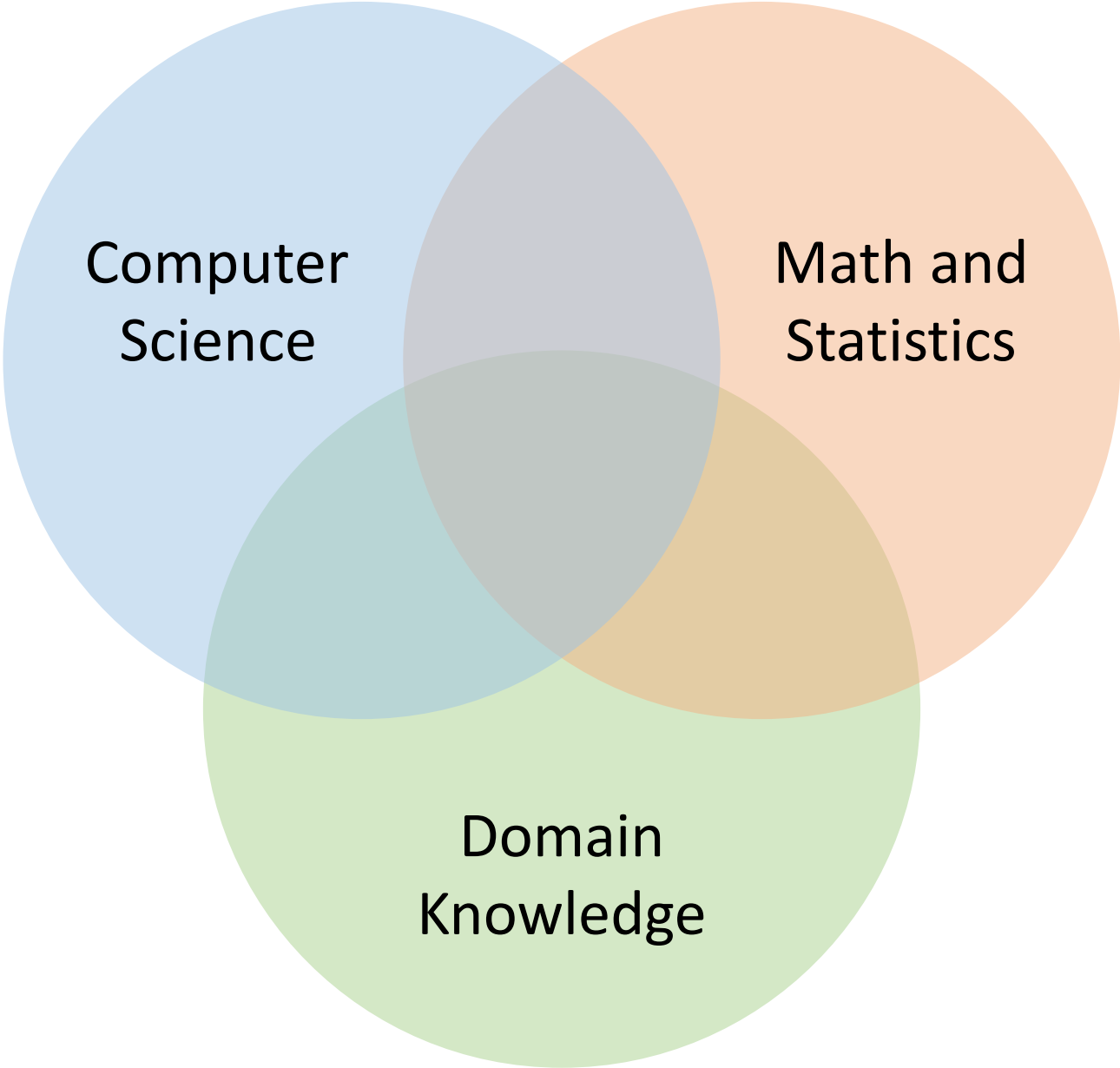


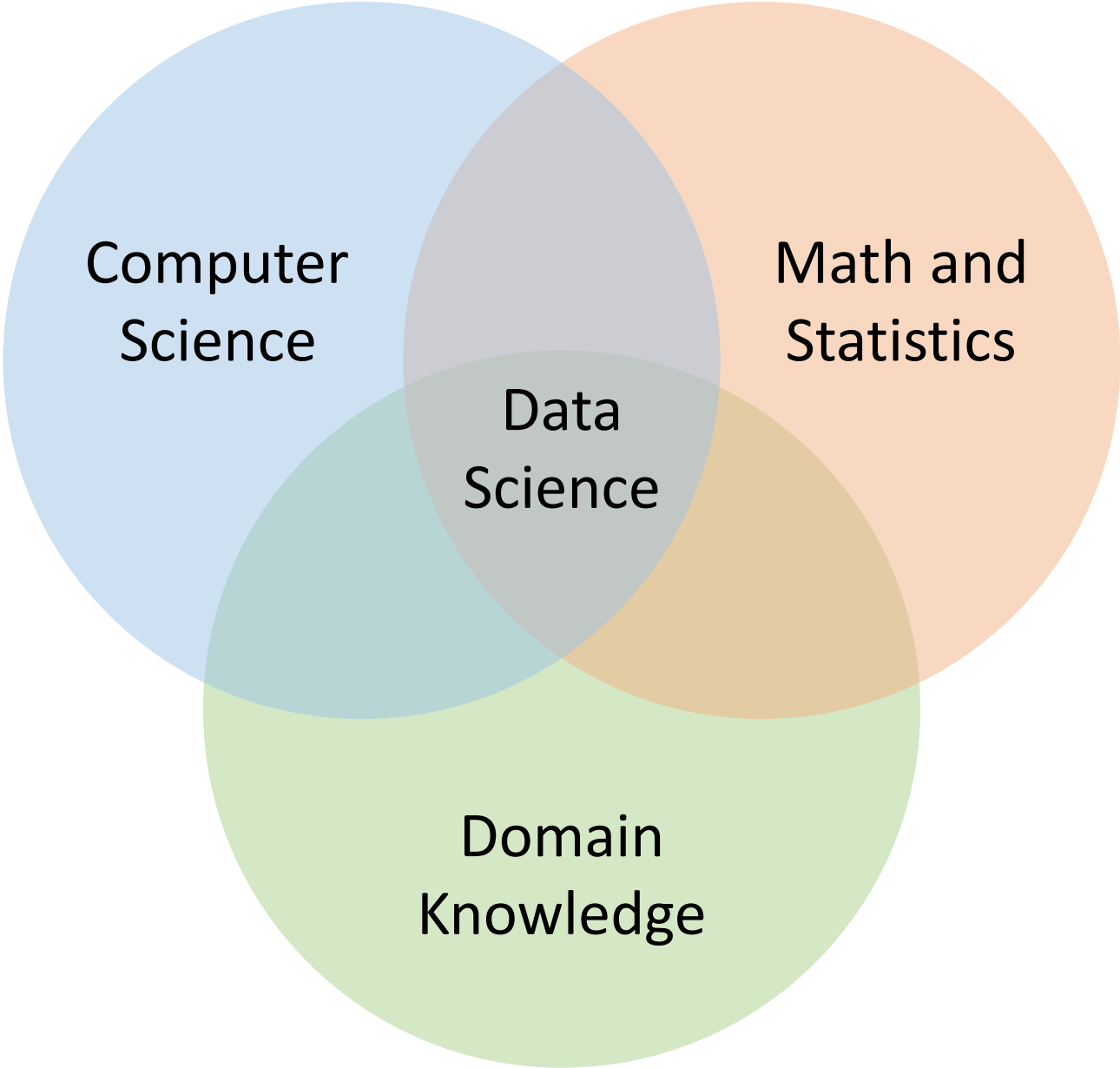
Deep Learning

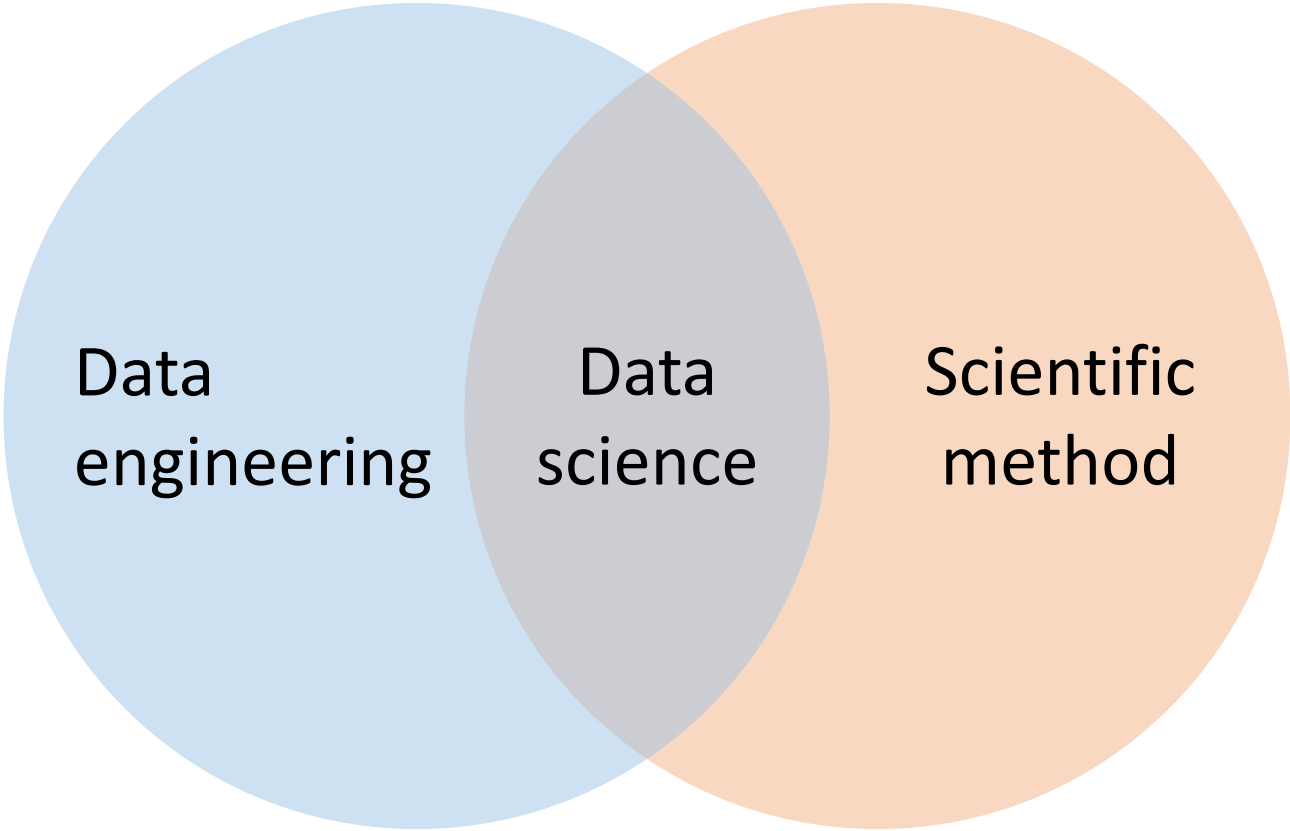


Reinforcement
Learning

Data Science



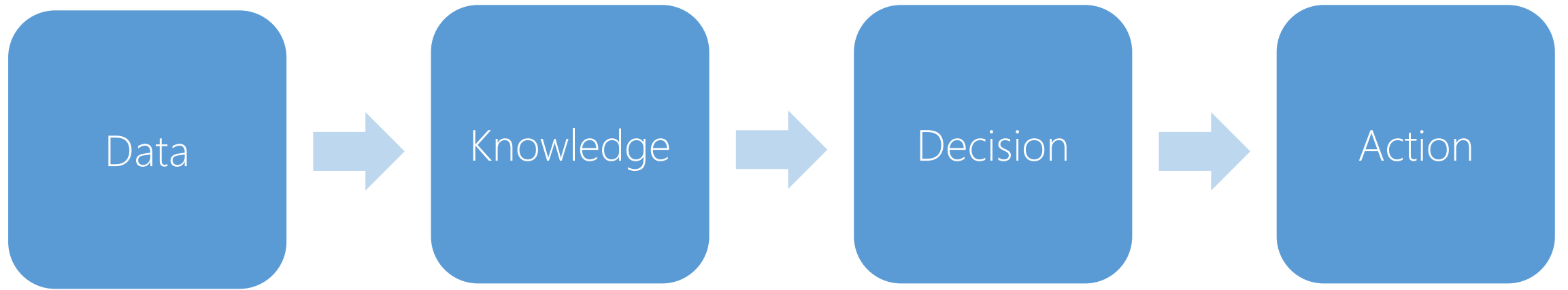




Data
engineering

Data
science

Scientific
method



Job Postings for Data Scientists

Data Scientist job openings at the world's top companies



Source: Thinknum Job Listings

Top-paying Tech Skills

Rank	Skill	2022	Change
1	Solr*	\$143,464	▲15.8%
2	Mokito*	\$140,366	▲ 5.3%
3	Service Oriented Architecture (SOA)	\$139,961	▲ 5.1%
4	RabbitMQ	\$137,717	▲ 1.2%
5	Elasticsearch	\$137,203	▲ 6.0%
6	Redis	\$136,405	▲ 5.5%
7	PAAS	\$134,894	▲ 1.9%
8	RDS	\$133,651	▲10.9%
9	Dynamo DB	\$133,522	▲ 5.6%
10	HANA	\$133,302	▲ 6.7%
11	MapReduce	\$132,014	▼ 2.6%
12	Apache Kafka	\$131,520	▲ 2.1%
13	Amazon Route 53	\$131,236	▲ 3.6%
14	Neural Networks	\$130,922	▲ 1.5%
15	Amazon Redshift	\$130,468	▲ 4.2%

Rank	Skill	2022	Change
16	OLAP	\$130,404	▲ 2.2%
17	Korn Shell	\$129,971	▲ 5.3%
18	Hadoop	\$129,913	▲ 0.4%
19	Chef*	\$129,903	▲ 0.4%
20	Tensorflow	\$129,161	▲ 0.1%
21	OLTP	\$128,871	▲ 1.9%
22	Spark	\$128,107	▲ 3.7%
23	REST	\$127,298	▲ 3.1%
24	NoSQL	\$126,905	▲ 1.5%
25	ETL	\$126,417	▲ 1.3%
26	Containers	\$126,344	▼ 0.3%
27	Vagrant	\$126,164	▲ 2.1%
28	LoadRunner Tutorial	\$124,653	▼ 0.4%
29	Cloudera	\$124,526	▼ 5.7%
30	Cassandra	\$123,764	▼ 5.2%

Source: Dice Salary Survey 2022





BUSINESS SOLUTION

GLOBAL NETWORK

MARKETING STRATEGIC





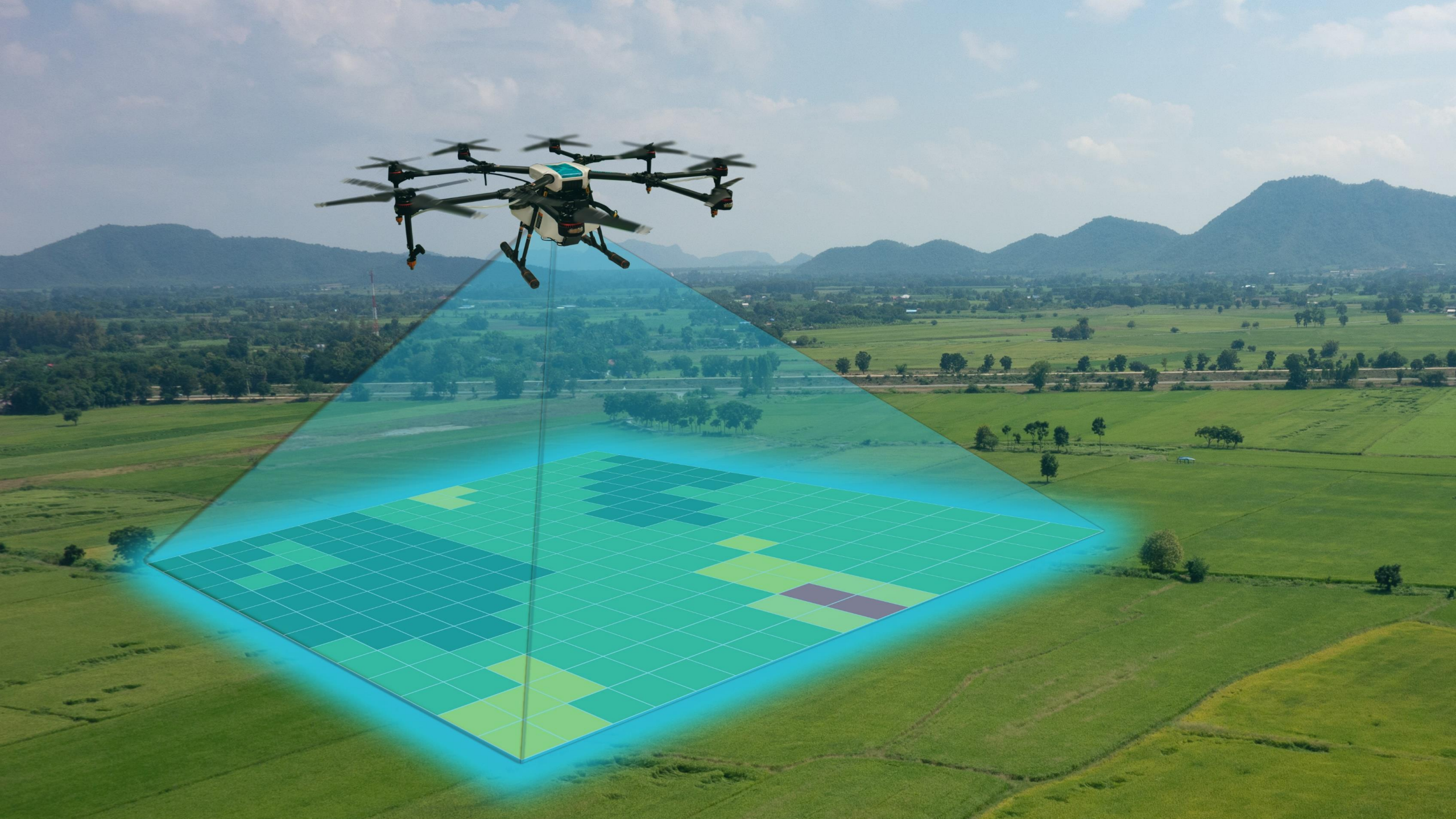
















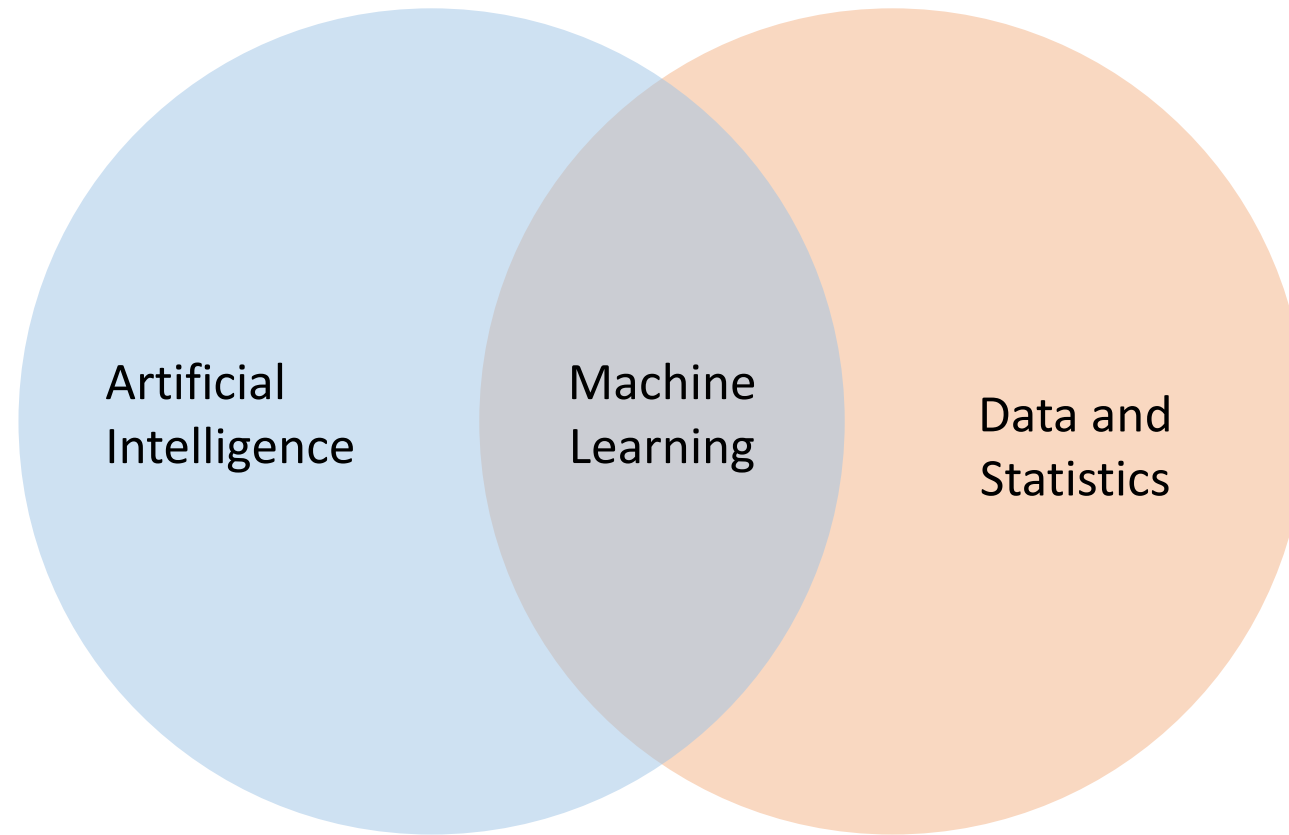




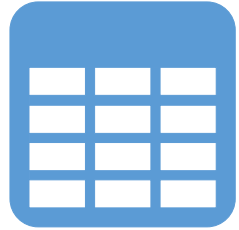
Data science is the foundation
of modern data-driven AI.

Machine Learning

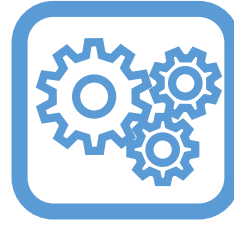
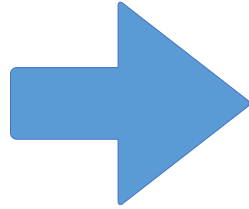
Machine Learning



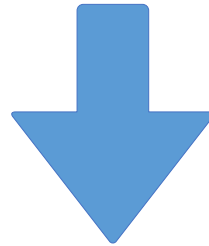
Machine Learning



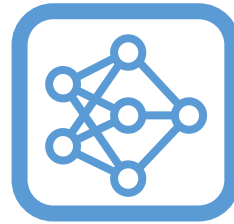
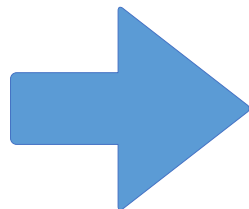
Training Data



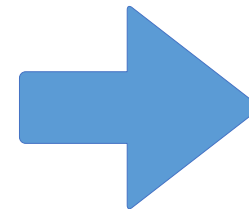
Algorithm



New data

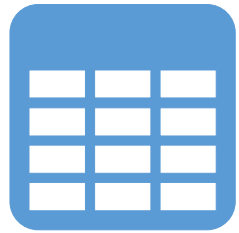


Model

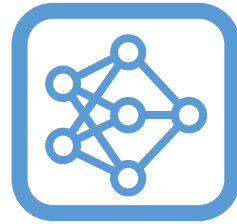
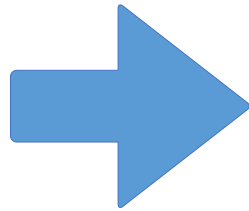


Prediction

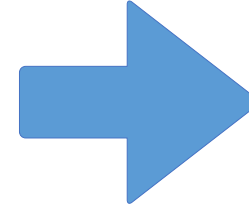
Machine Learning



New data



Model



Prediction

input

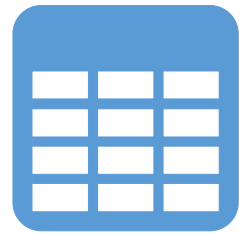


$f(x)$

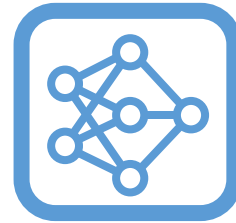
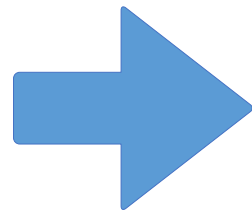


output

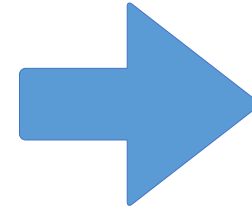
Machine Learning



New data



Model



Prediction



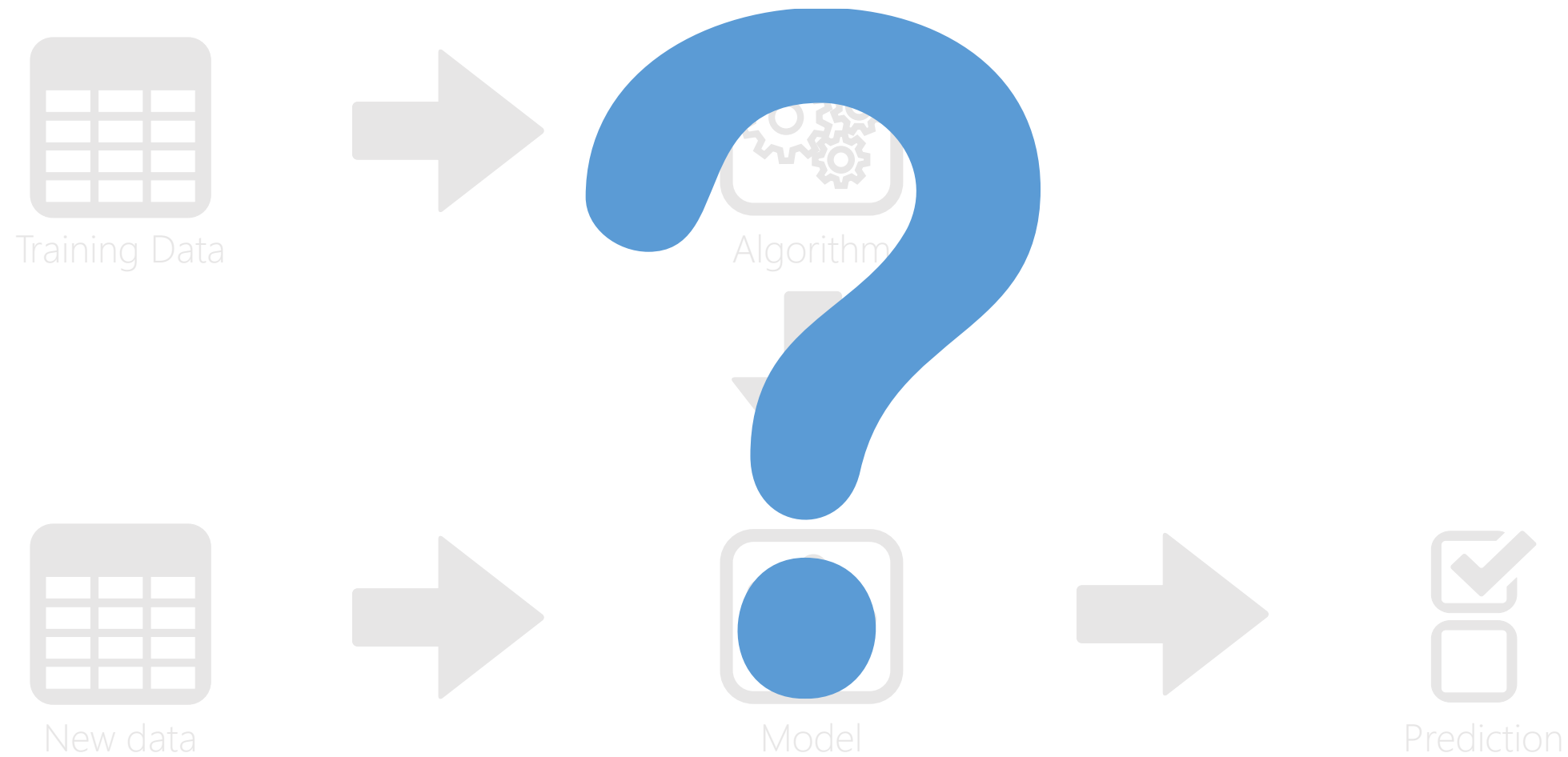
$f(x)$



Cat

Not Cat

Machine Learning



Machine Learning



Training Data

Machine Learning

Cat

Not Cat

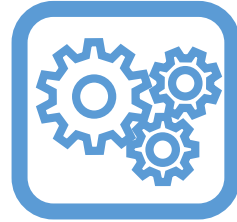
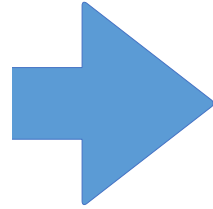


Training Data

Machine Learning

Cat

Not Cat



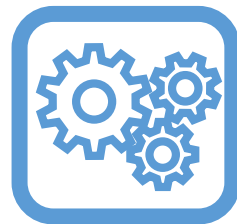
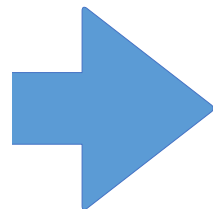
Algorithm

Training Data

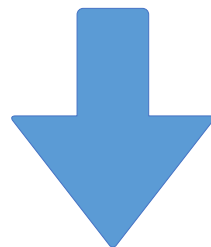
Machine Learning

Cat

Not Cat



Algorithm



Model

Training Data

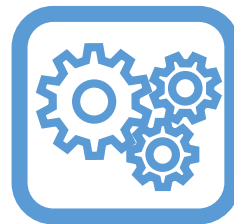
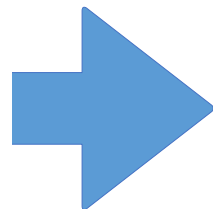
Machine Learning

Cat

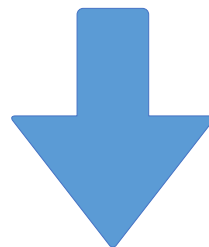
Not Cat



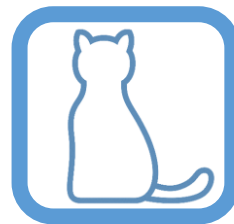
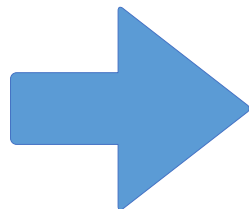
Training Data



Algorithm

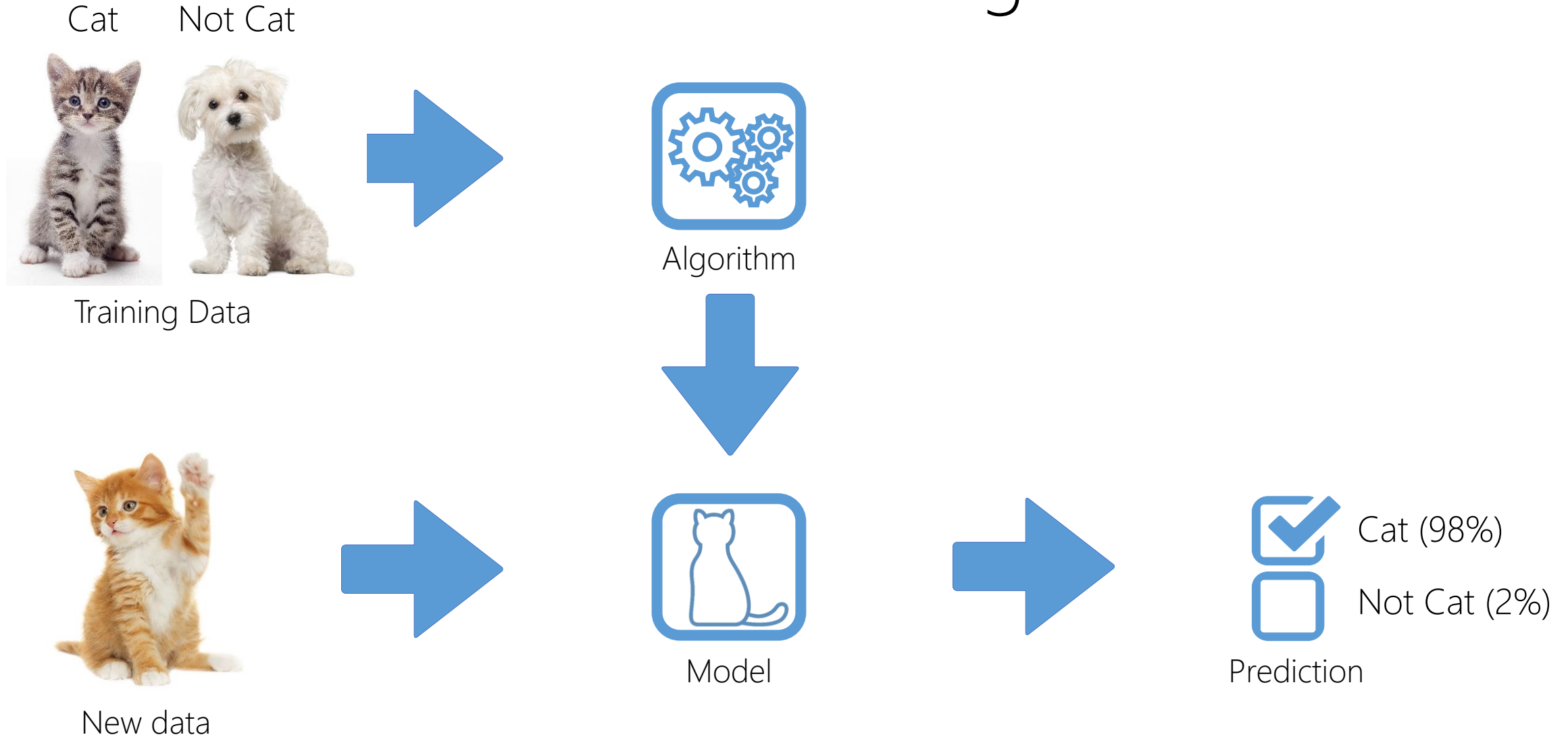


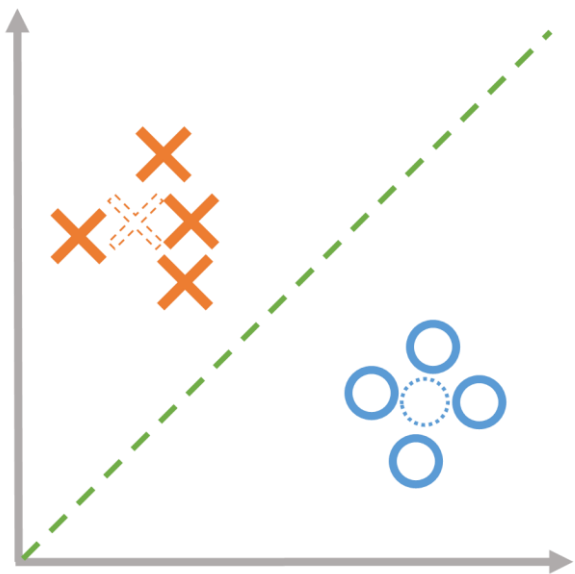
New data



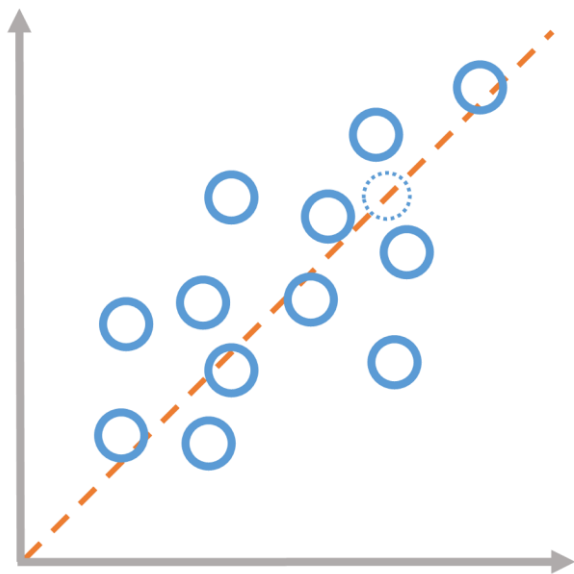
Model

Machine Learning

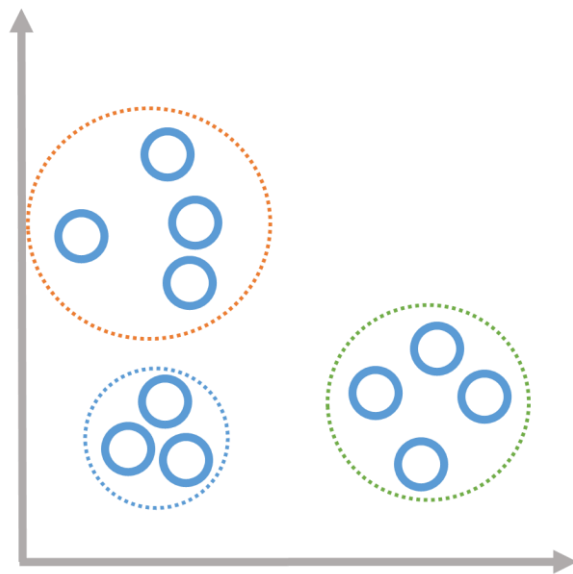




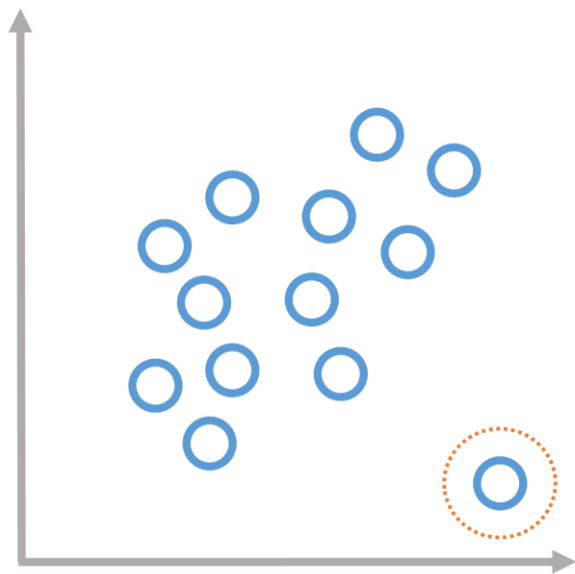
Classification



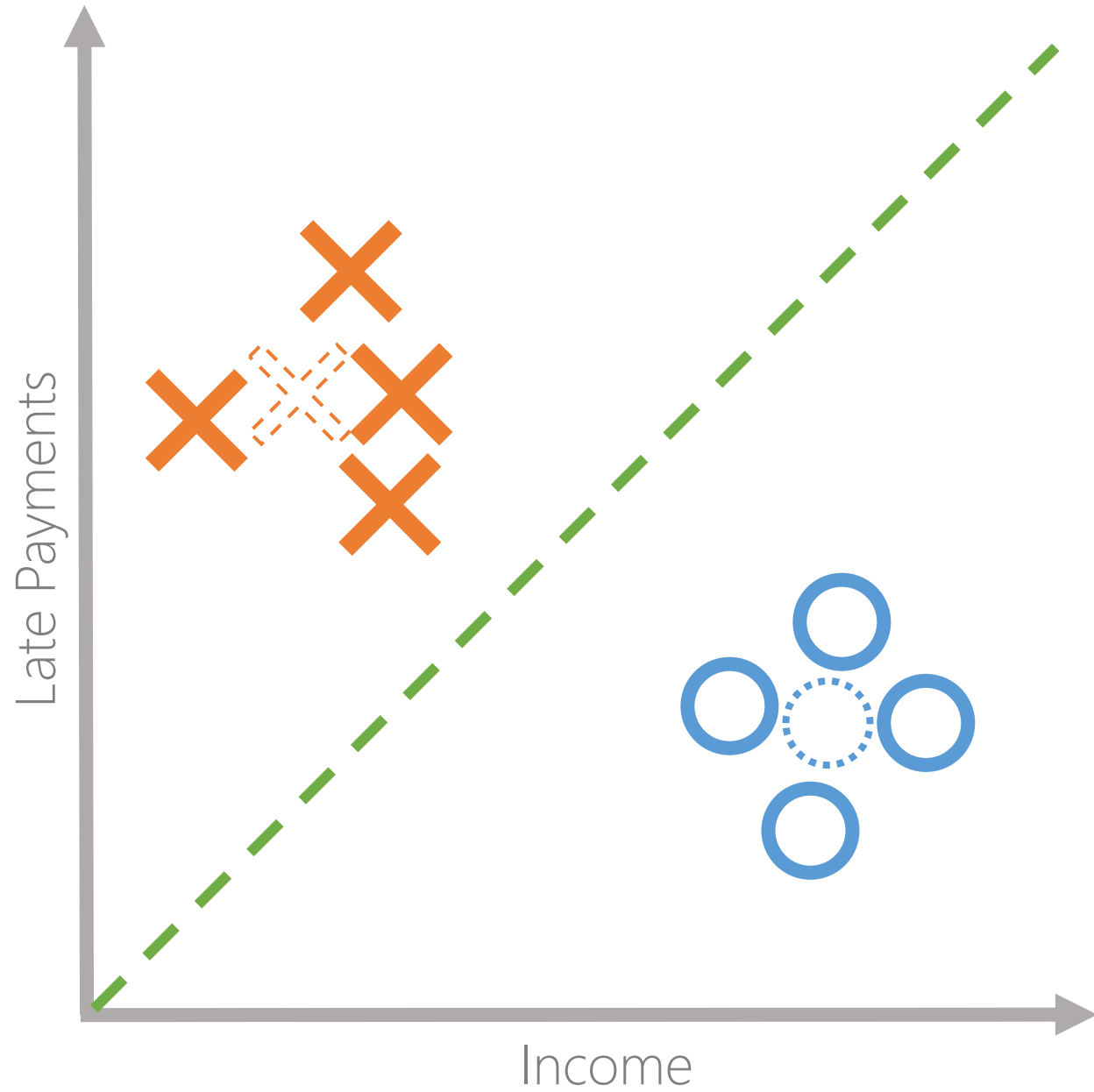
Regression

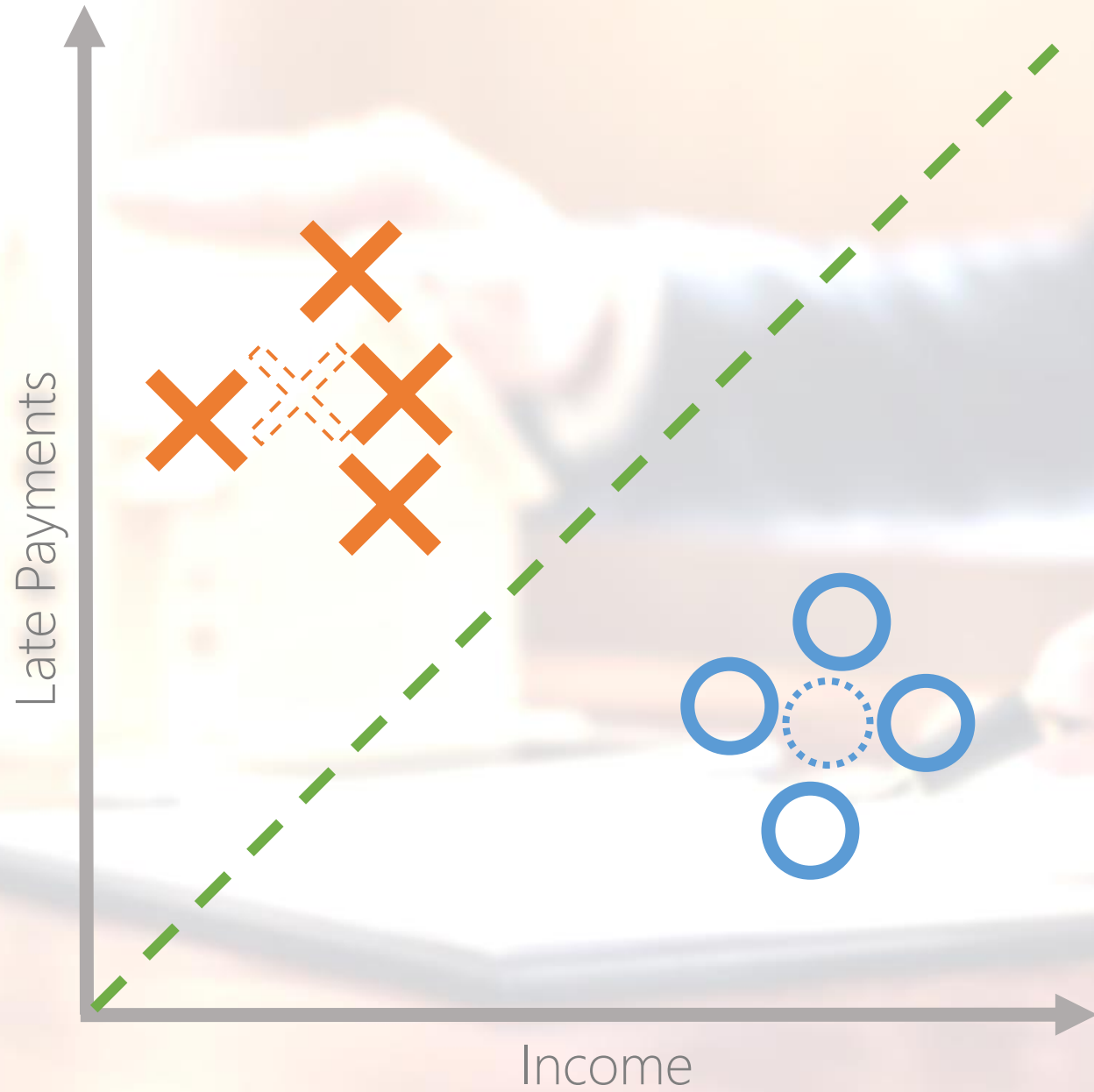


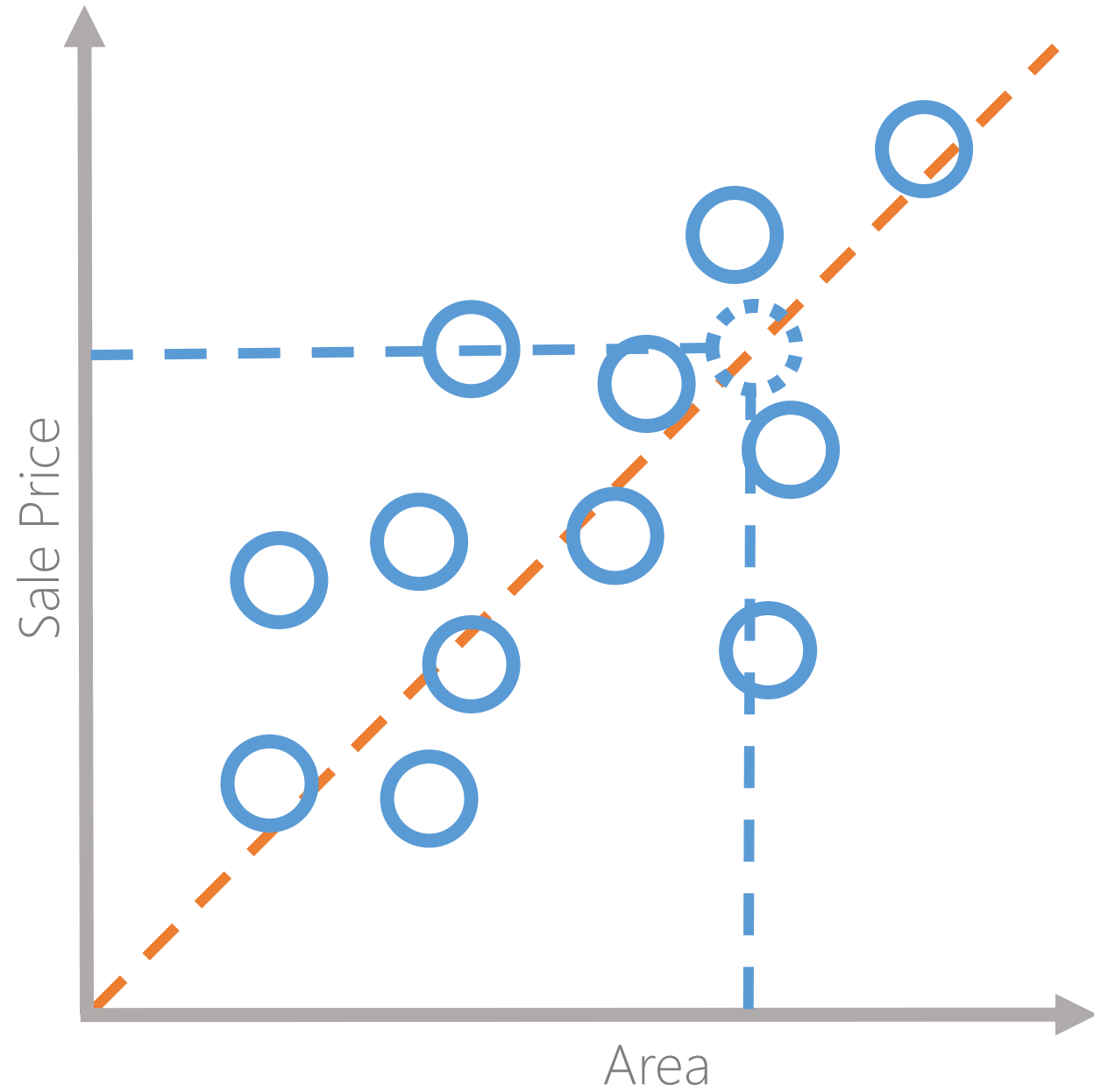
Clustering

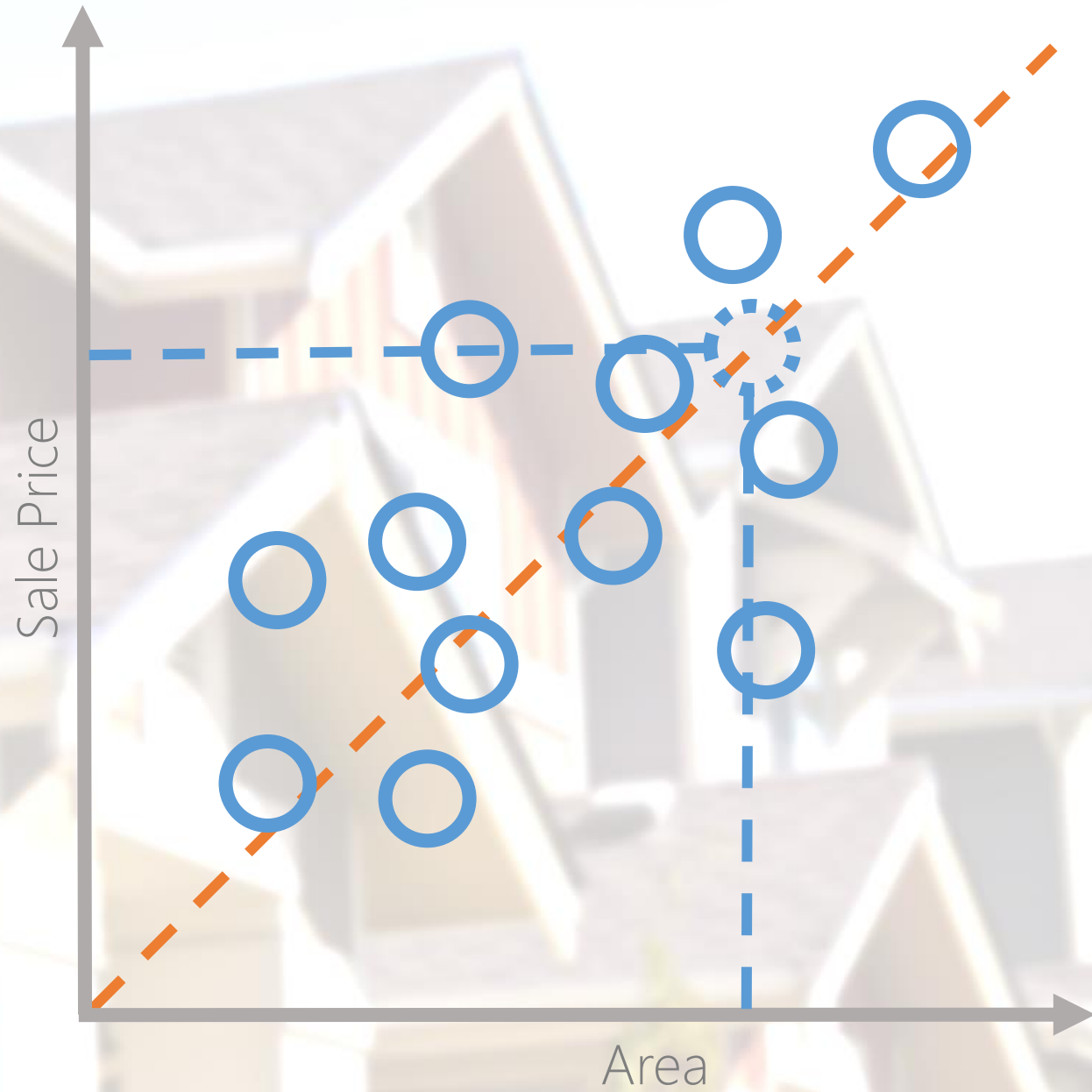


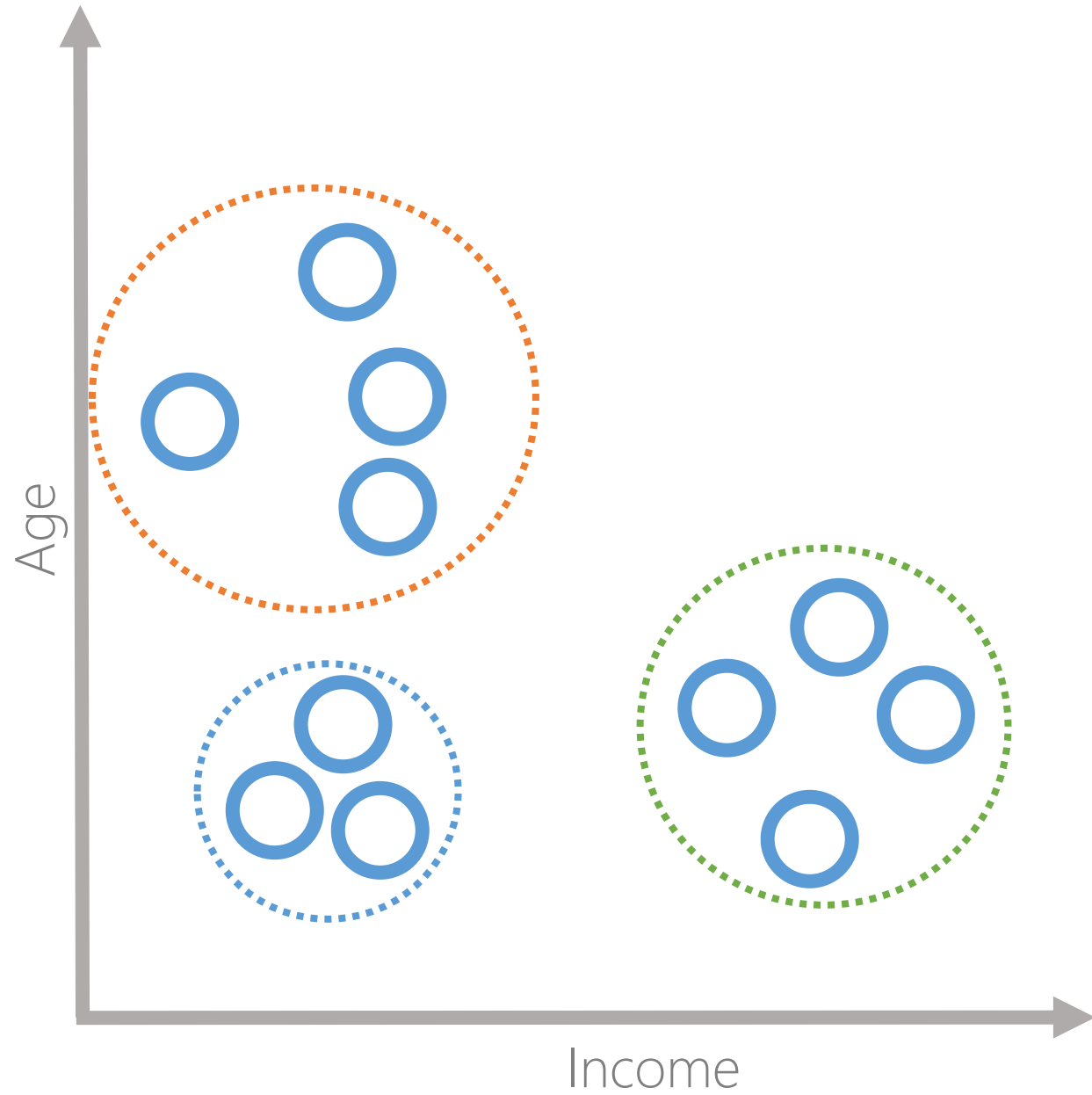
Anomaly Detection

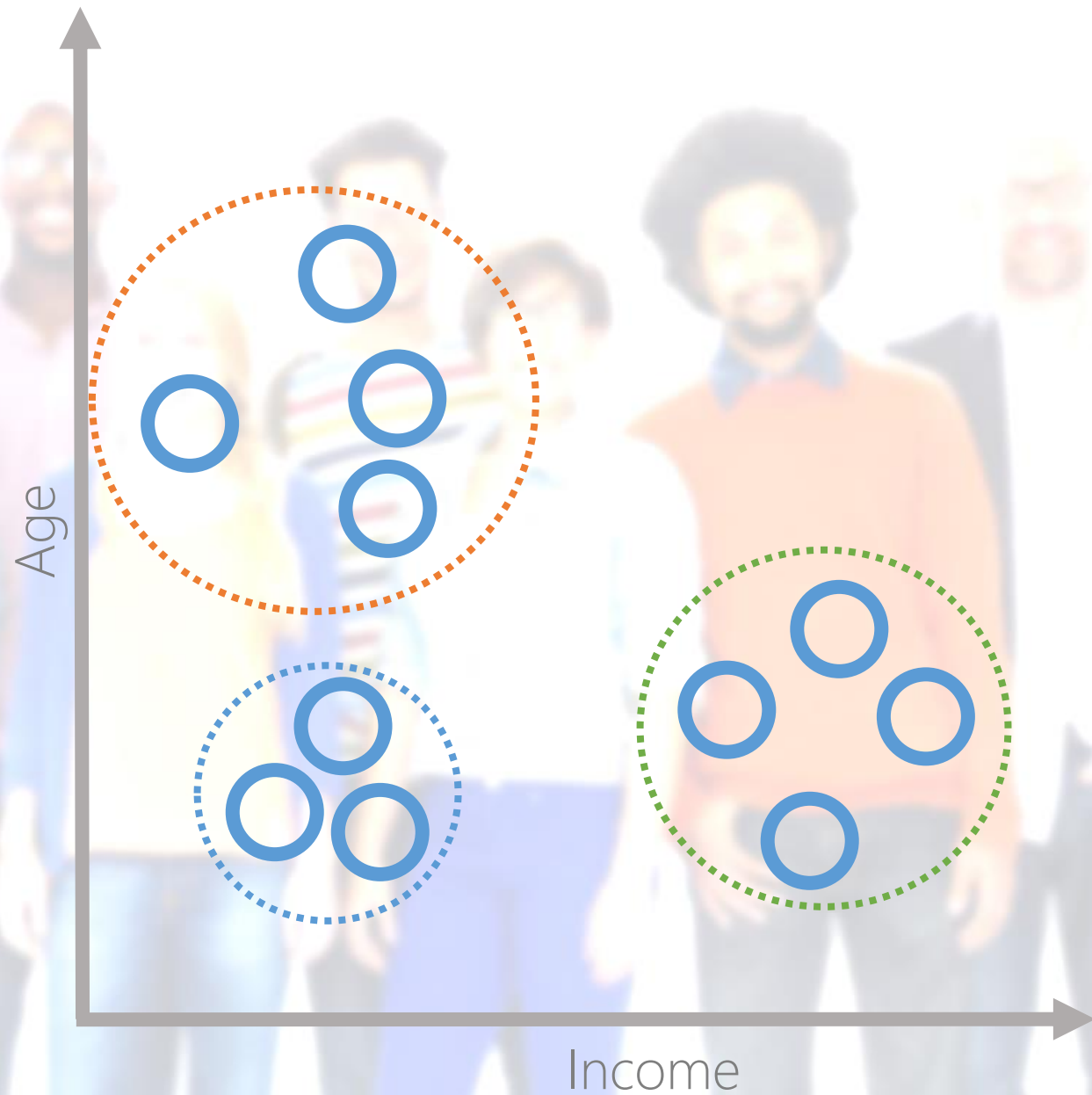
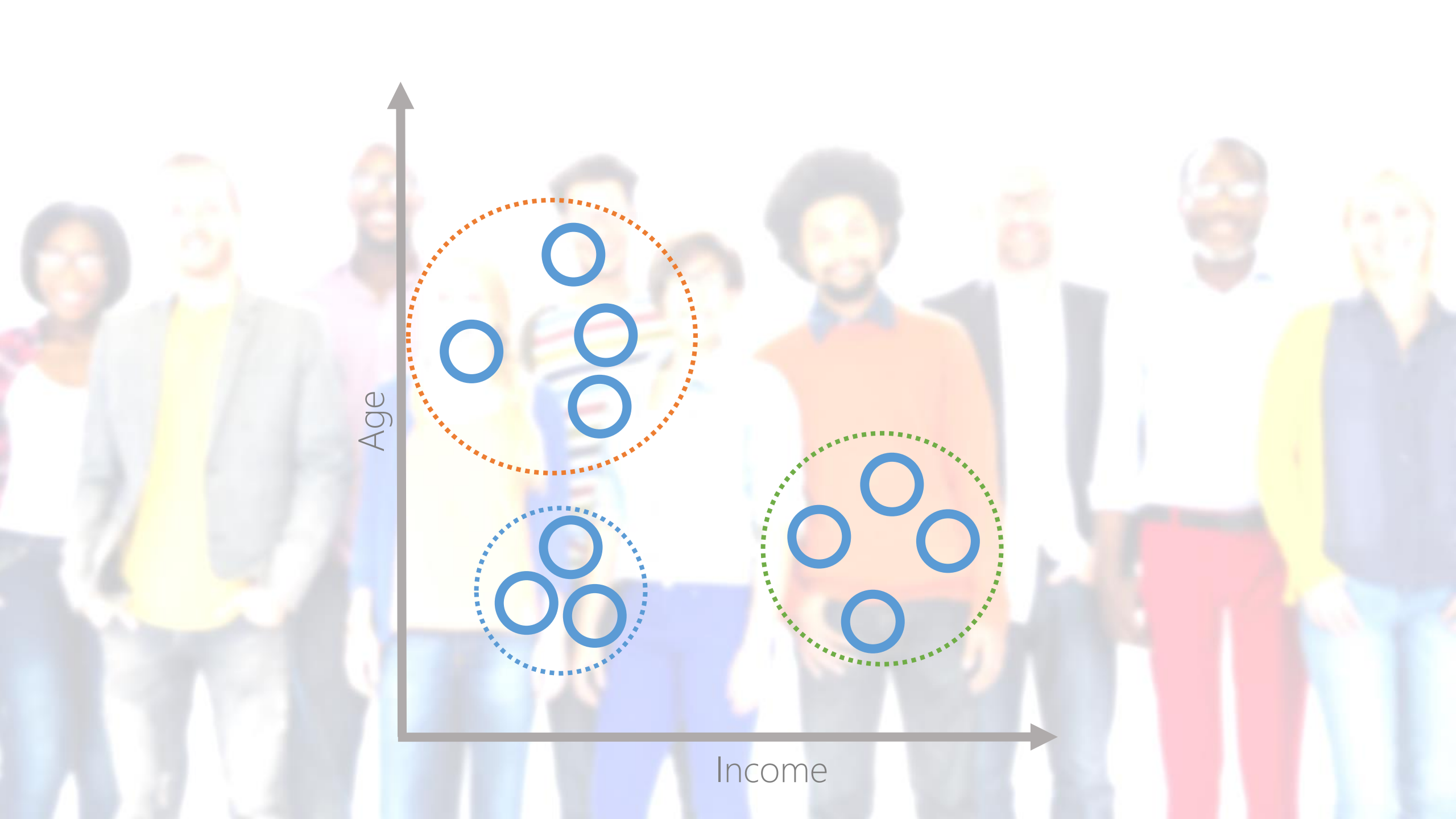


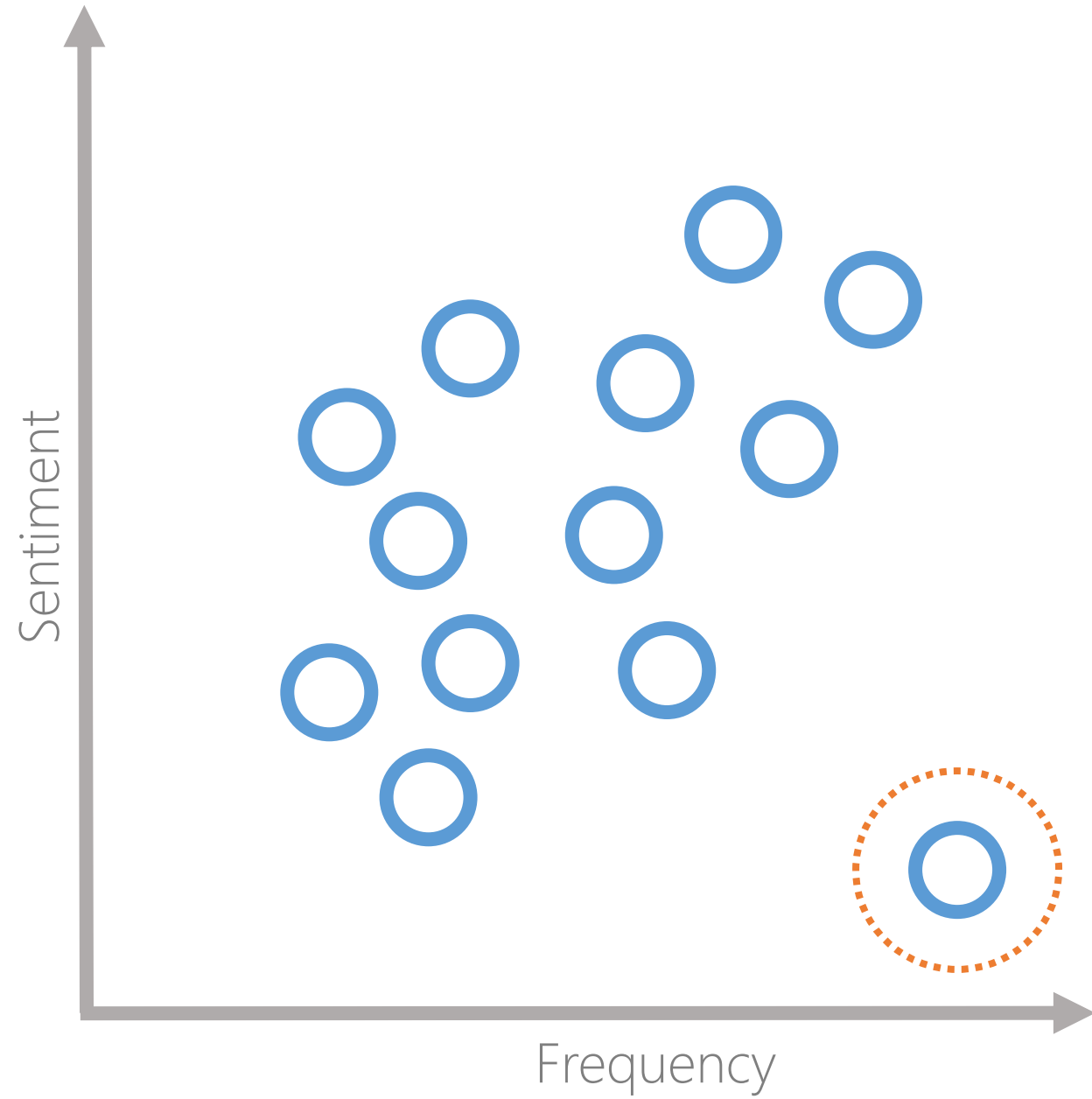


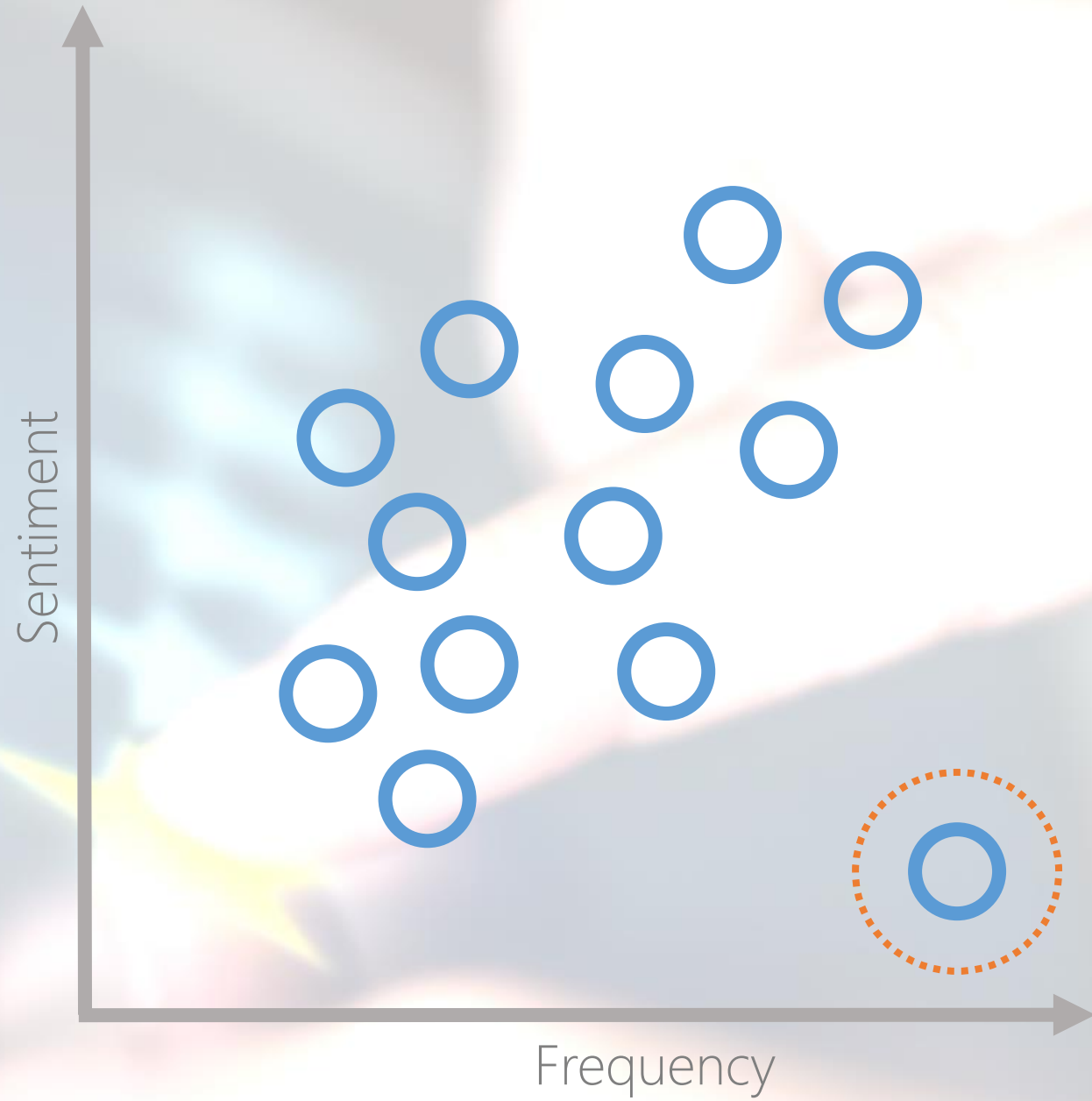














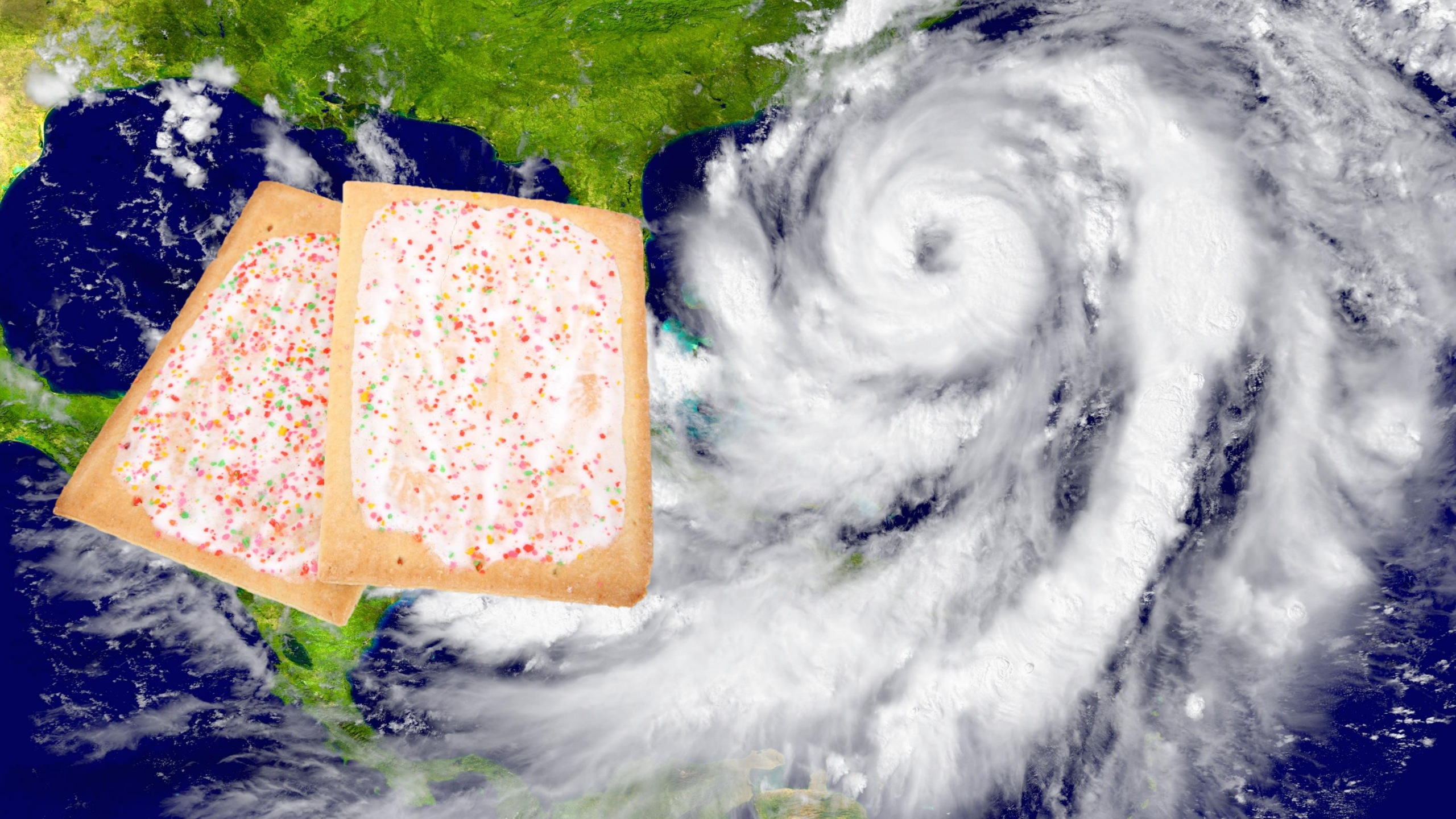


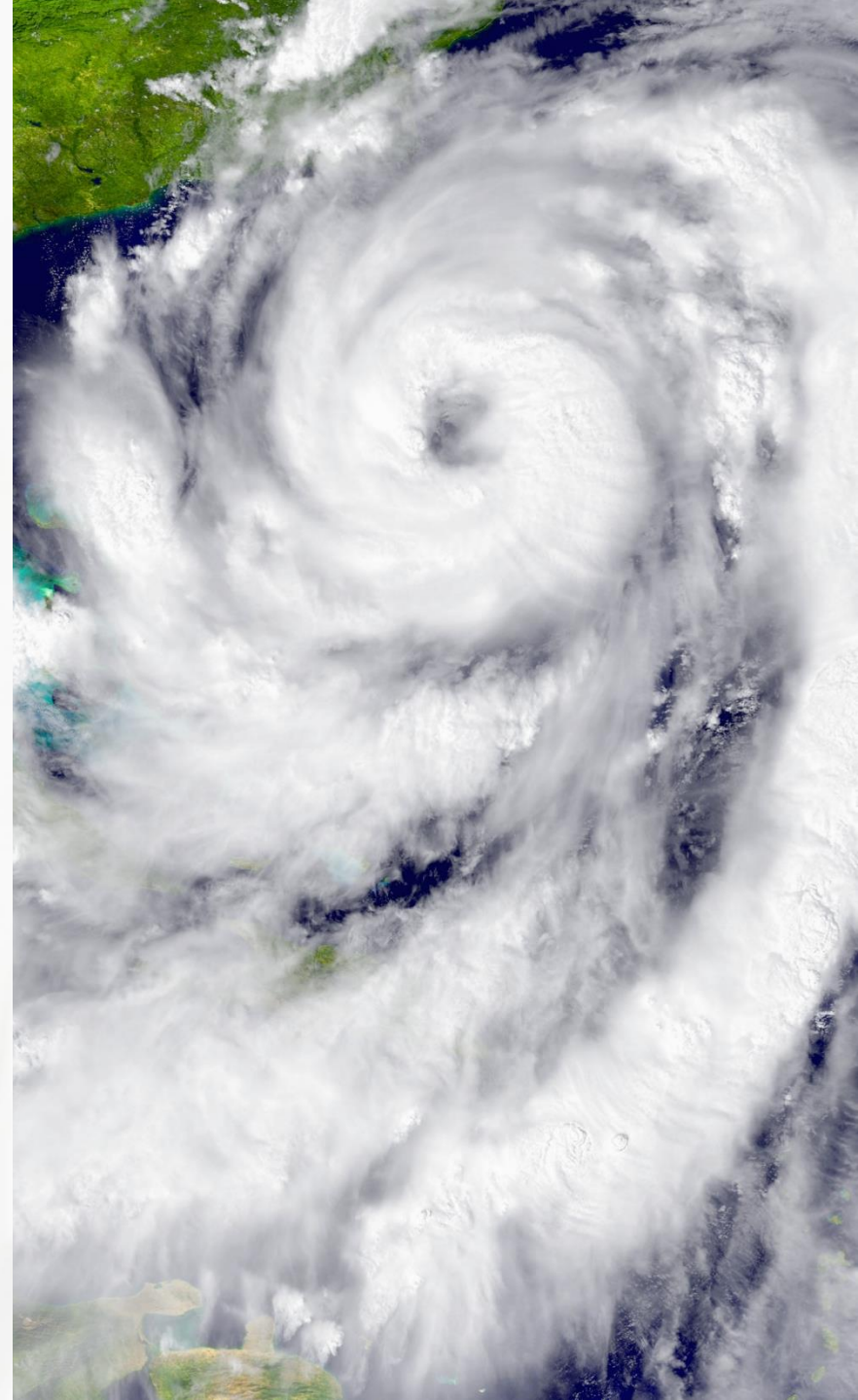


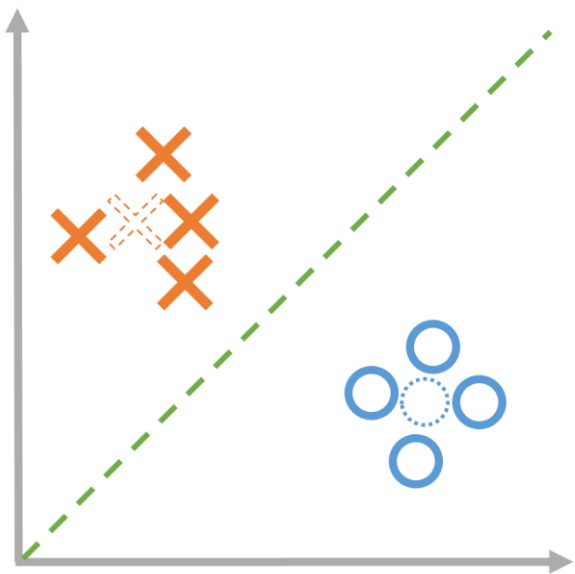


August 2022						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

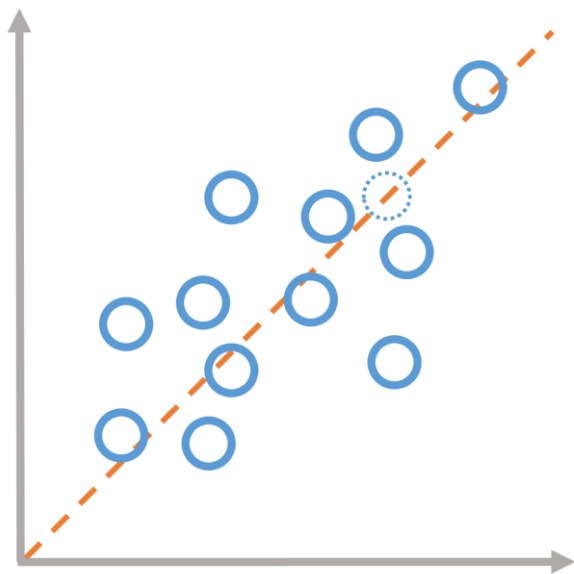




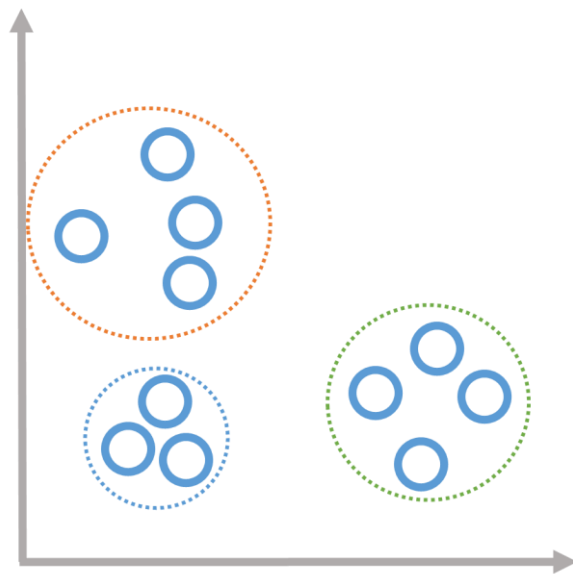




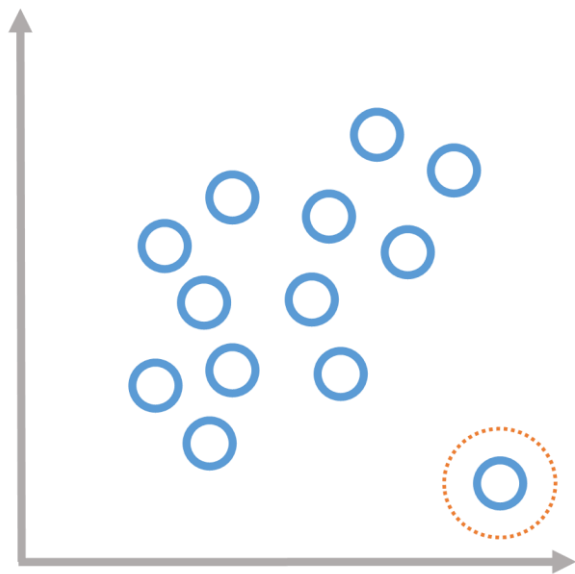
Classification



Regression

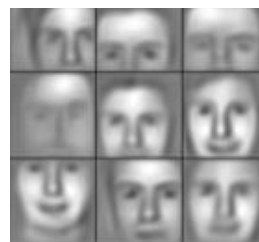
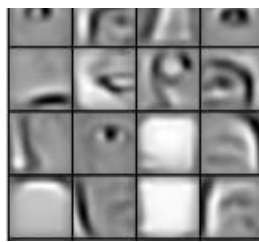
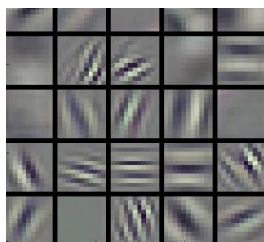
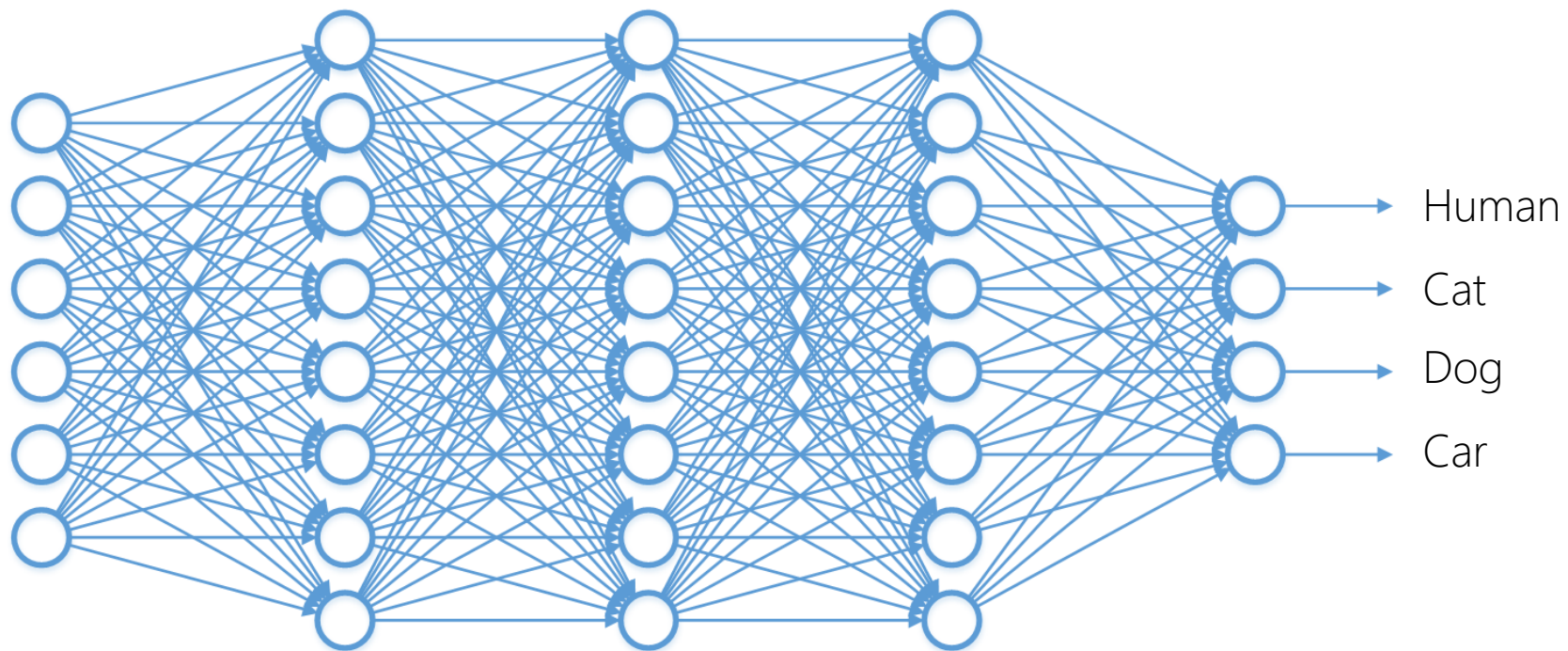


Clustering

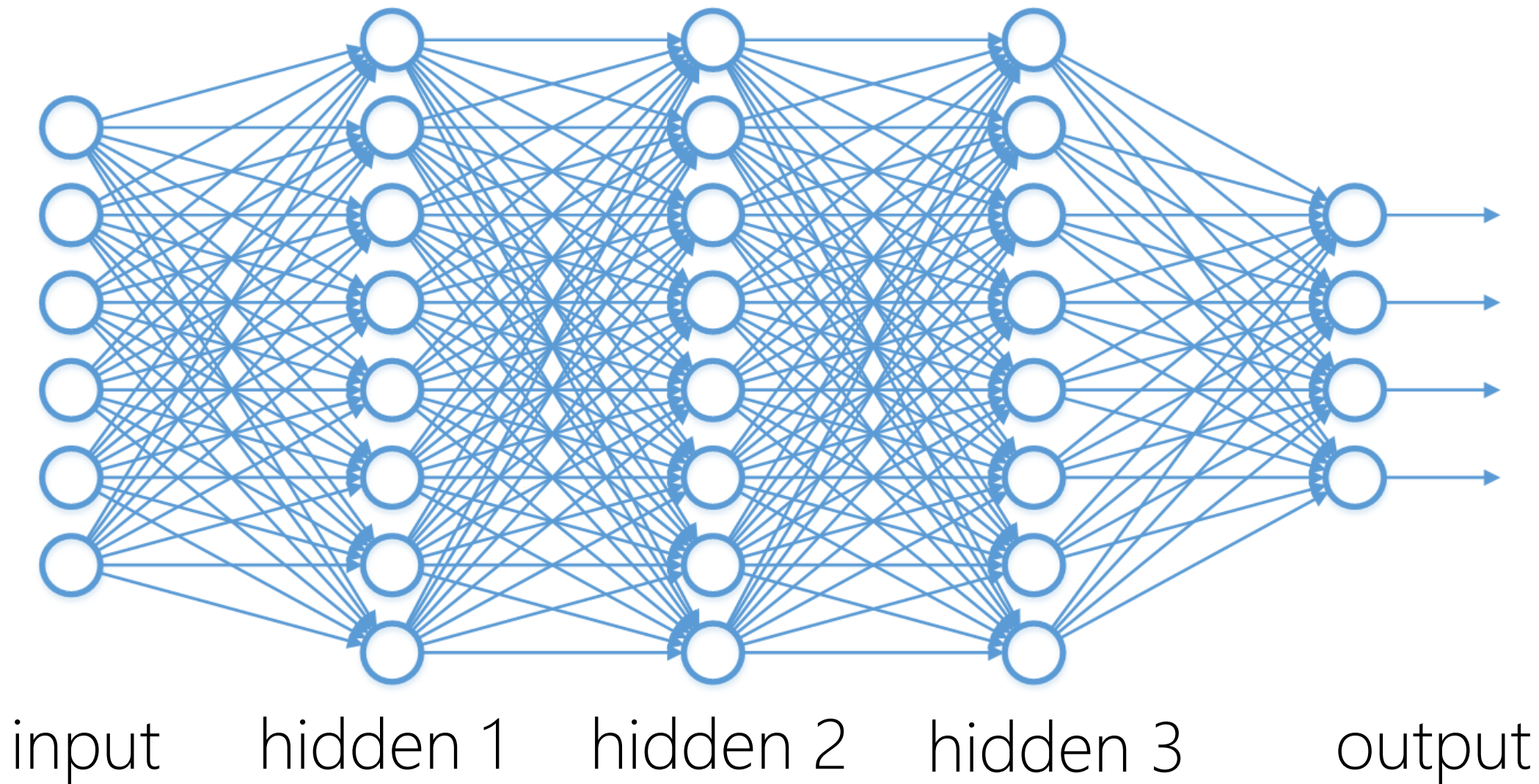


Anomaly Detection

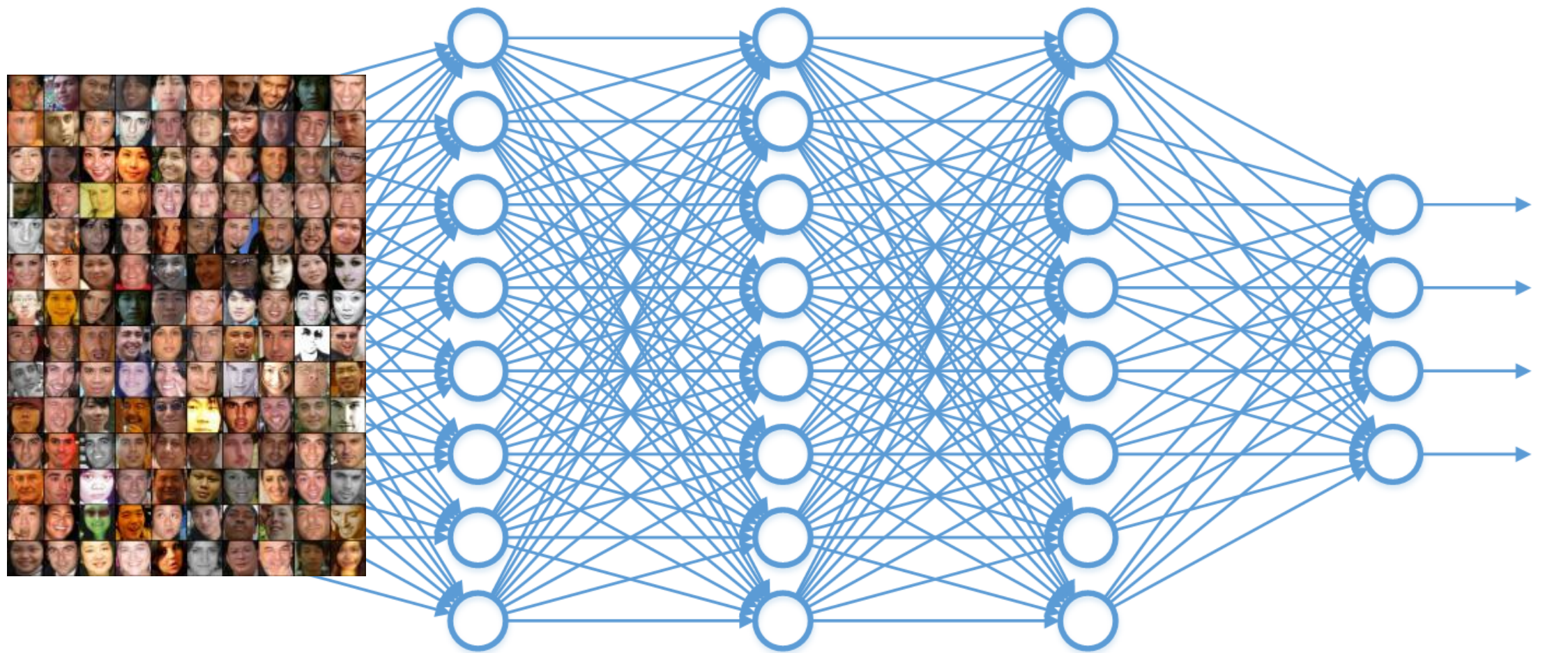
Deep Learning



Deep Neural Network



Deep Neural Network



input

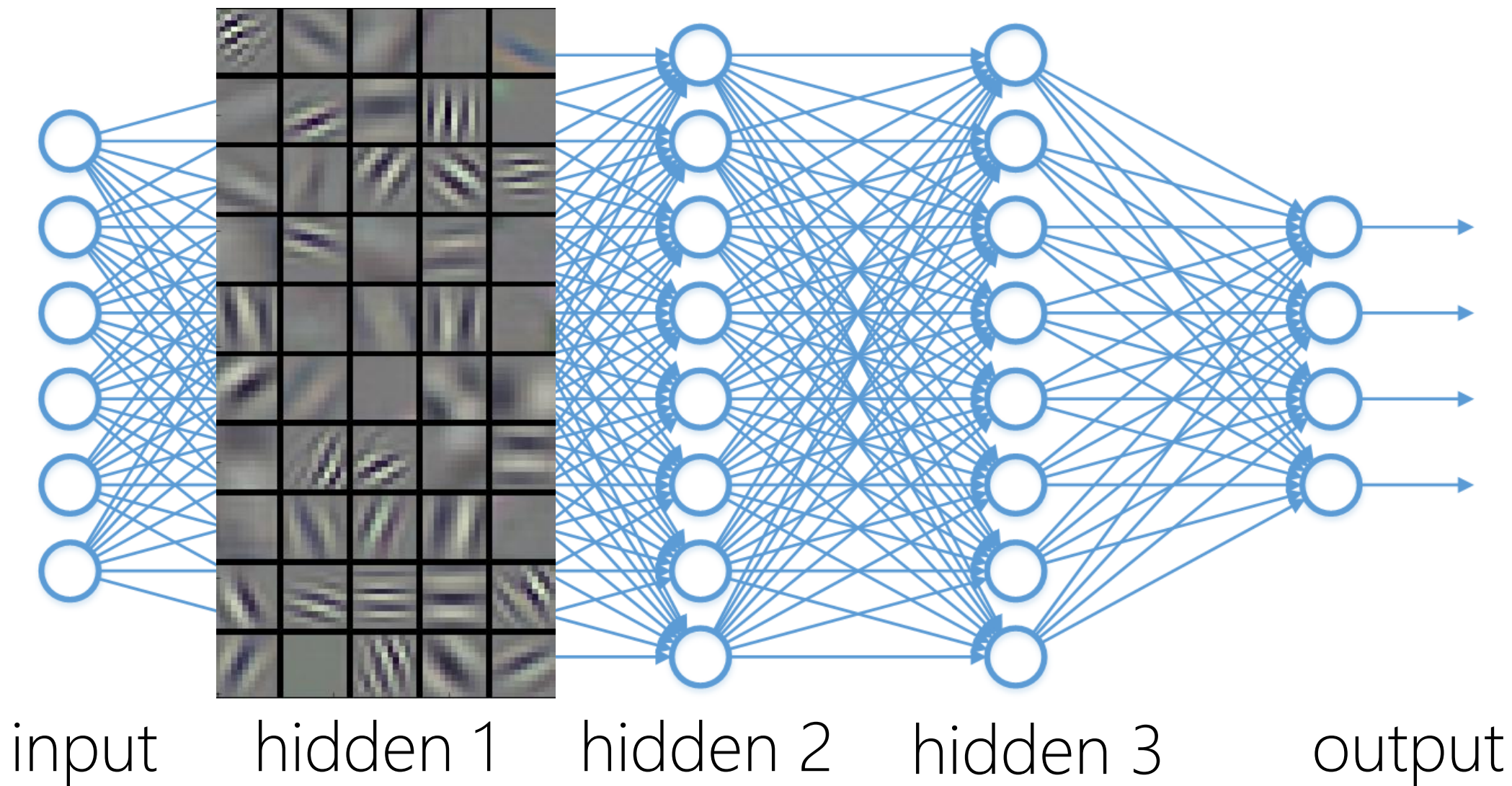
hidden 1

hidden 2

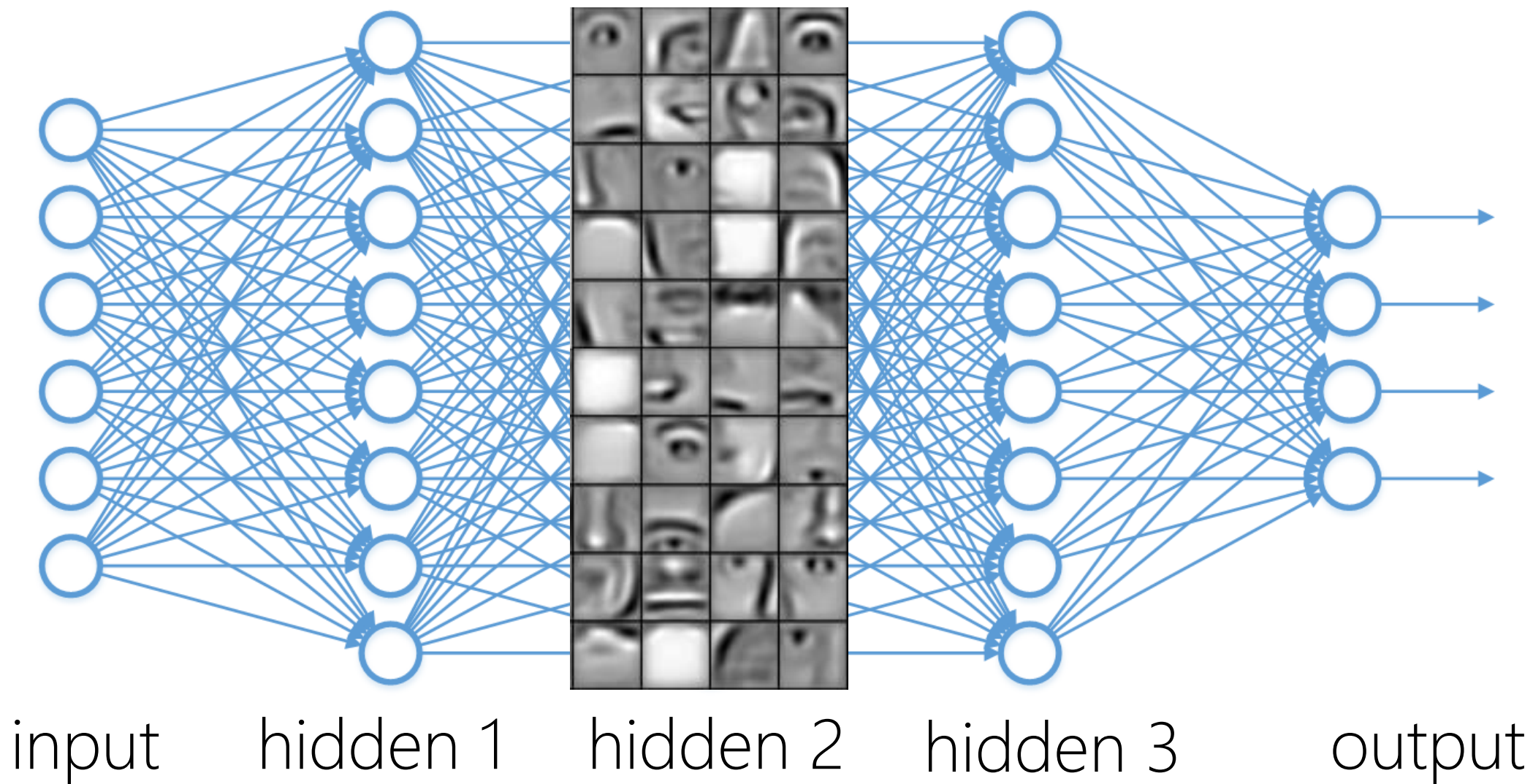
hidden 3

output

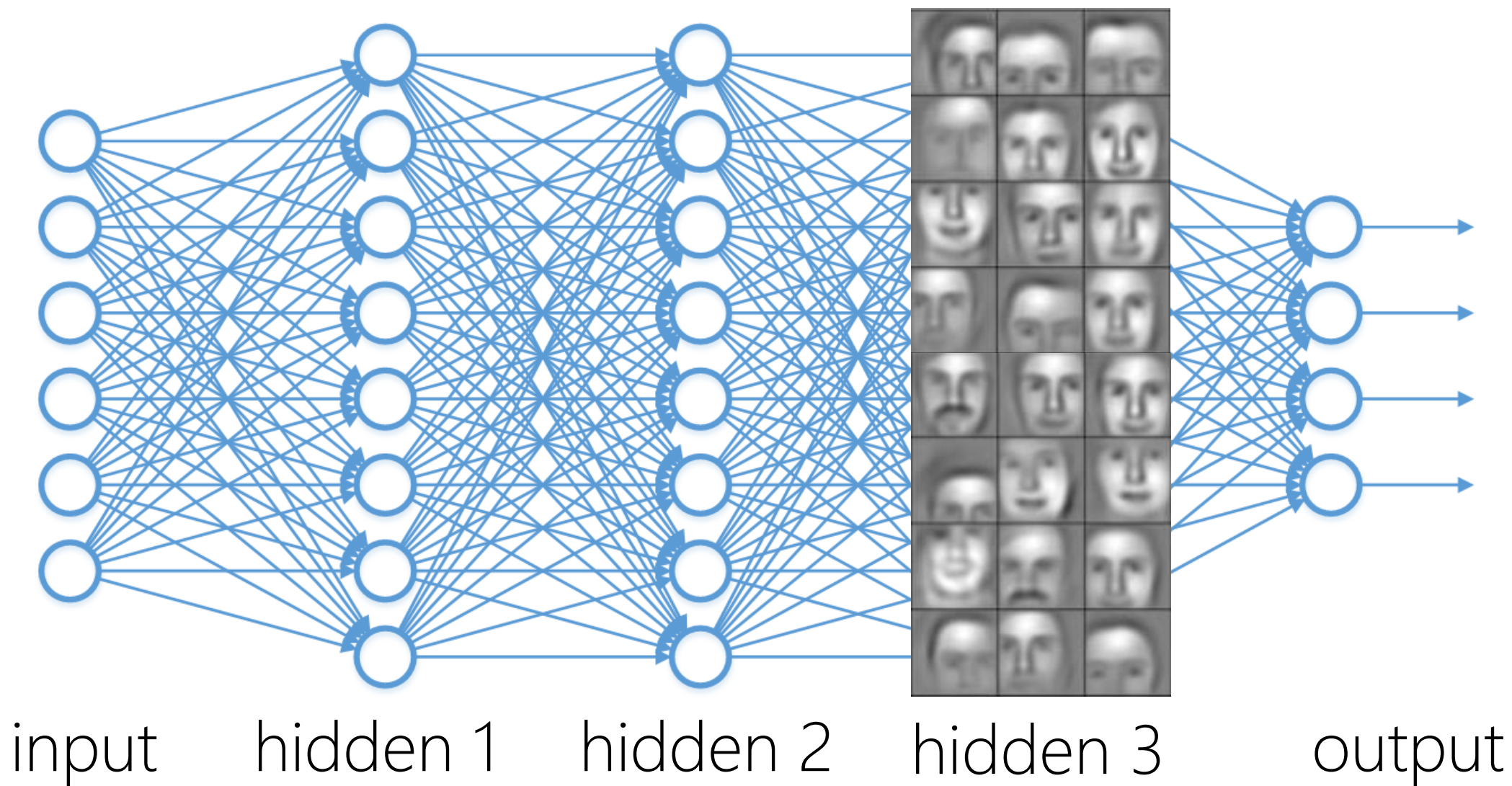
Deep Neural Network



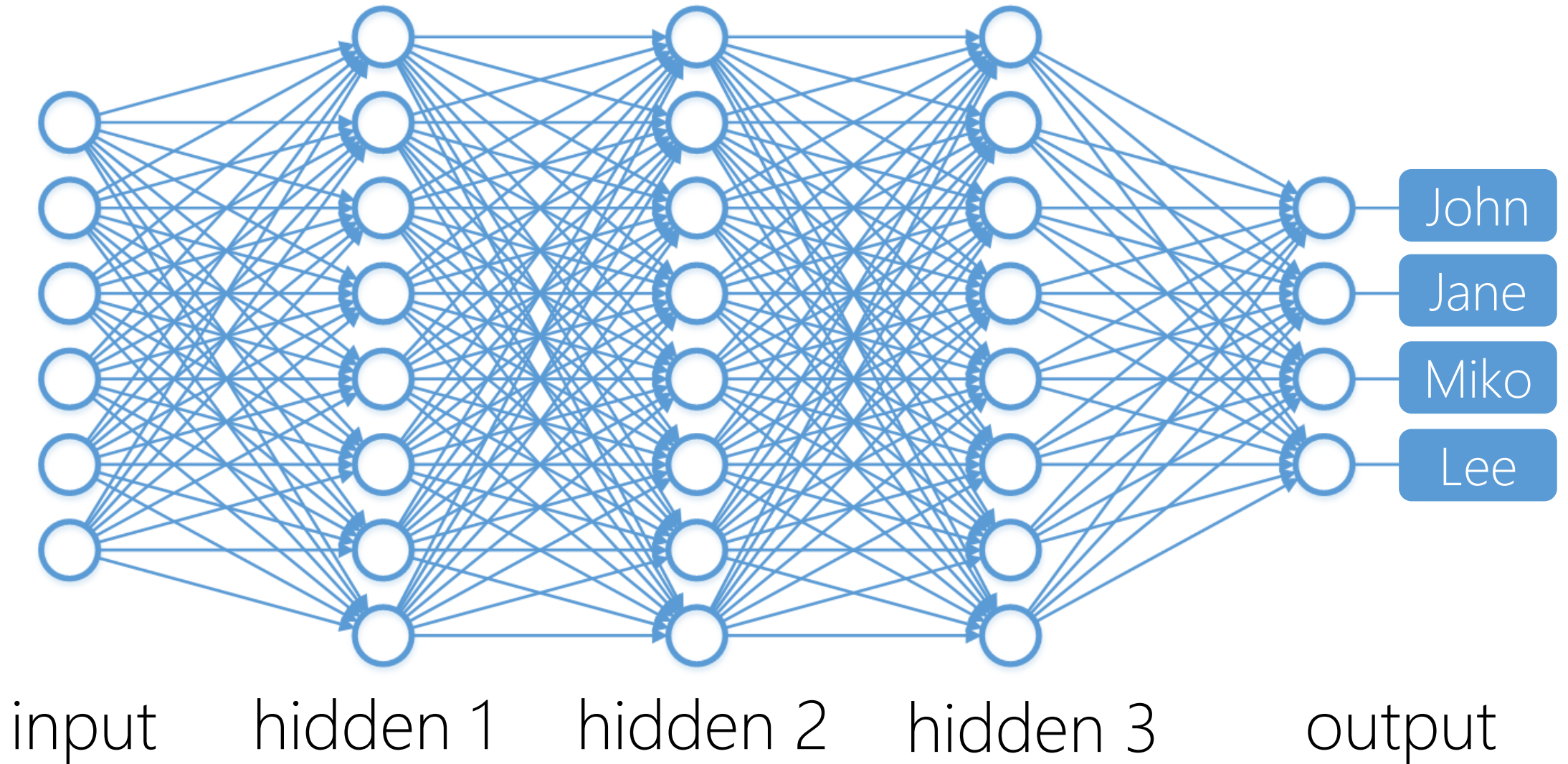
Deep Neural Network



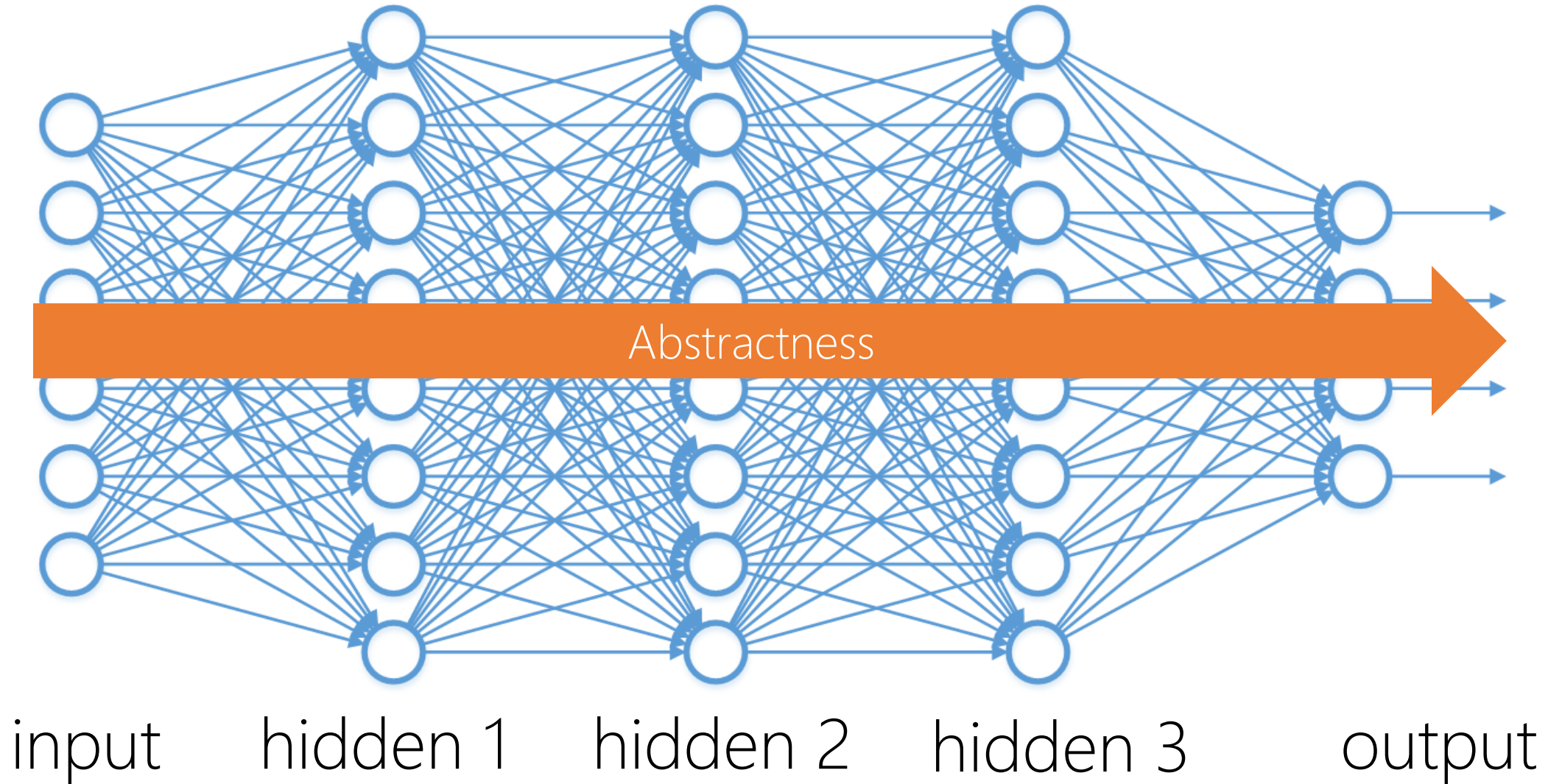
Deep Neural Network



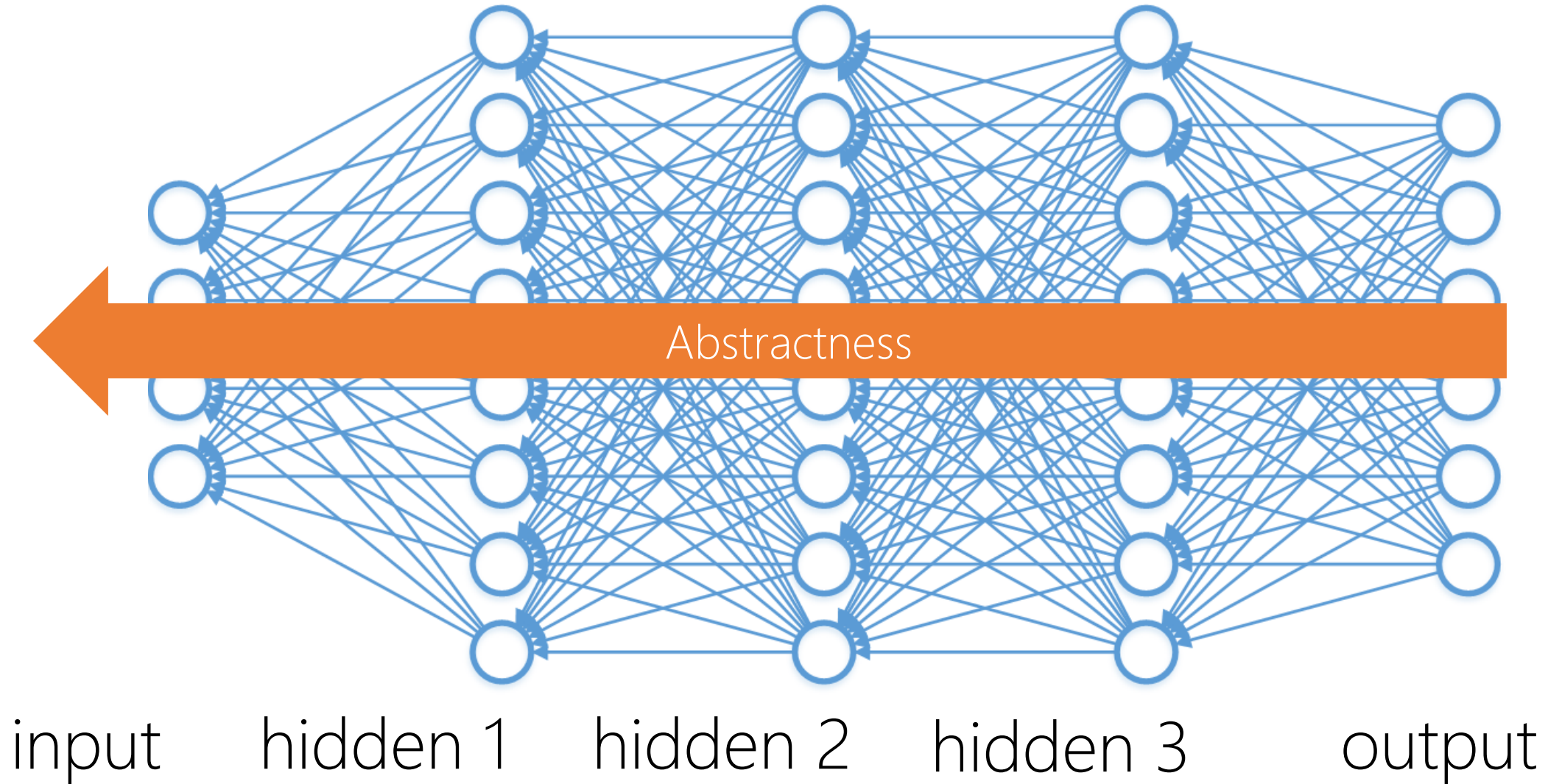
Deep Neural Network

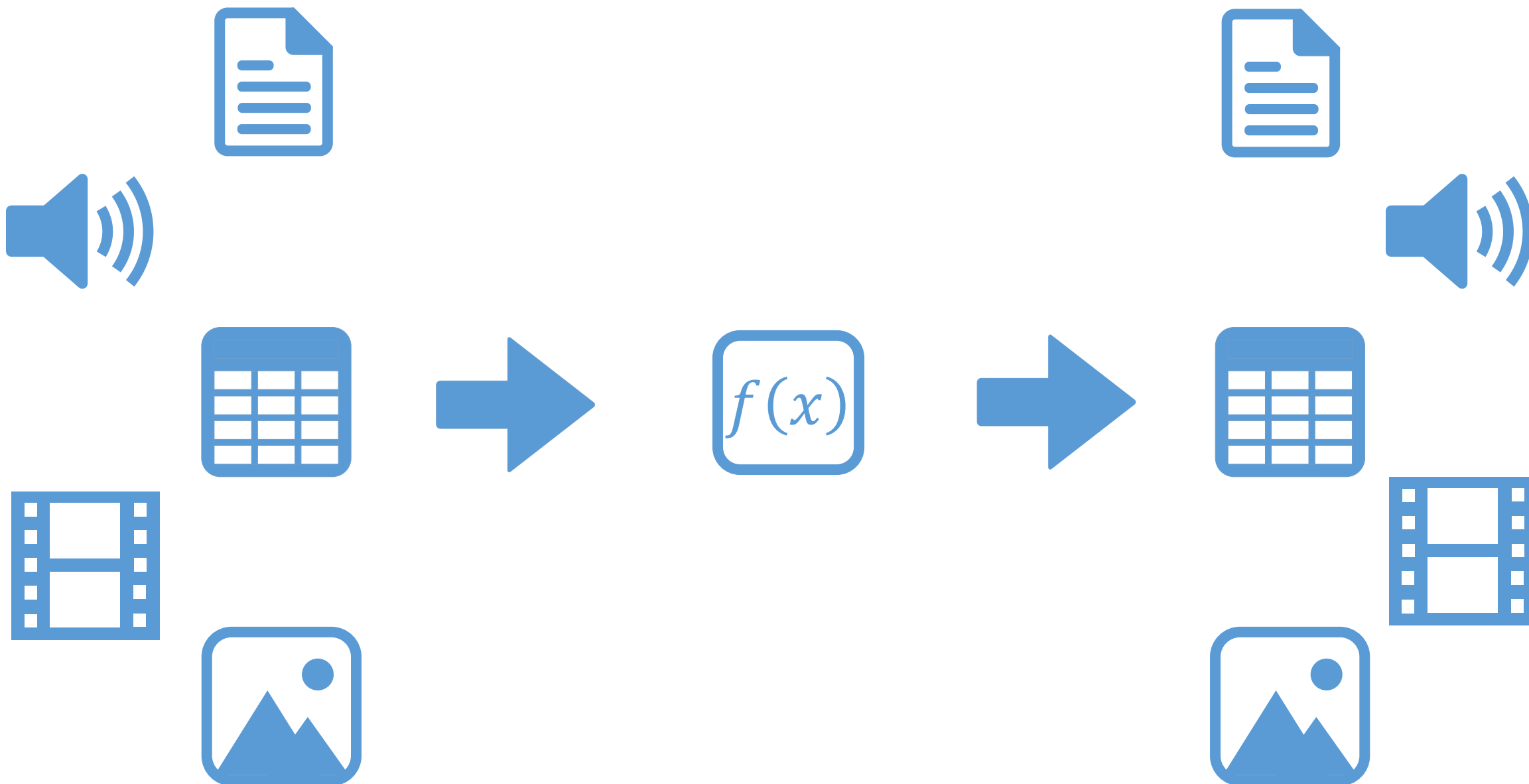


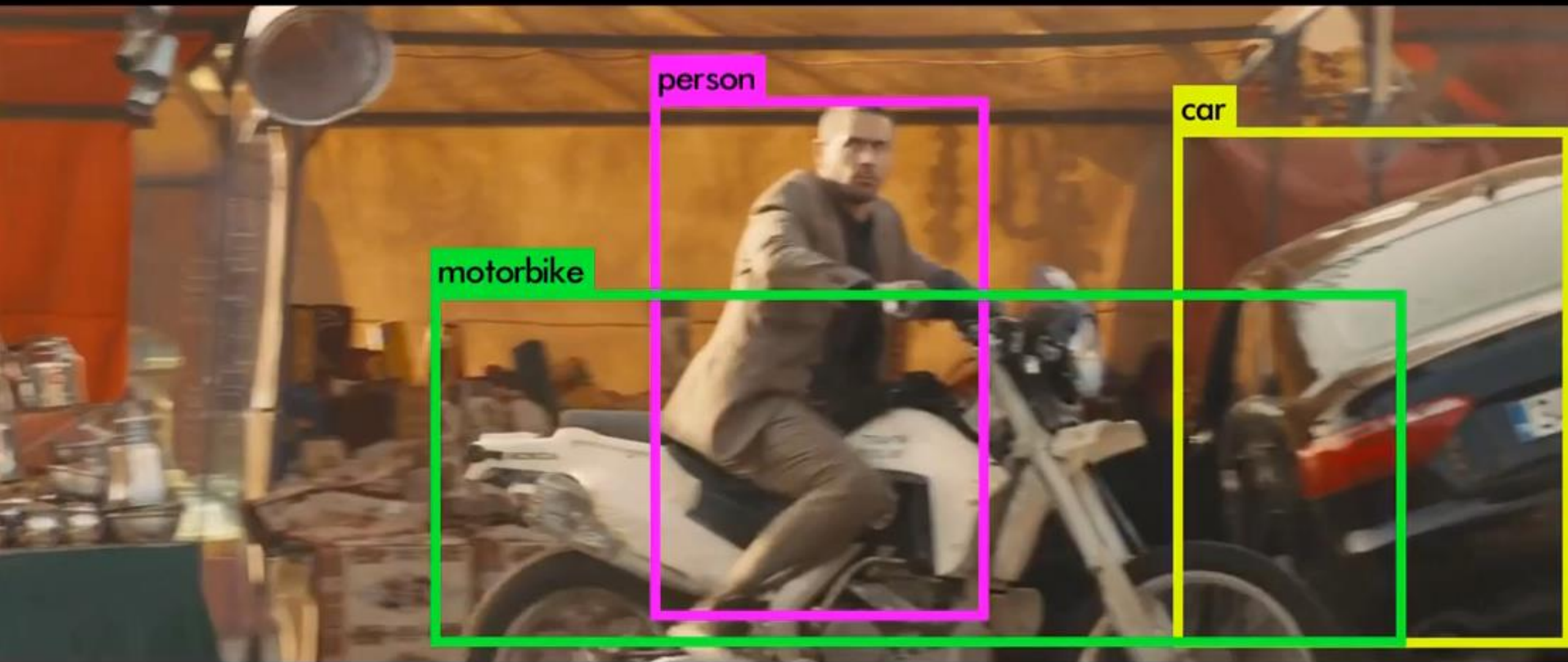
Deep Neural Network



DNN Generator







person

car

motorbike



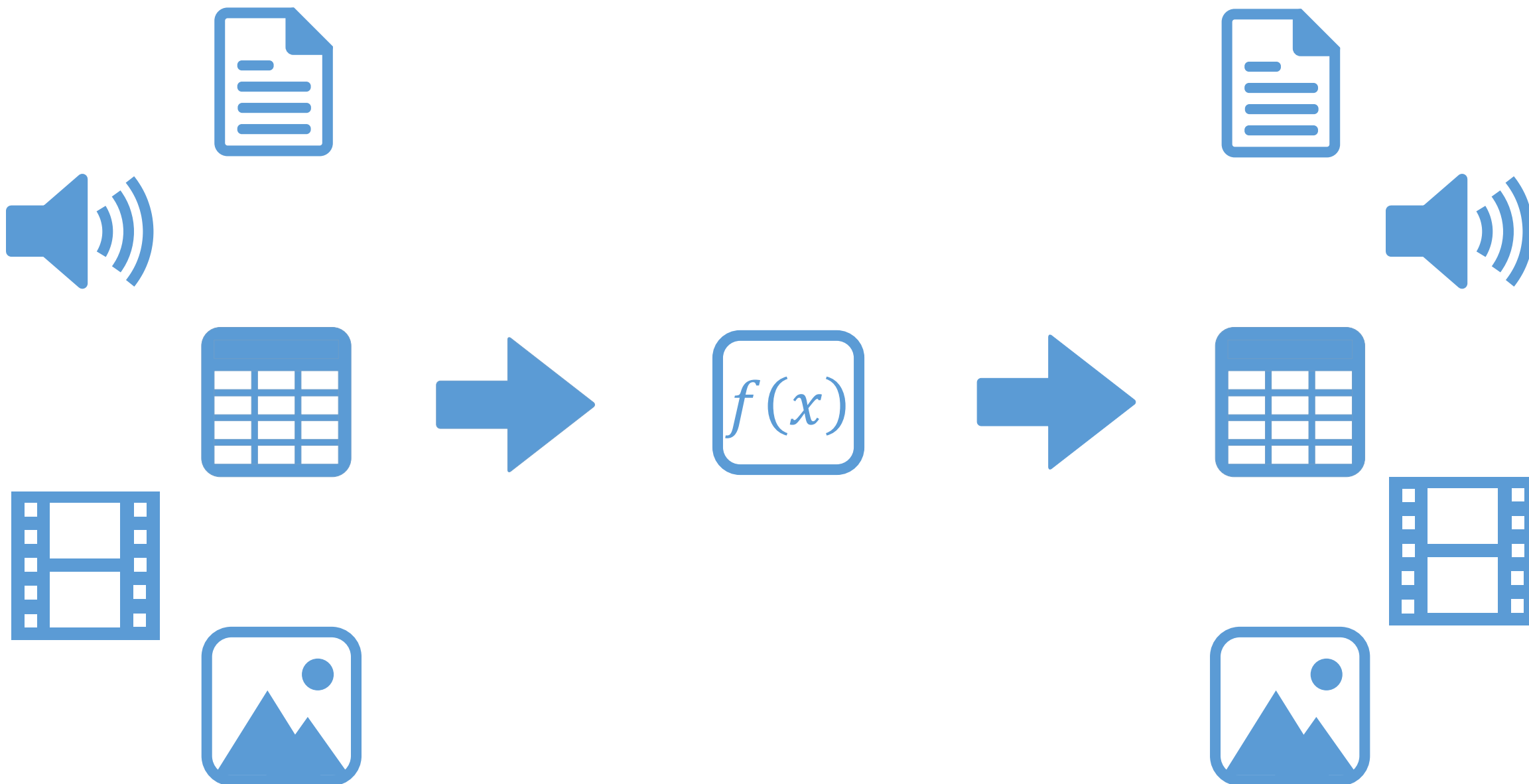






ctrl shift face





Reinforcement Learning

Reinforcement Learning



Agent

Environment

Reinforcement Learning



Agent



Environment

Reinforcement Learning



Agent

state



Environment

Reinforcement Learning



Agent

action



state

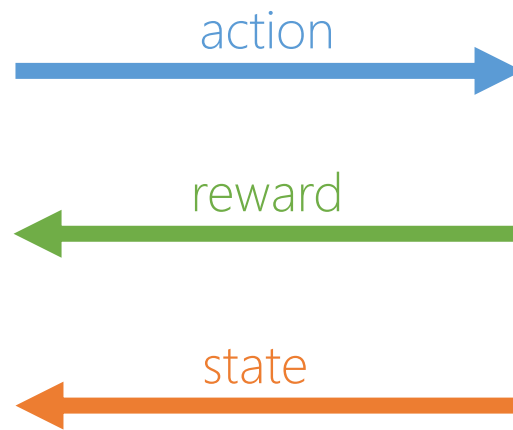


Environment

Reinforcement Learning

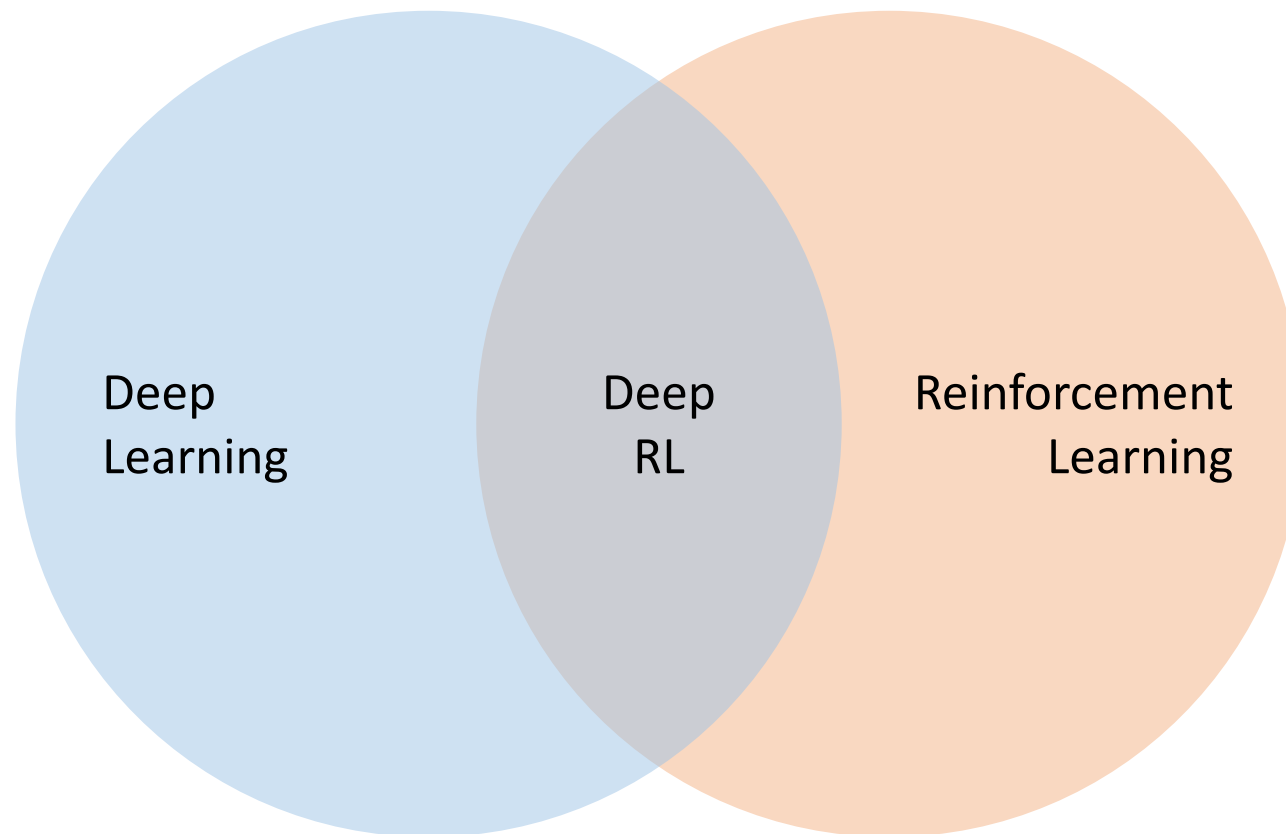


Agent



Environment

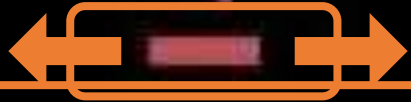
Deep Reinforcement Learning



021 3 1



021 3 1



021 3 1



100 Training Episodes

200 Training Episodes

400 Training Episodes

600 Training Episodes





Exploration vs. Exploitation

Exploring new
rewards

vs.

Exploiting known
rewards

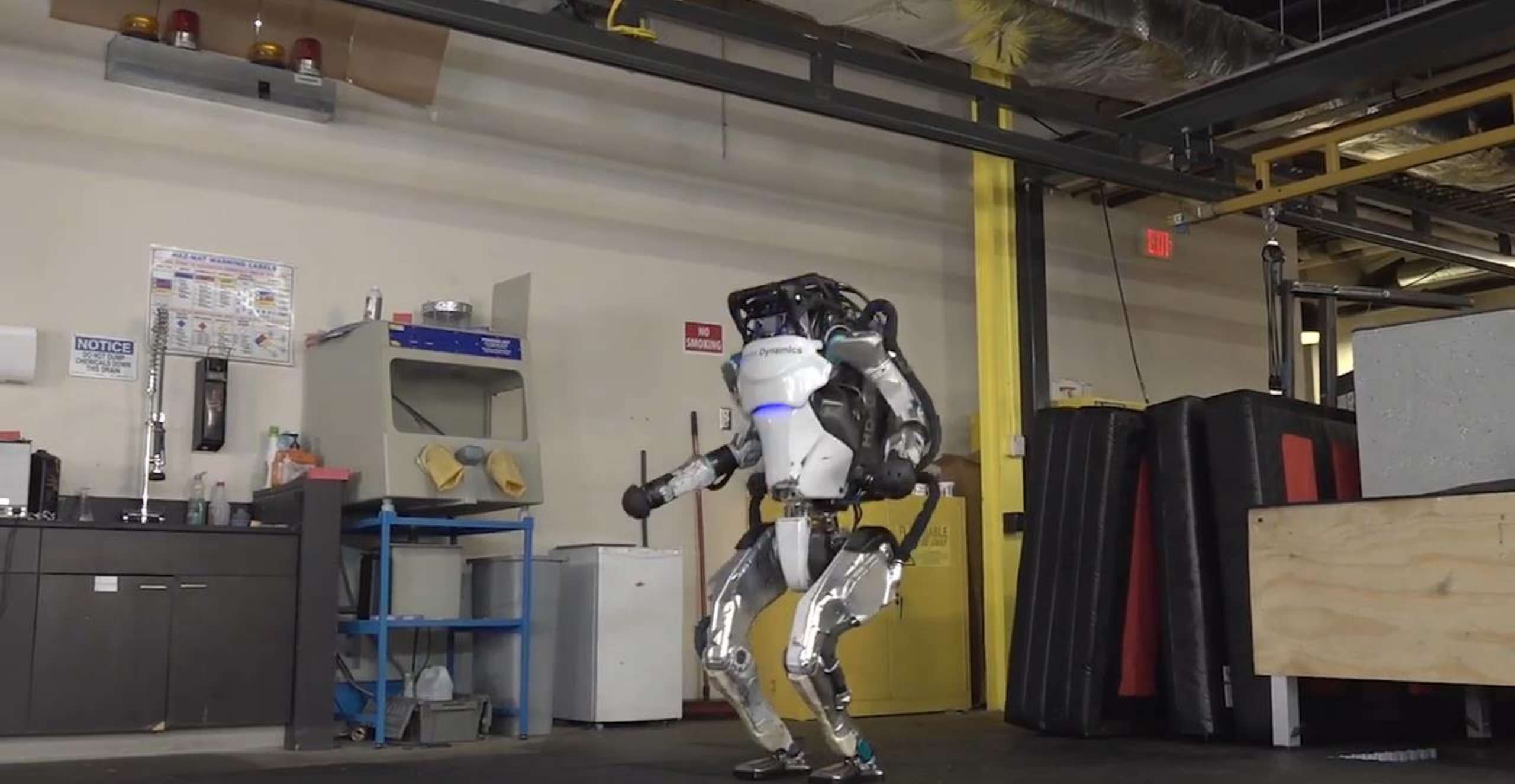


Humanoid:
27 DoFs, 21 Actuators.





Boston Dynamics



NOTICE
DO NOT POUR
CHEMICALS DOWN
THE DRAIN

WIRE MATT WARNING LABELS

NO
SMOKING

EXIT

Boston Dynamics



Source: Boston Dynamics

(Y) NET WORTH

- 9903
- 8847
- 8502
- 7583
- 5961
- 5564
- 3934
- 3637
- 3276
- 1558

39 21:34 8

24 18 43 11

Show Fight Recap

OpenAI 3 (Bot) 15

OpenAI 5 (Bot) 14

OpenAI 4 (Bot) 12

OpenAI 2 (Bot) 15

OpenAI 1 (Bot) 14

It's not all just fun and games!

OpenAI 3 (Bot) Blitz 273

MoonMeander: gg
Blitz: gg



LICH

108 / 6+9 / 434 / 46+3 / 43+3 / 62+17

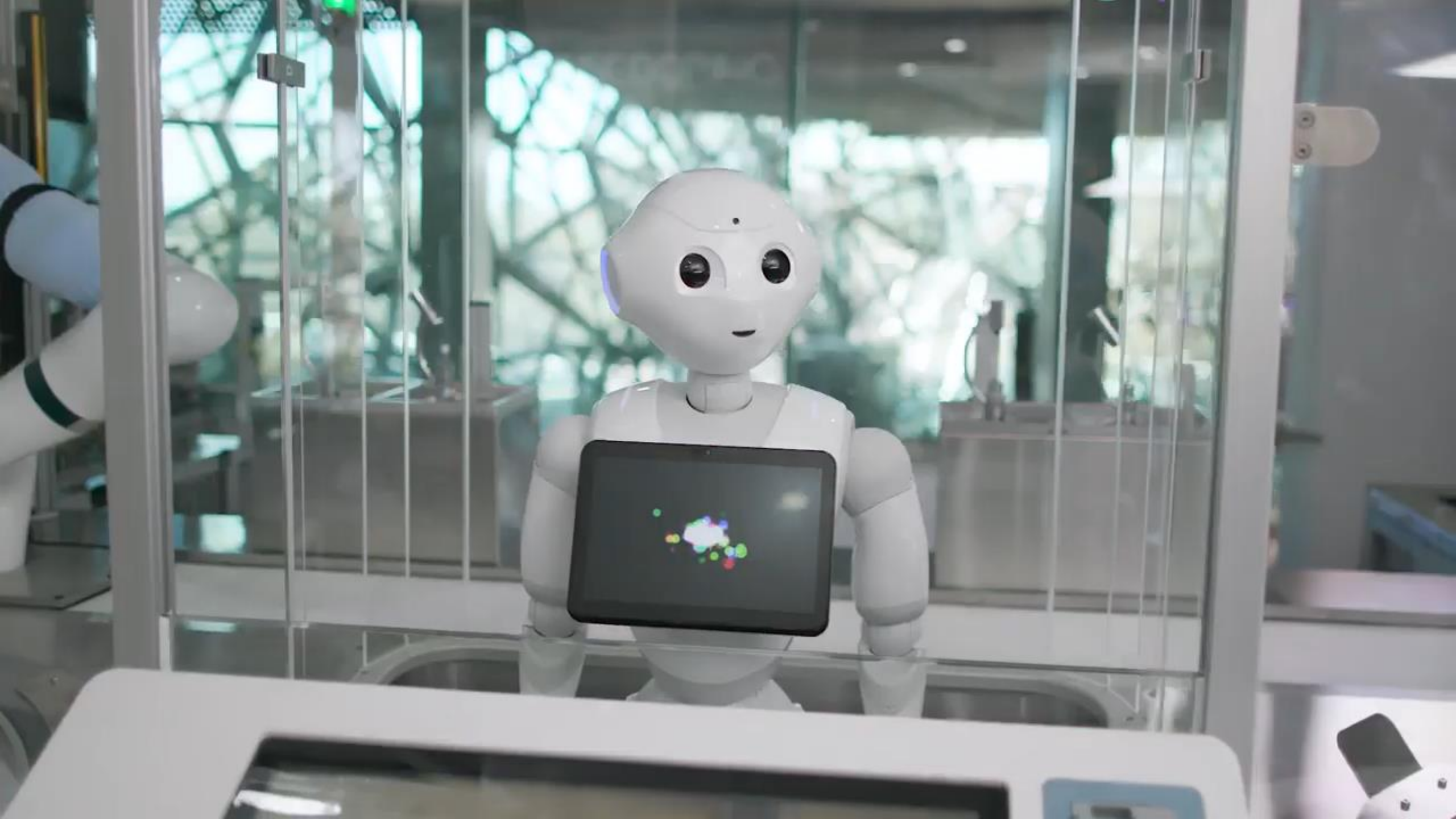
743 / 1064 +1.9

400 / 1245 +3.9

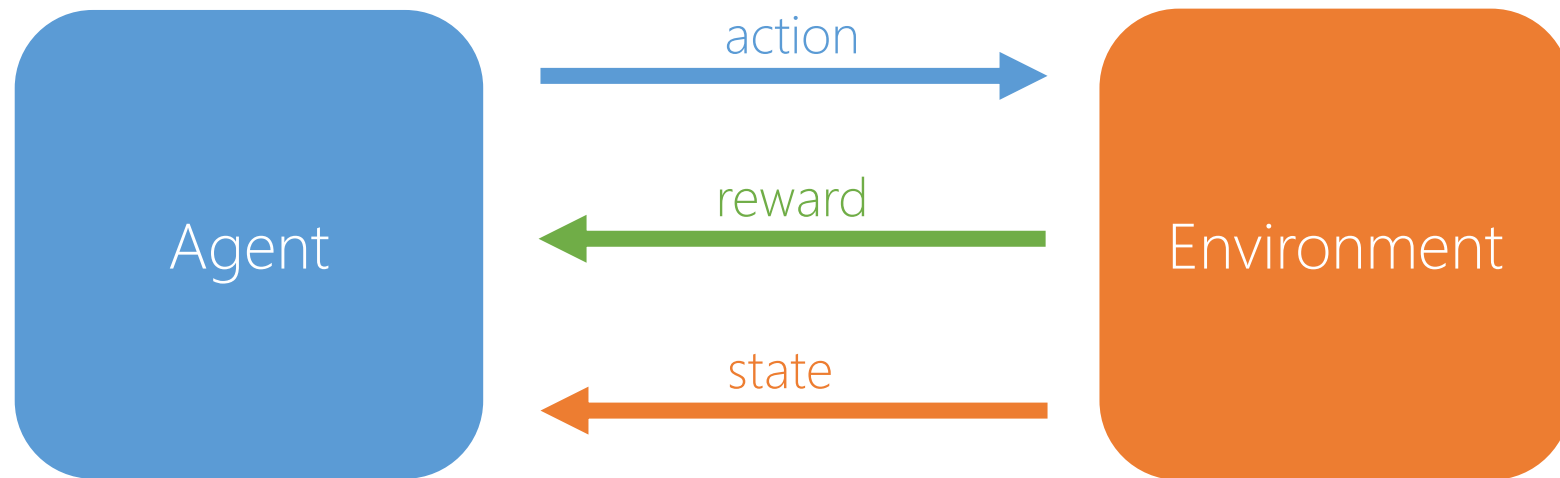
67 / 13 / 1

OpenAI

475

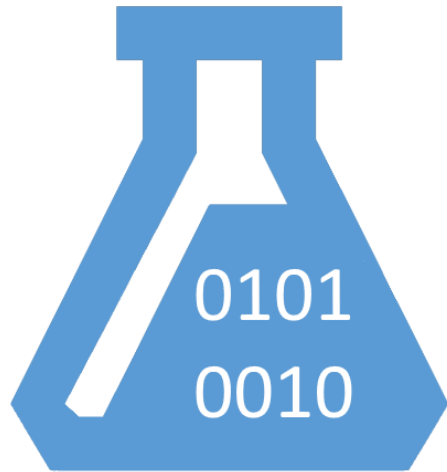


Reinforcement Learning

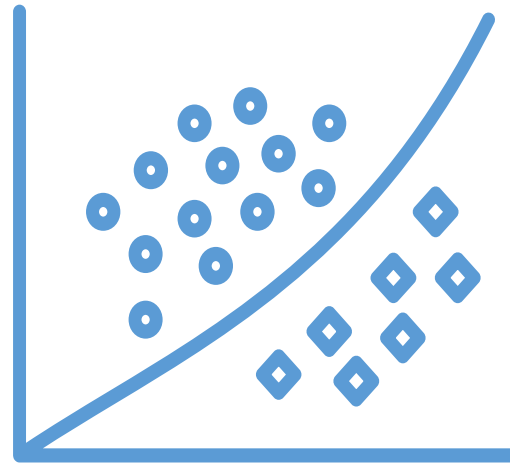


Modern Data-Driven AI

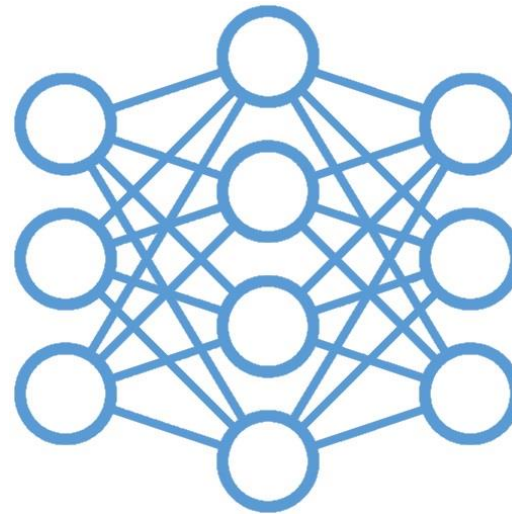
Data-driven AI Trends



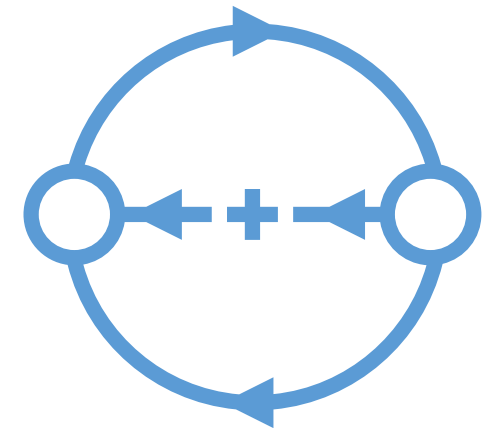
Data
Science



Machine
Learning



Deep Learning



Reinforcement
Learning

Gender: Female
Age: 31
Emotion: Happy

Gender: Male
Age: 5
Emotion: Happy



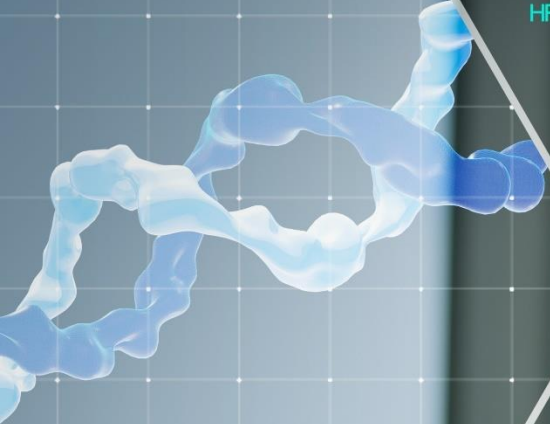
Apple



Schedule a haircut for me for tomorrow around noon.

Ok. I've scheduled an appointment for tomorrow at noon.

FRIDAY 02.10.2017
01:03:32.500
HR . MIN . SEC . MS



628

739

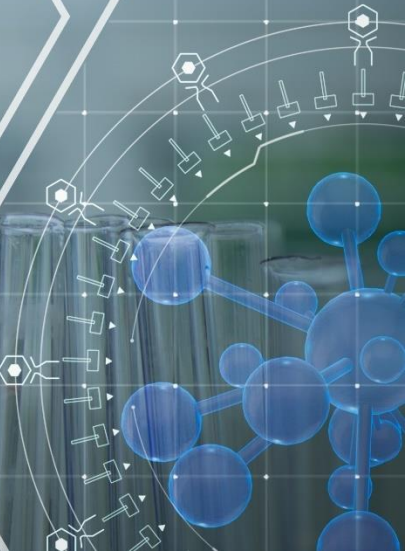
1	2	3	4
5	6	7	8
9	0	+	=

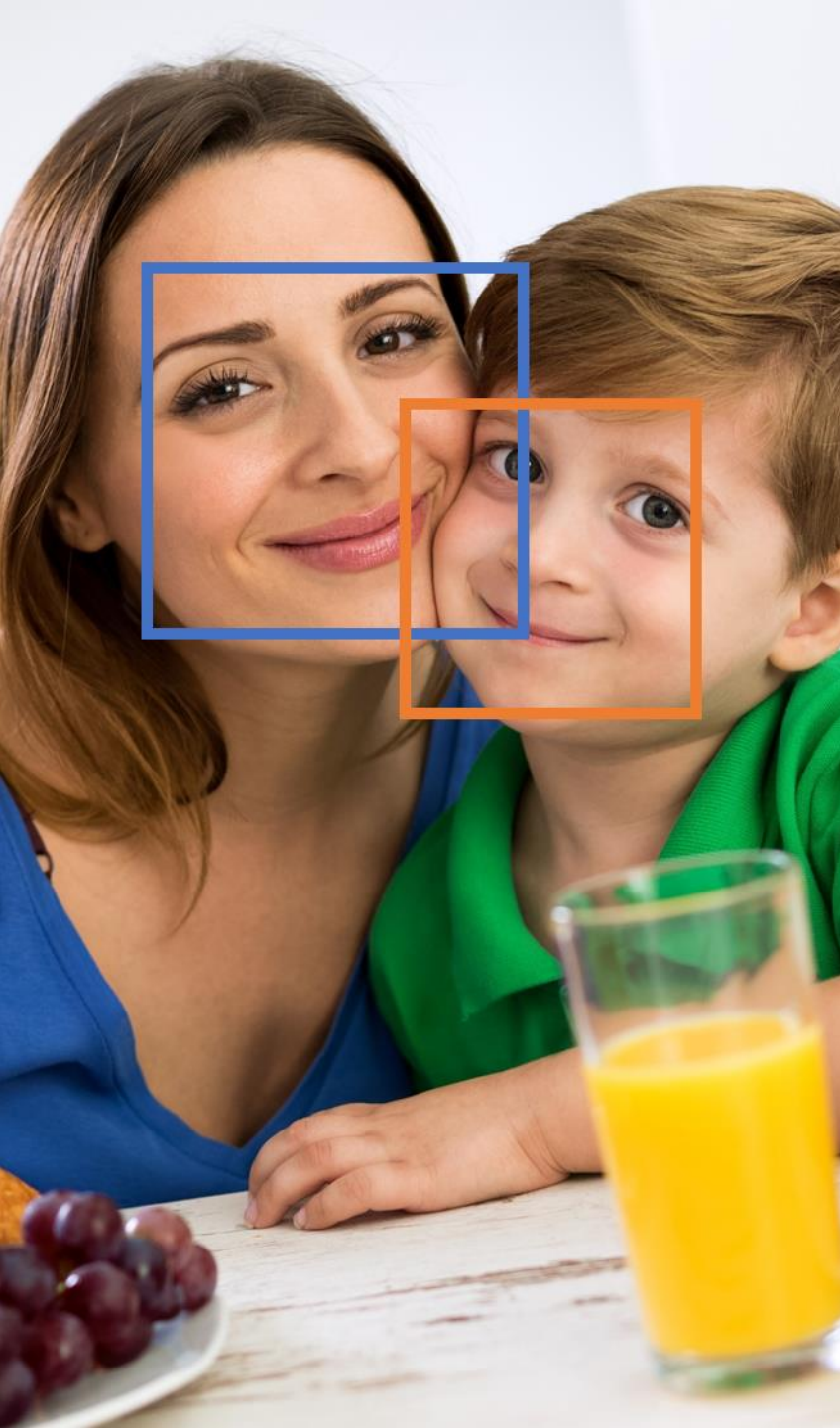


628
739



628
739











CAUTION

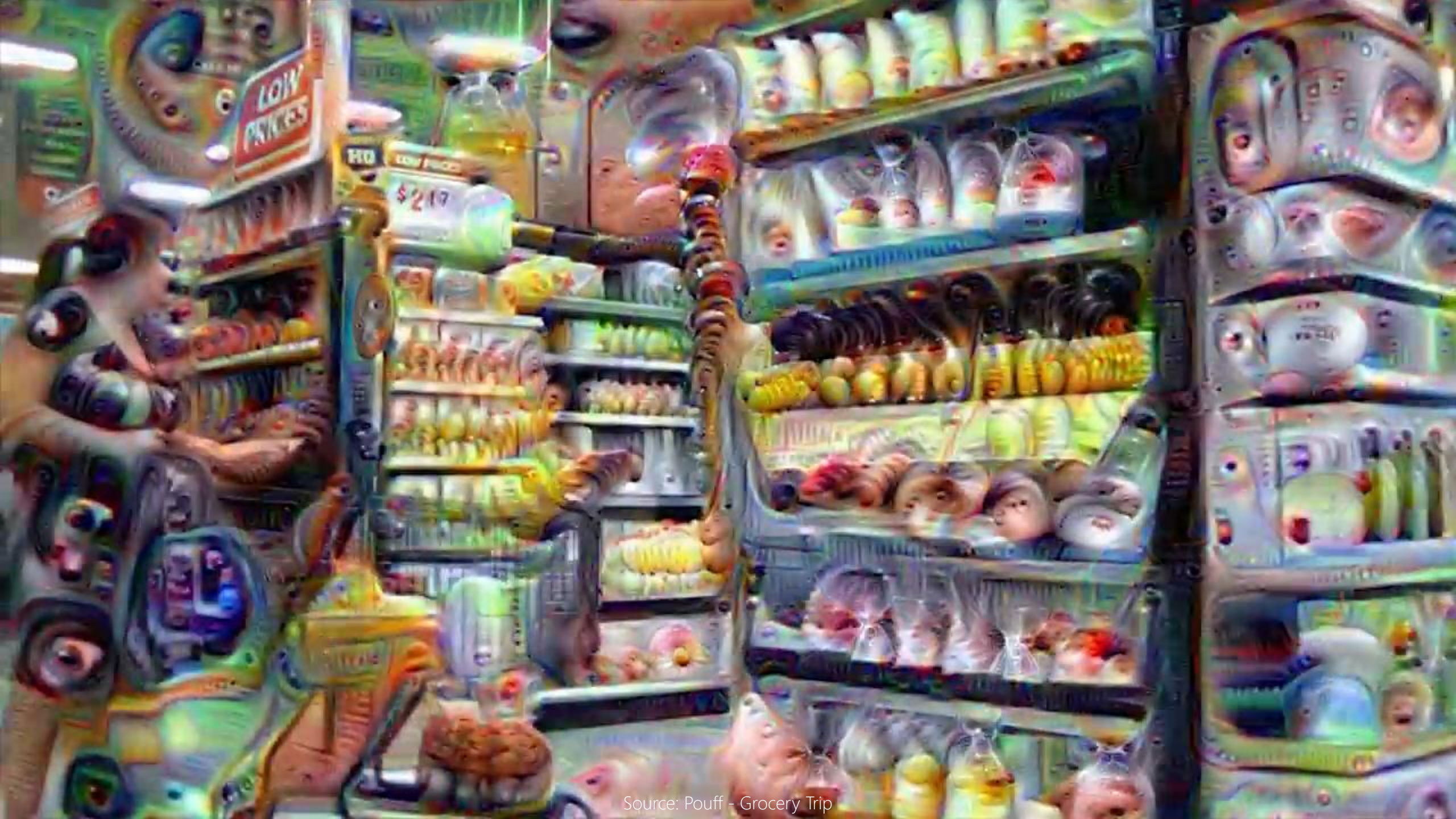
ACHTUNG
ATTENTION
CUIDADO







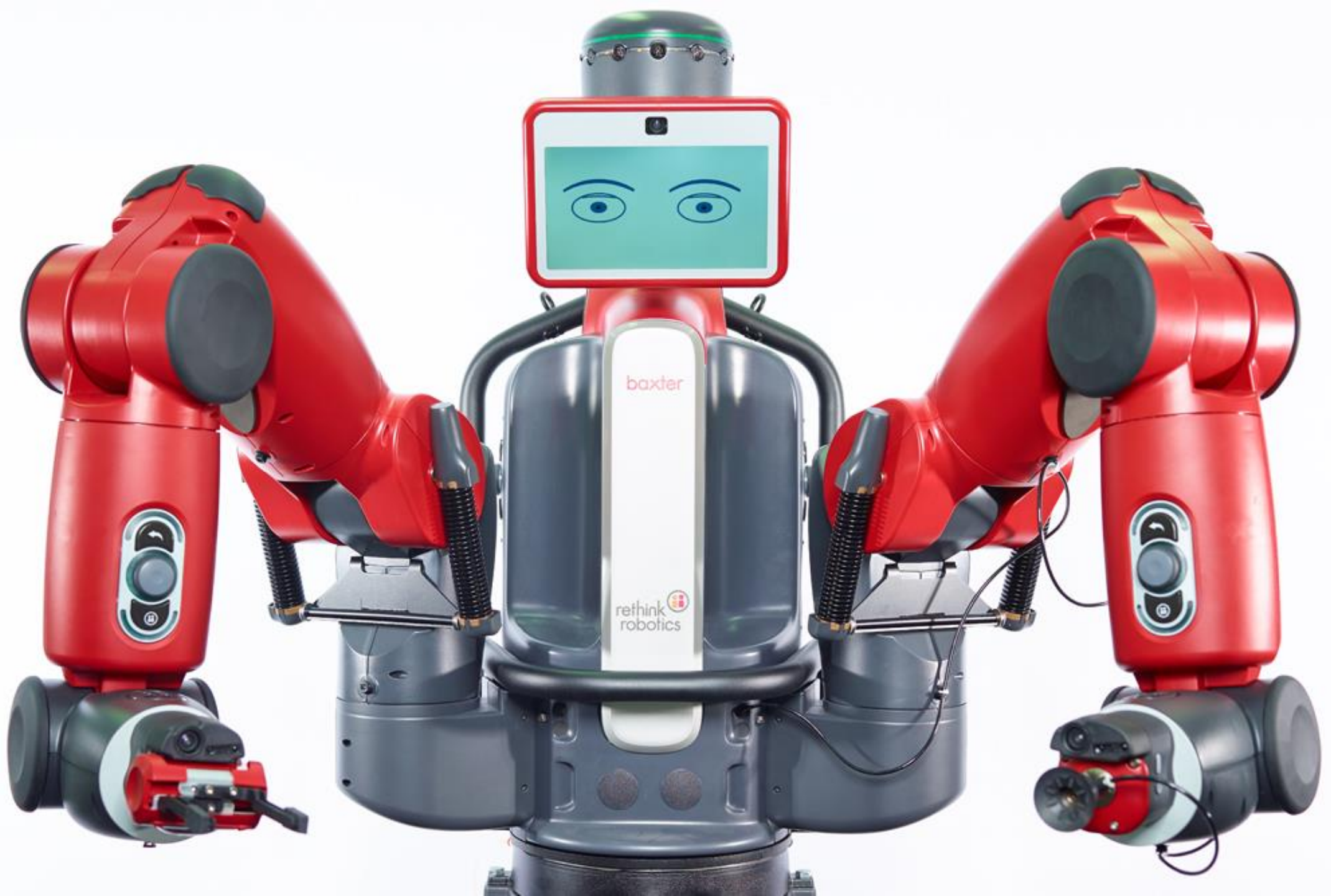




How will this affect you?



Courtesy of Ford Motor Company





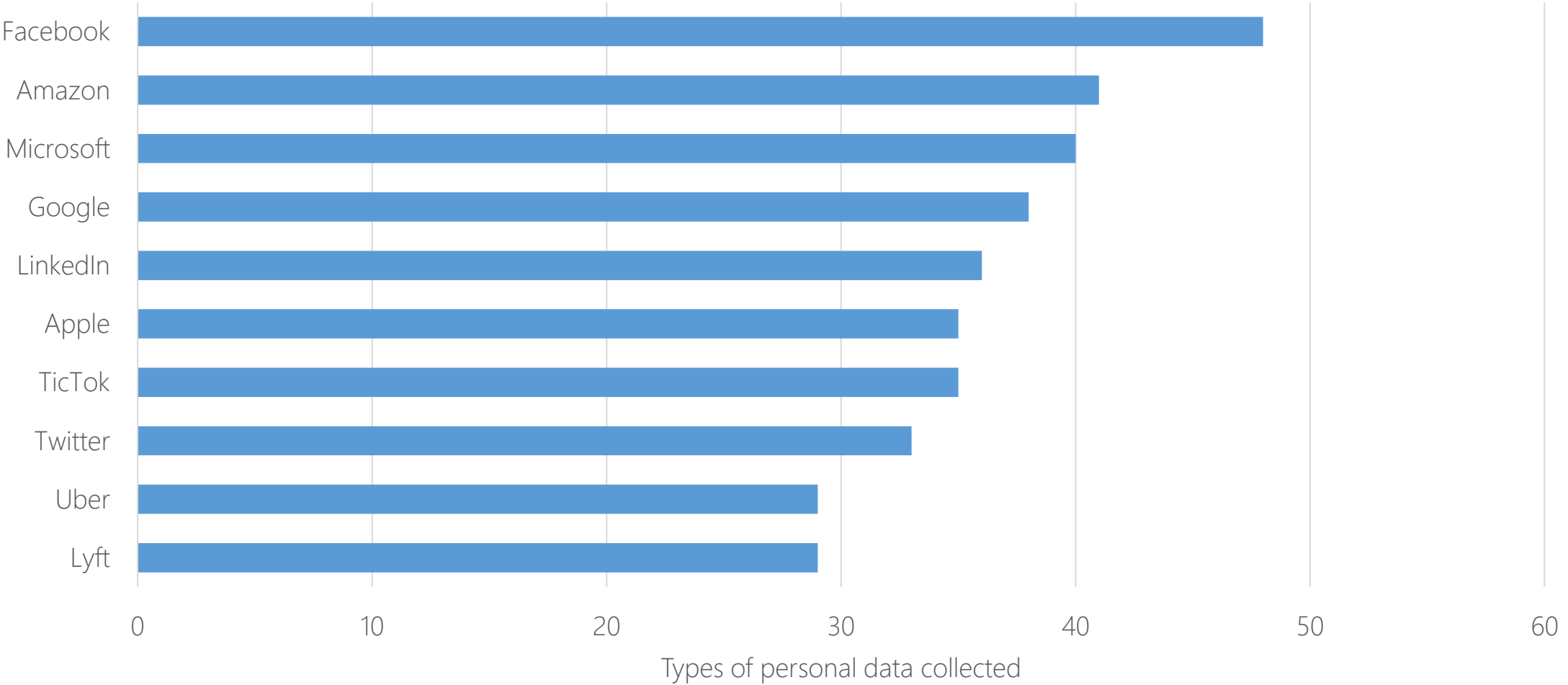




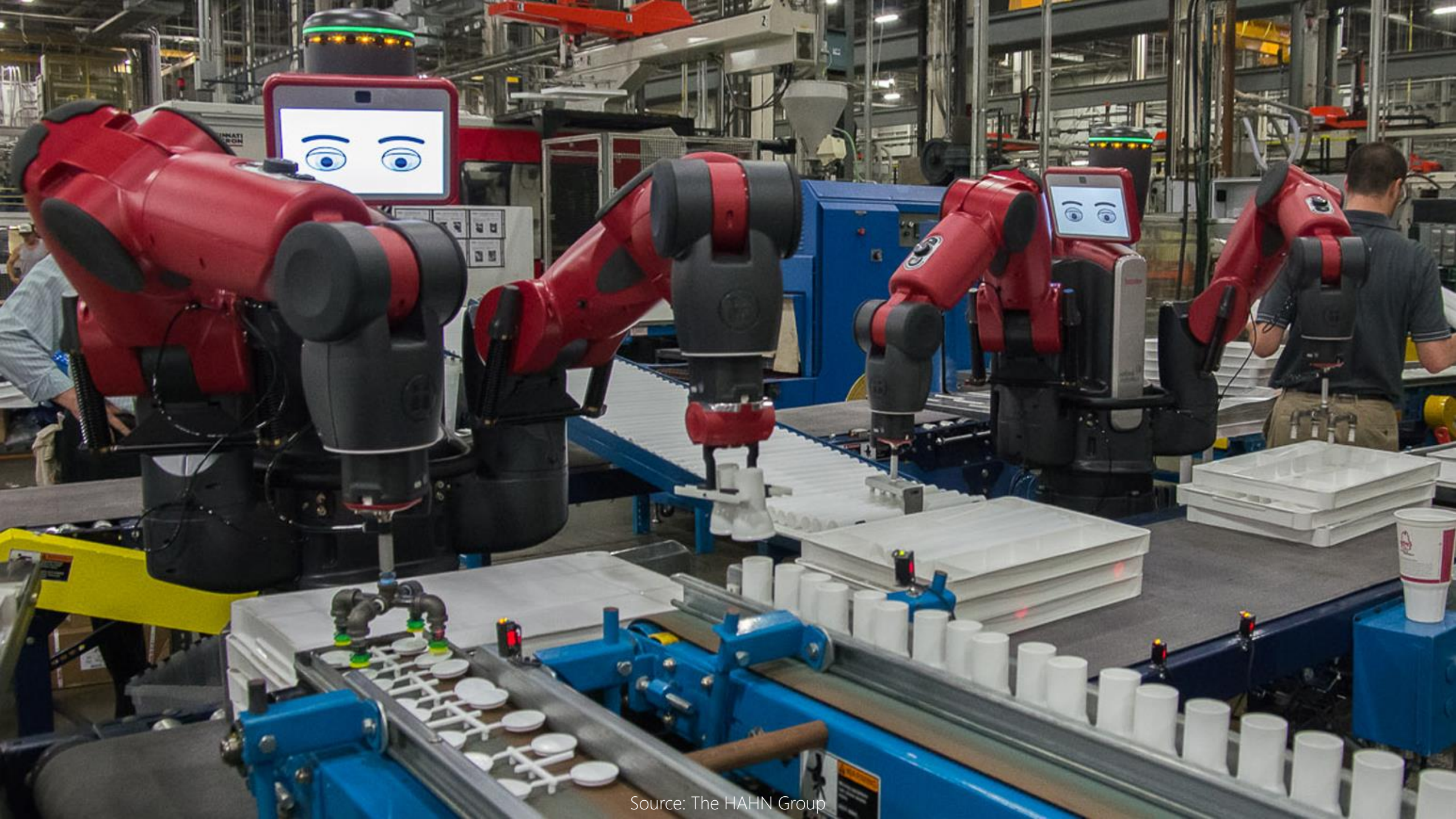
Artificial intelligence will be woven
into the fabric of our society.



Who Collects the Most Personal Data?



Source: Digital Information World 2020



Source: The HAHN Group



Benvenuti da McDonald's

ASSIETO SACCHETTO

Choose your language

English Spanish Français Italiano Deutsch

Torna per ordinare Touch to order

VOCCA PER ORDINARE

McFamily Meal

Scegli l'offerta per la tua famiglia!

Torna per ordinare Touch to order

McFamily Meal

Scegli l'offerta per la tua famiglia!

McFamily Meal

Scegli l'offerta per la tua famiglia!

McFamily Meal

Scegli l'offerta per la tua famiglia!



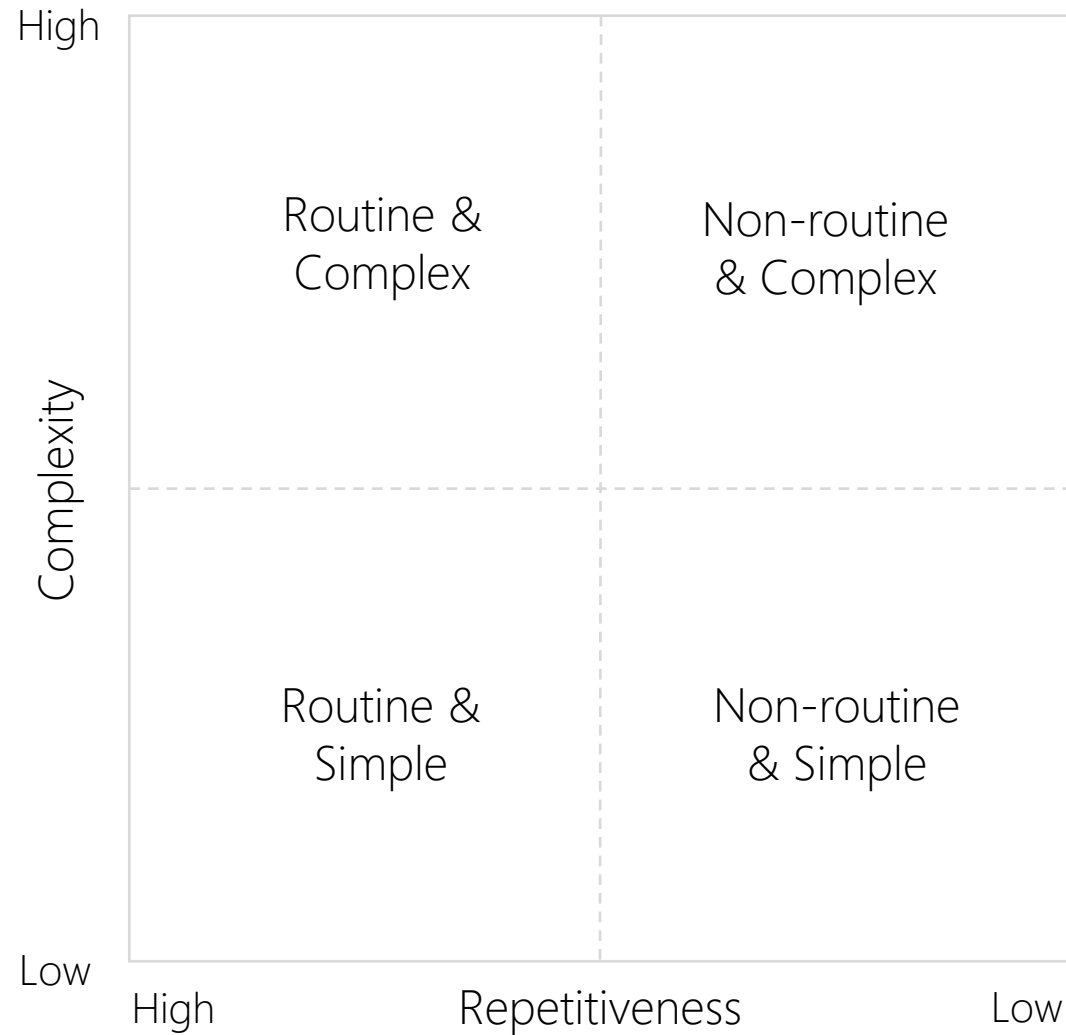


What about human creativity?

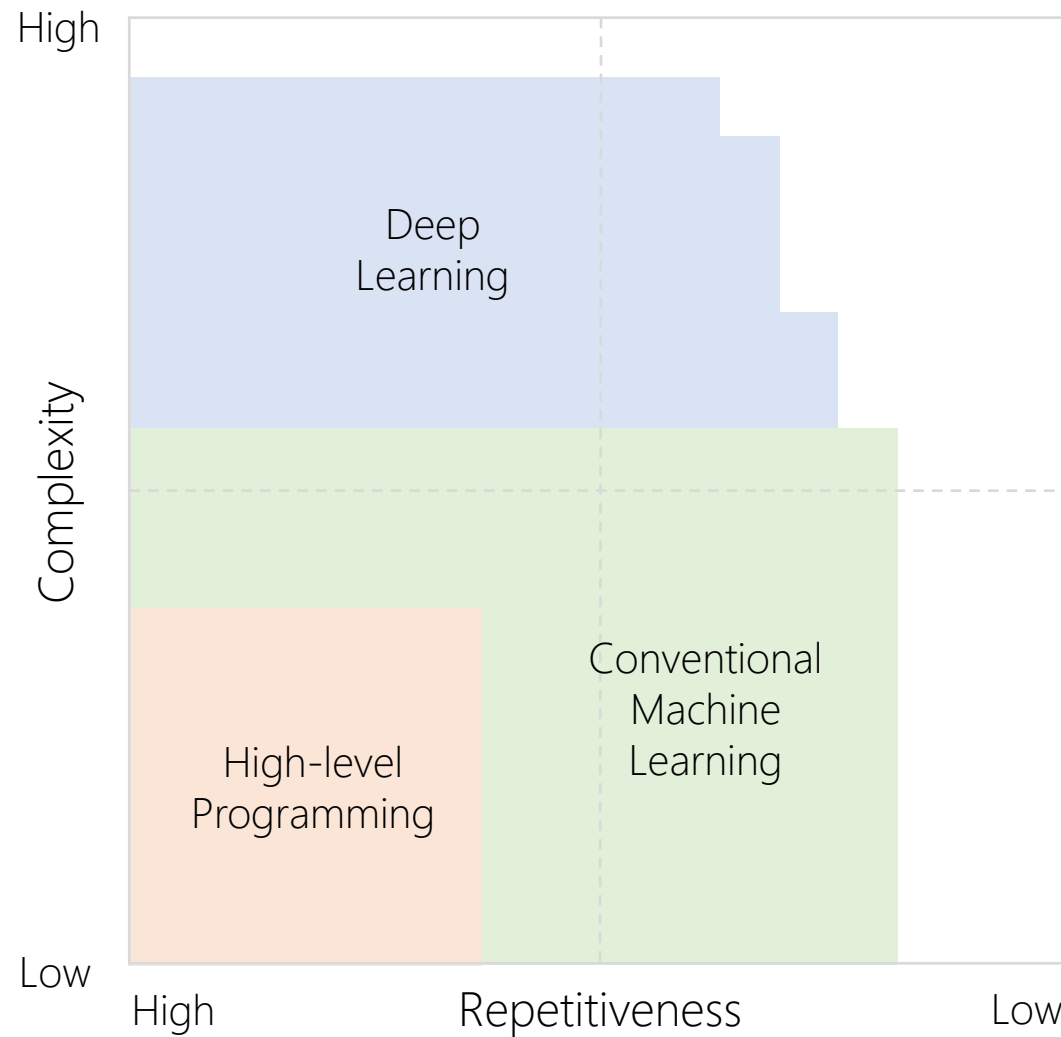




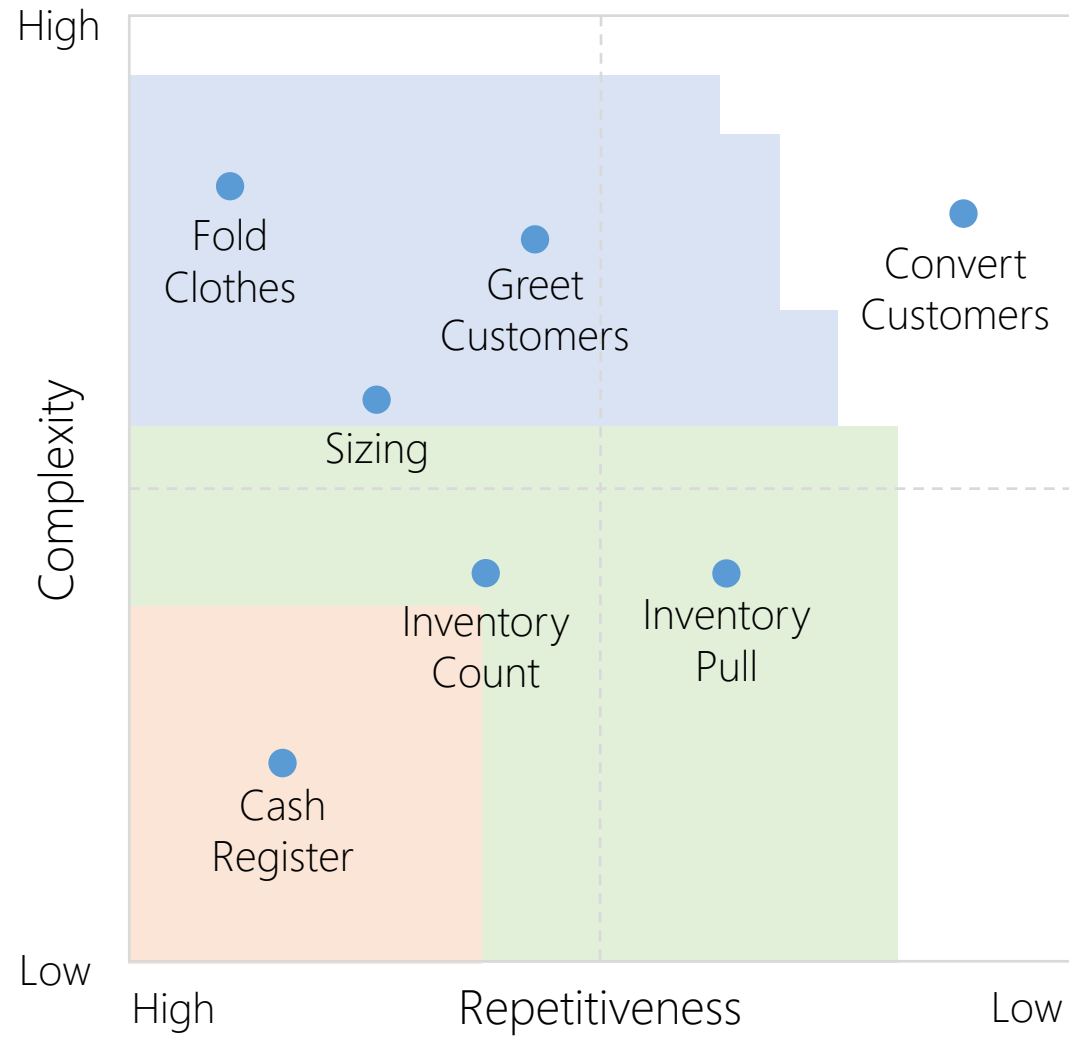
Automation Framework



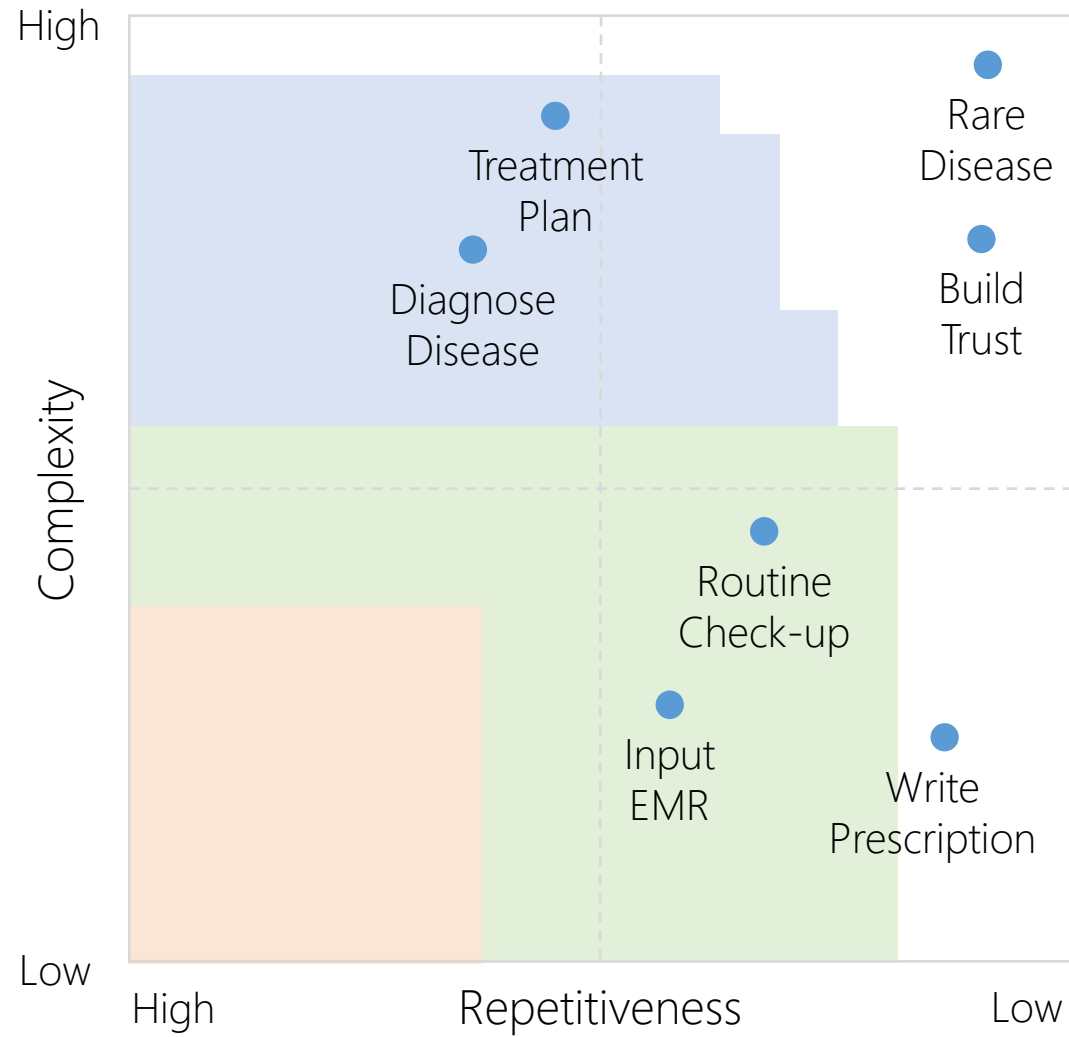
Automation Technology



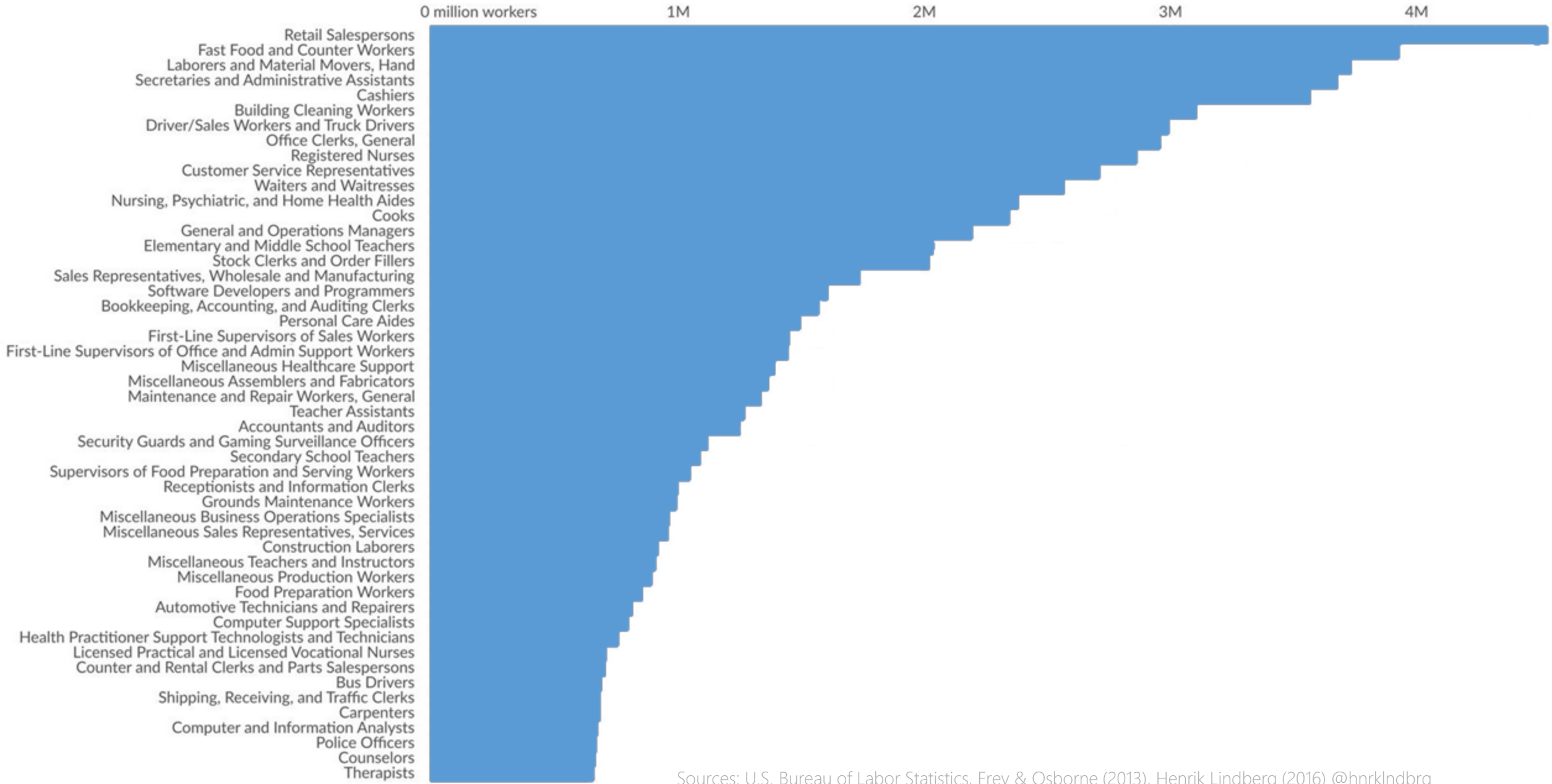
Retail Salesperson



Medical Doctor

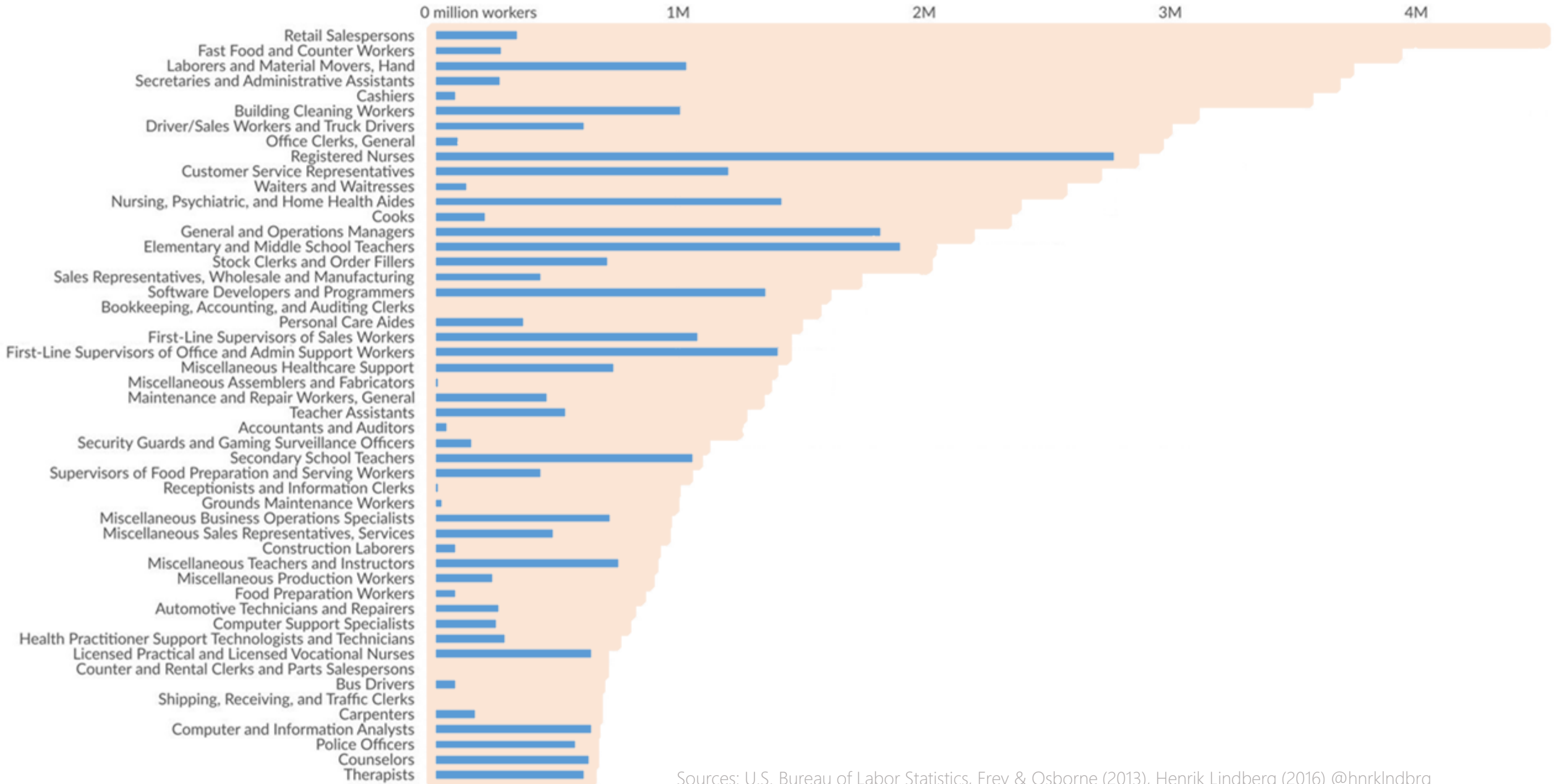


The Future of Labor



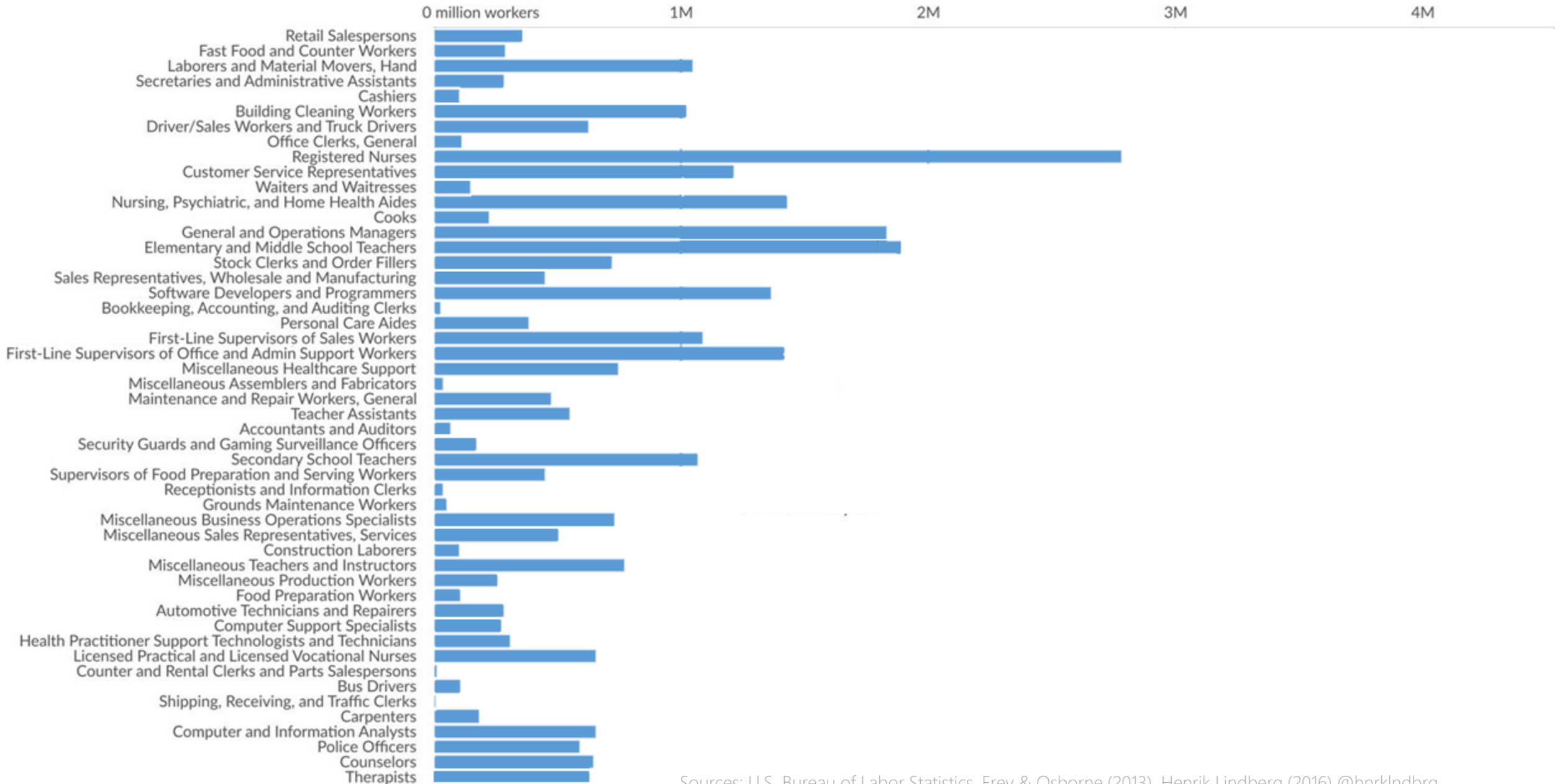
Sources: U.S. Bureau of Labor Statistics, Frey & Osborne (2013), Henrik Lindberg (2016) @hnrklndbrg

The Future of Labor



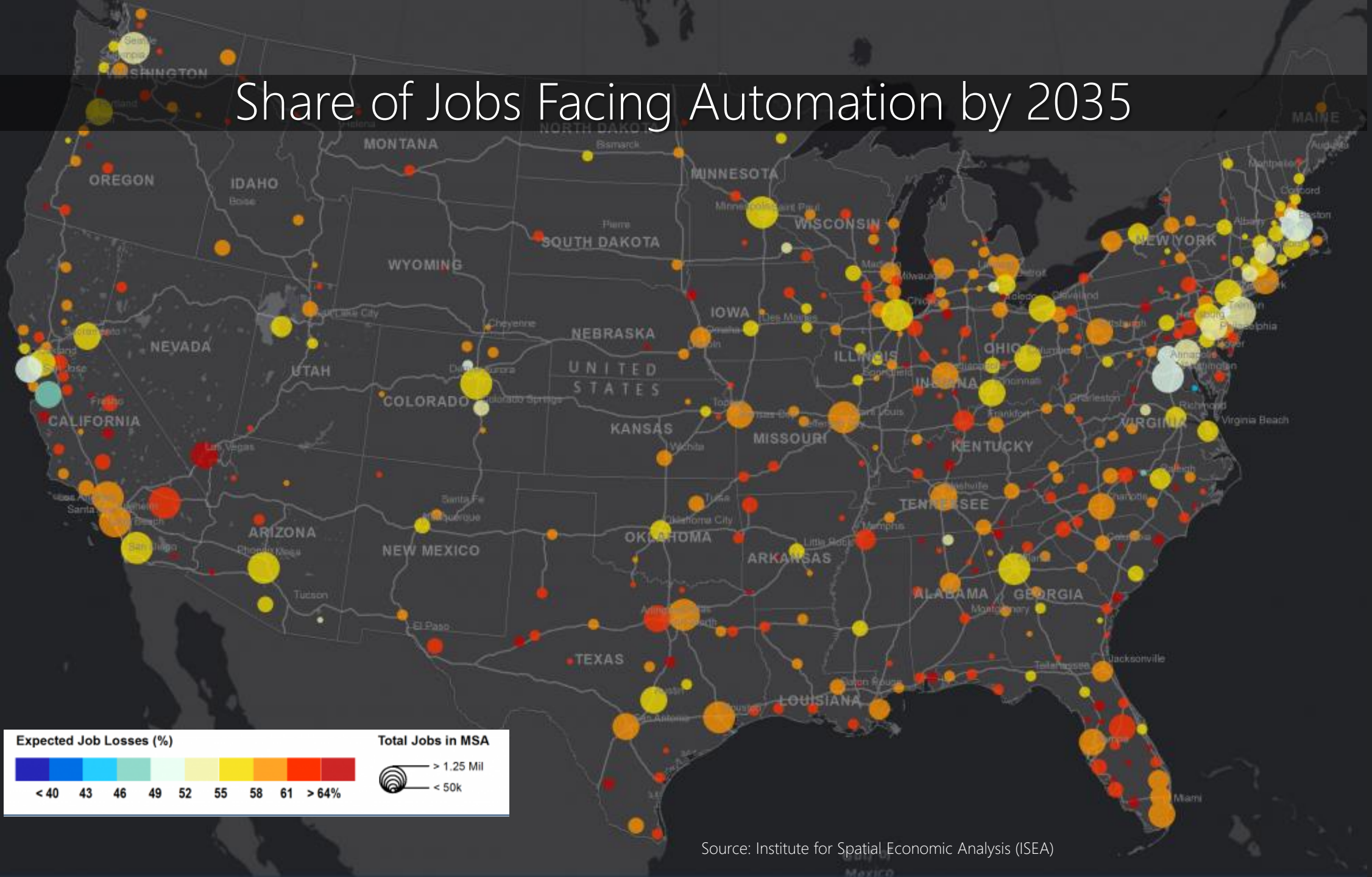
Sources: U.S. Bureau of Labor Statistics, Frey & Osborne (2013), Henrik Lindberg (2016) @hnrklnbrg

The Future of Labor

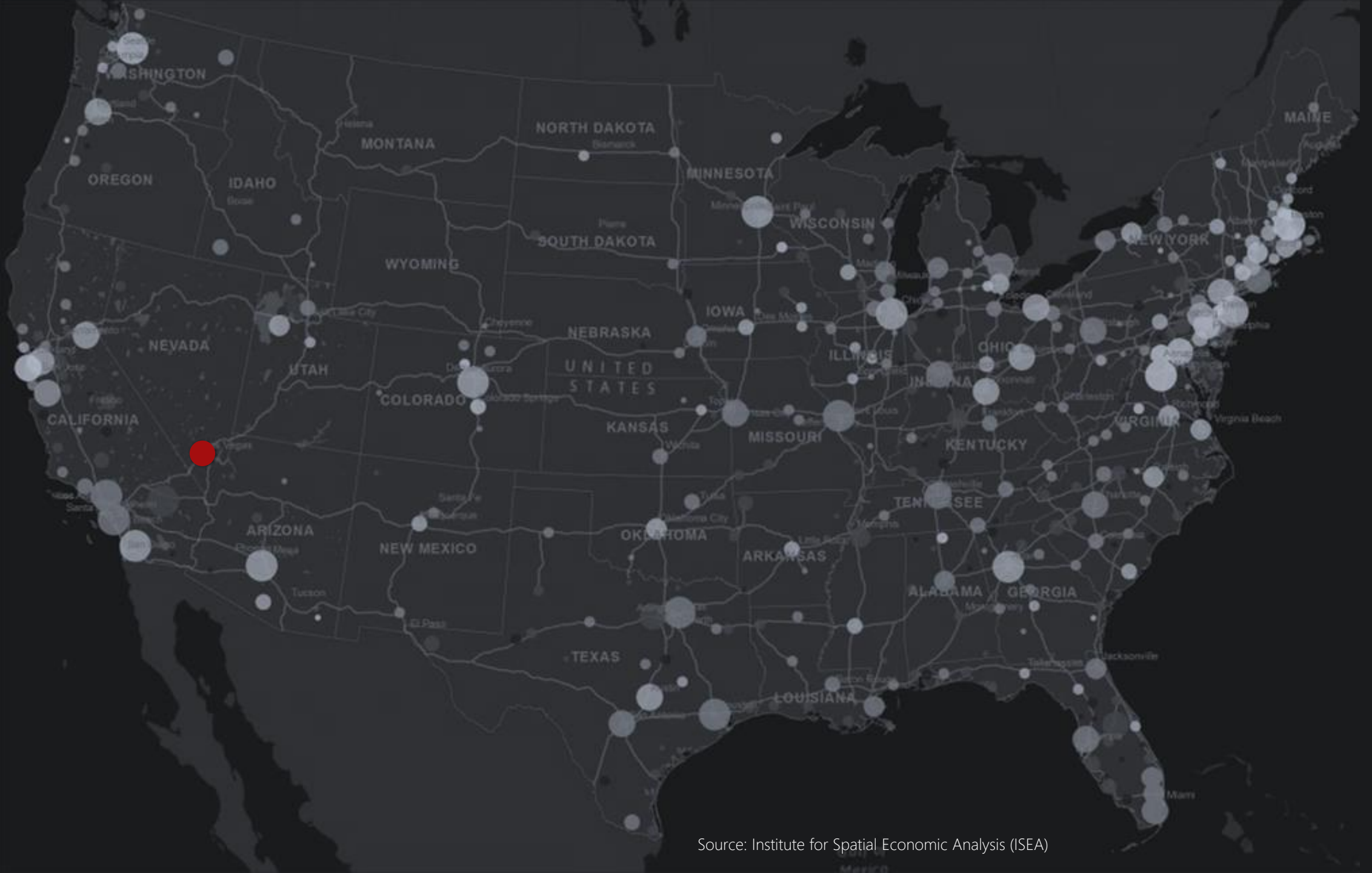


Sources: U.S. Bureau of Labor Statistics, Frey & Osborne (2013), Henrik Lindberg (2016) @hnrklnbrg

Share of Jobs Facing Automation by 2035




Source: Institute for Spatial Economic Analysis (ISEA)



Source: Institute for Spatial Economic Analysis (ISEA)



65% of all jobs in Las Vegas
at risk of automation by 2035.



Half of all jobs in the USA at risk
in the next two decades.



Likelihood of Job Automation

Telemarketers – 99%

Underwriters – 99%

Sports referees – 99%

Cashiers – 97%

Chefs – 96%

Waiters – 94%

Paralegal Assistant – 94%

Tour guides – 91%

Bakers – 89%

Bus drivers – 89%

Construction workers – 88%

Veterinary assistant – 86%

Security guard – 84%

Sailor – 83%

Bartender – 77%

Archivist – 76%

Growth of New Job Opportunities

AI Specialist – 74%

Robotics Engineer – 40%

Data Scientist – 37%

Full Stack Engineer – 35%

Site Reliability Engineer – 34%

Data Engineer – 33%

Behavioral Health Tech – 32%

Cybersecurity Specialist – 30%

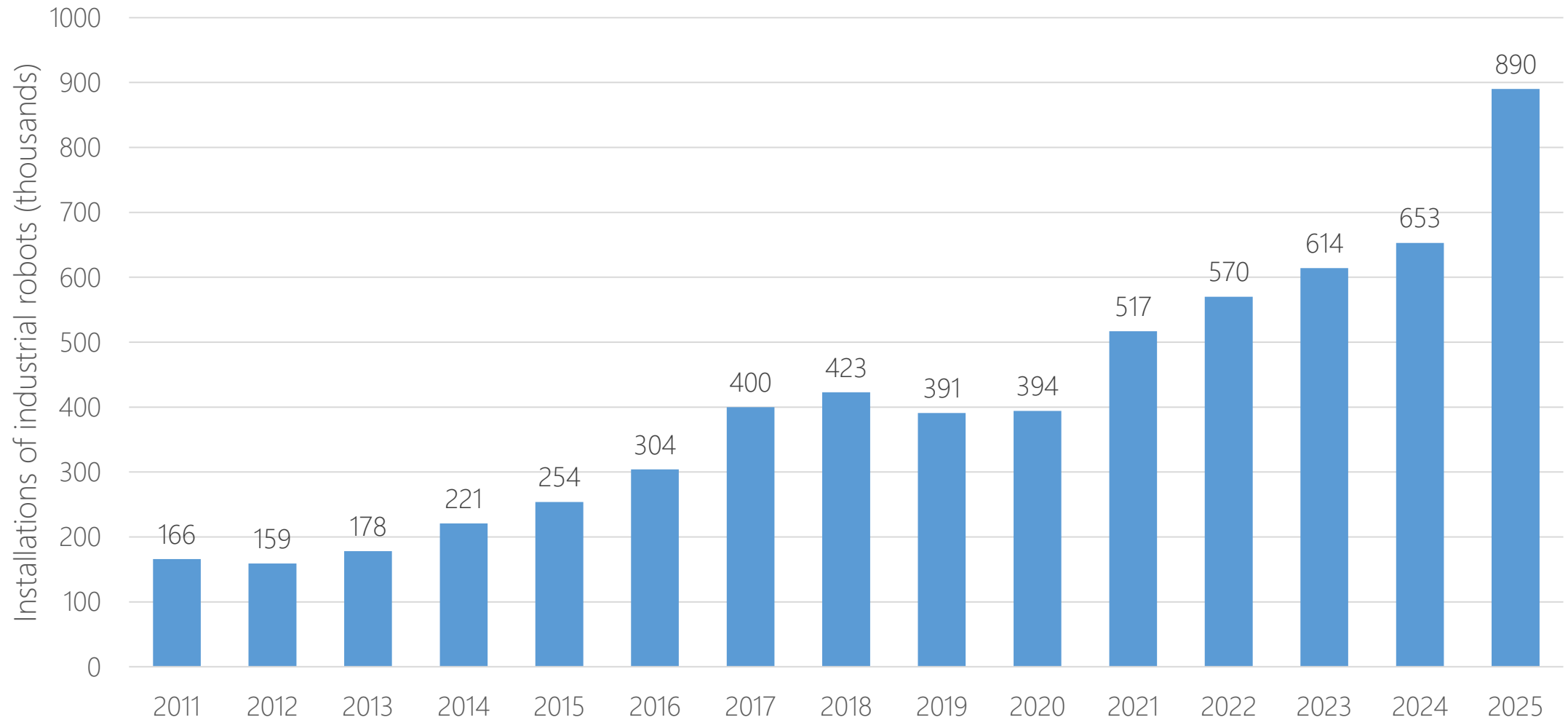
Back End Developer – 30%

Cloud Engineer – 27%

JavaScript Developer – 25%

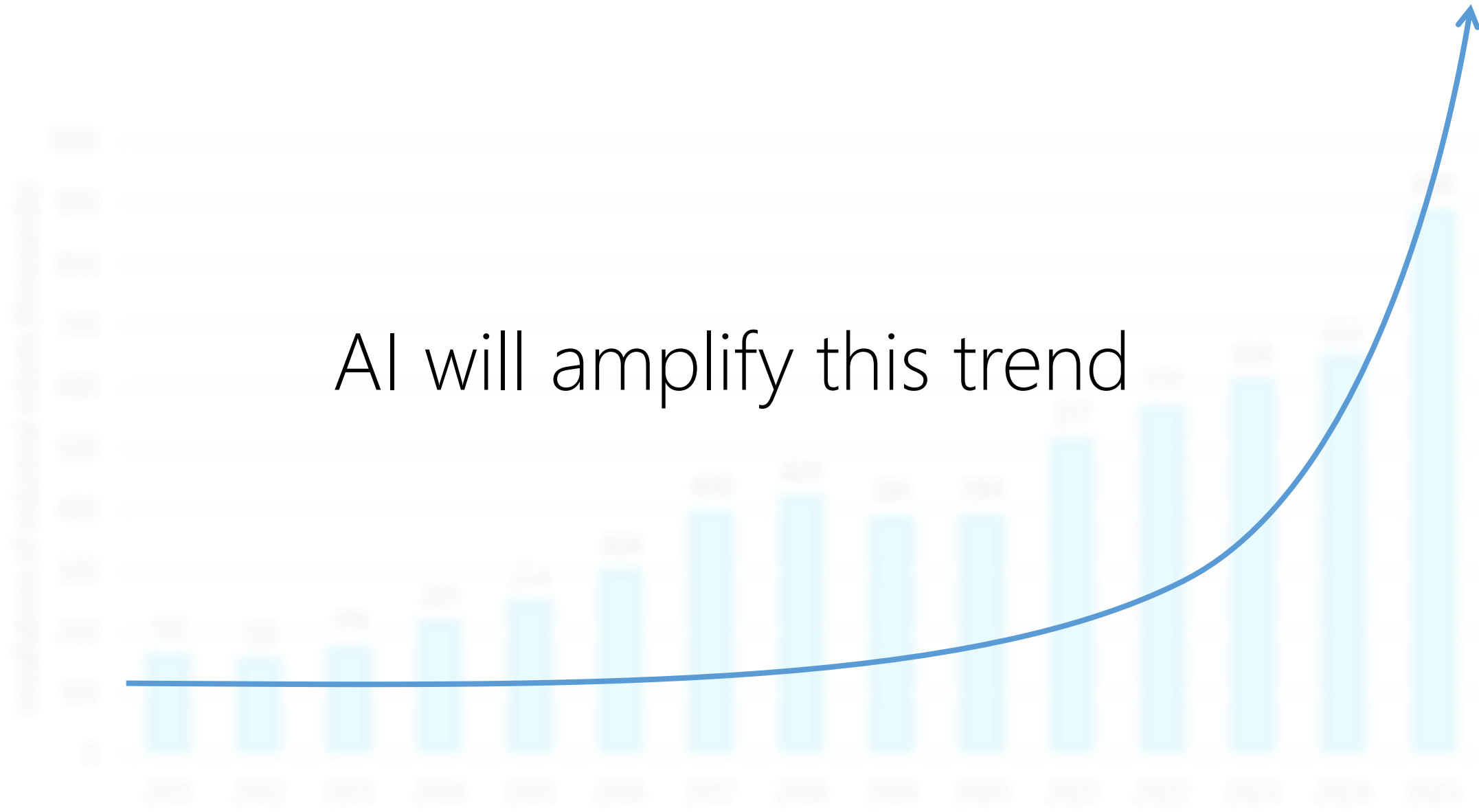
Product Owner – 24%

Rise of the Robots



Source: International Federation of Robotics 2022 (estimates for 2022-2025)

AI will amplify this trend

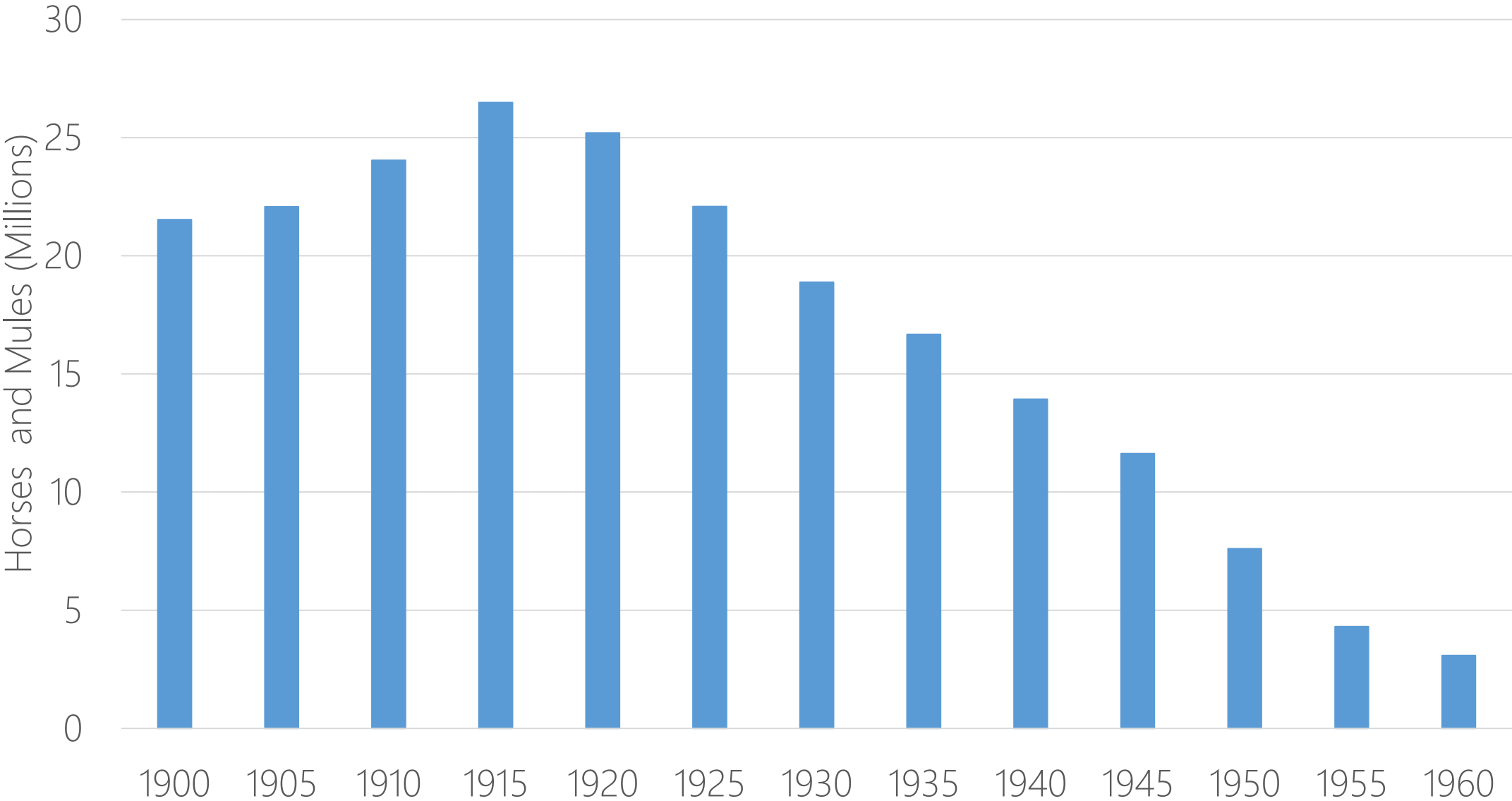




Will AI create more jobs
than it eliminates?

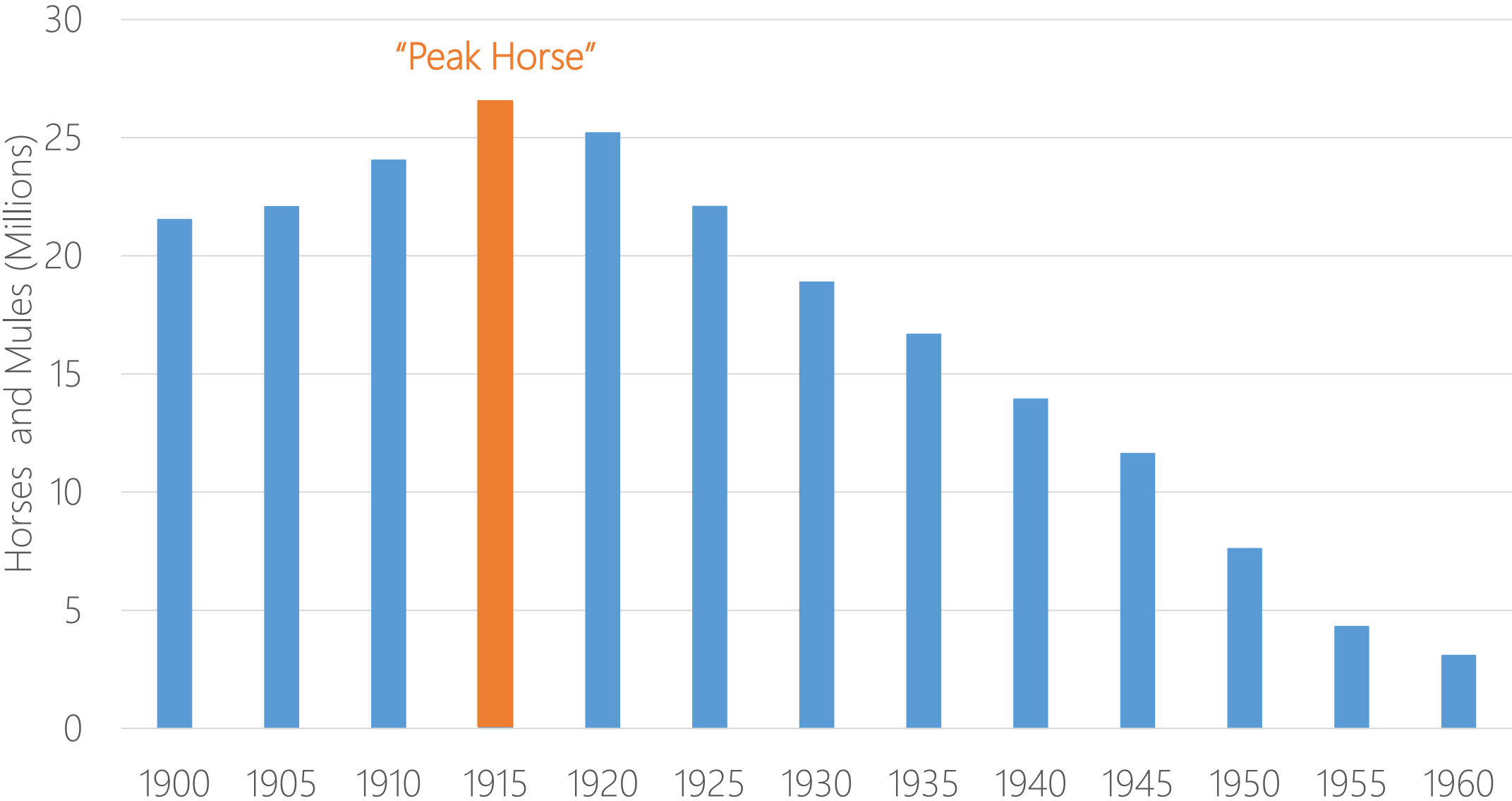


US Equine Population (1900 – 1960)



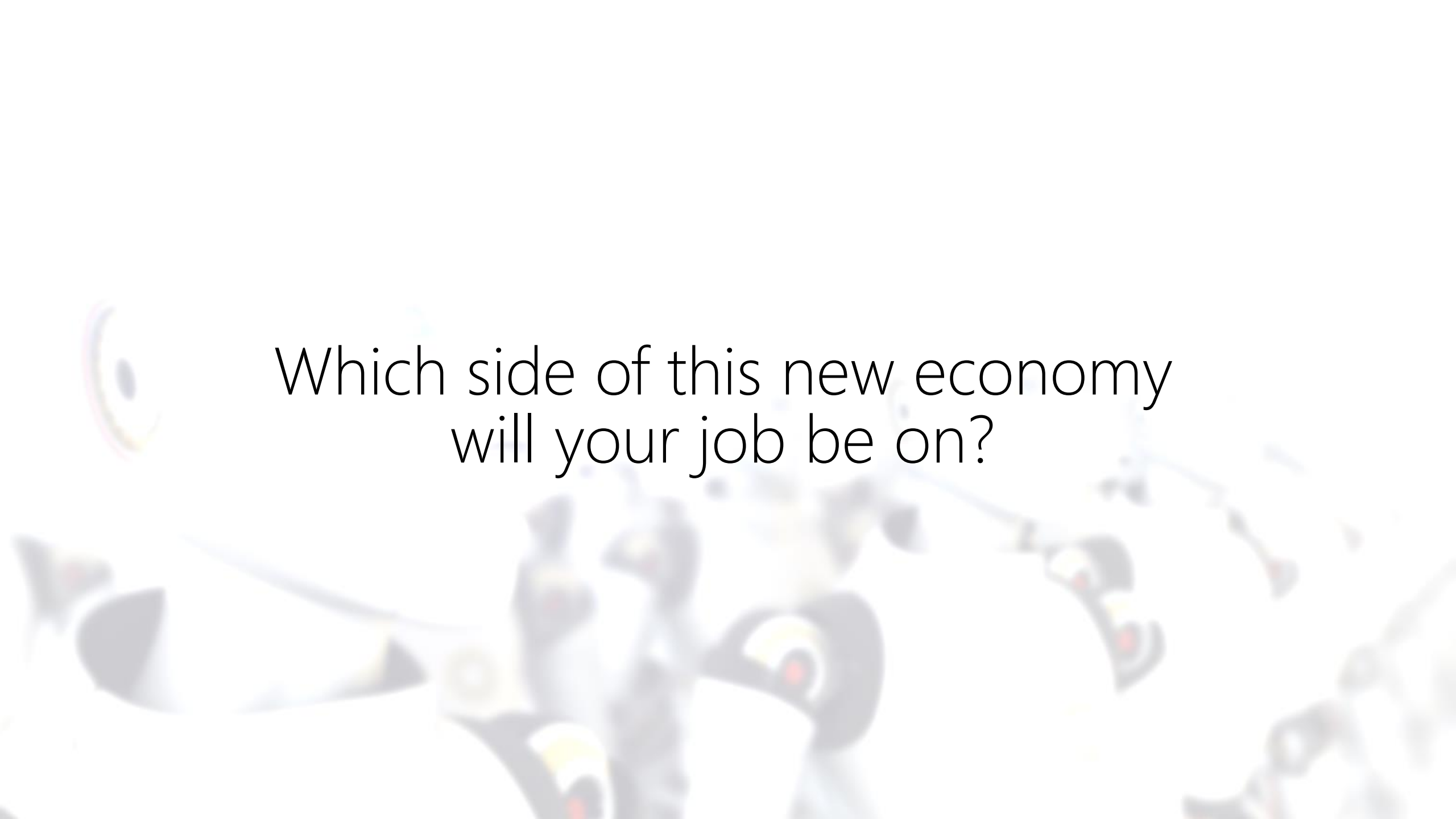
Source: The Demographics of the U.S. Equine Population

US Equine Population (1900 – 1960)



Source: The Demographics of the U.S. Equine Population





Which side of this new economy
will your job be on?



How should we allocate resources?

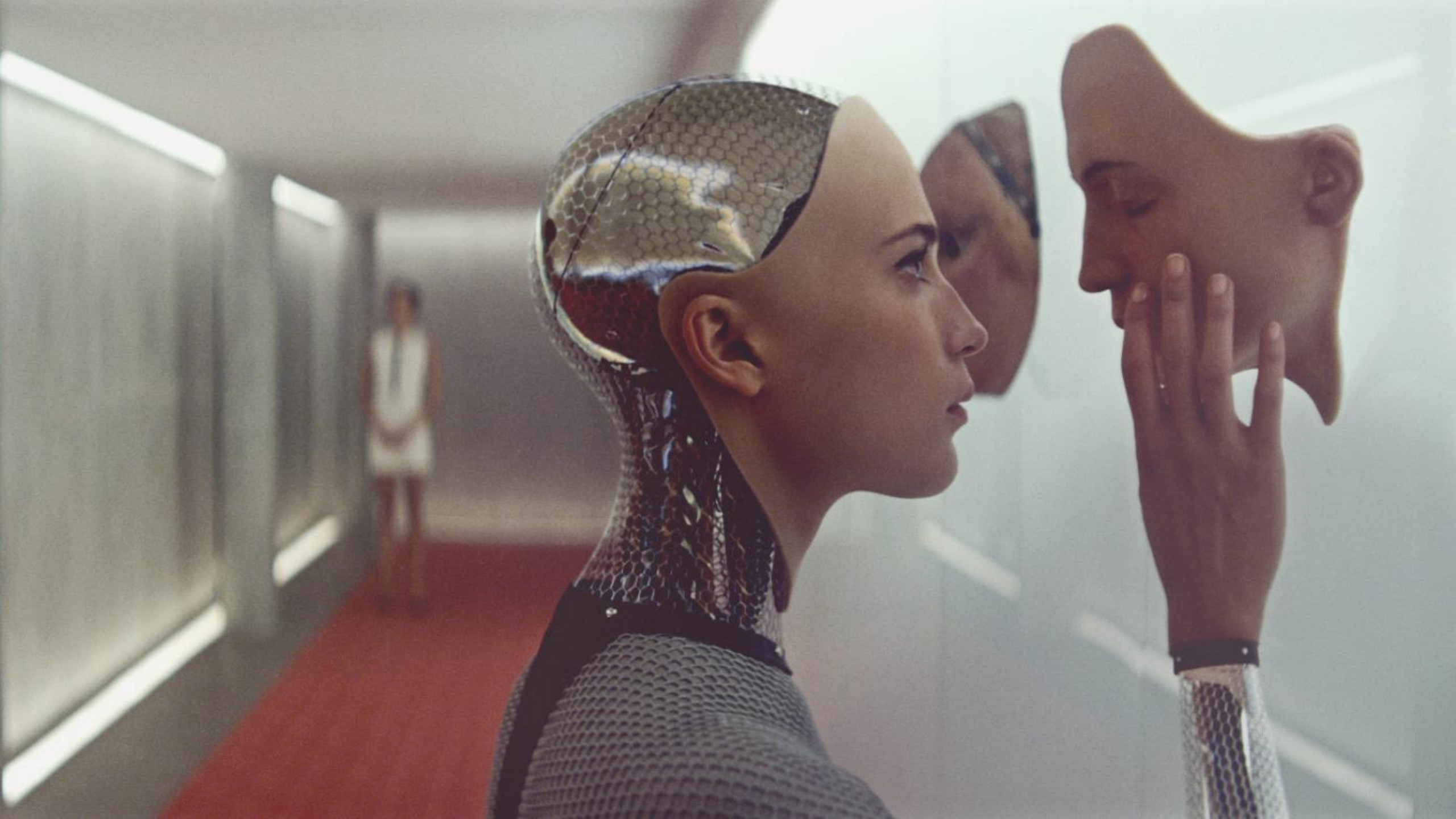
How should we allocate resources?

Should we tax robots?

How should we allocate resources?

Should we tax robots?

What rights should machines have?



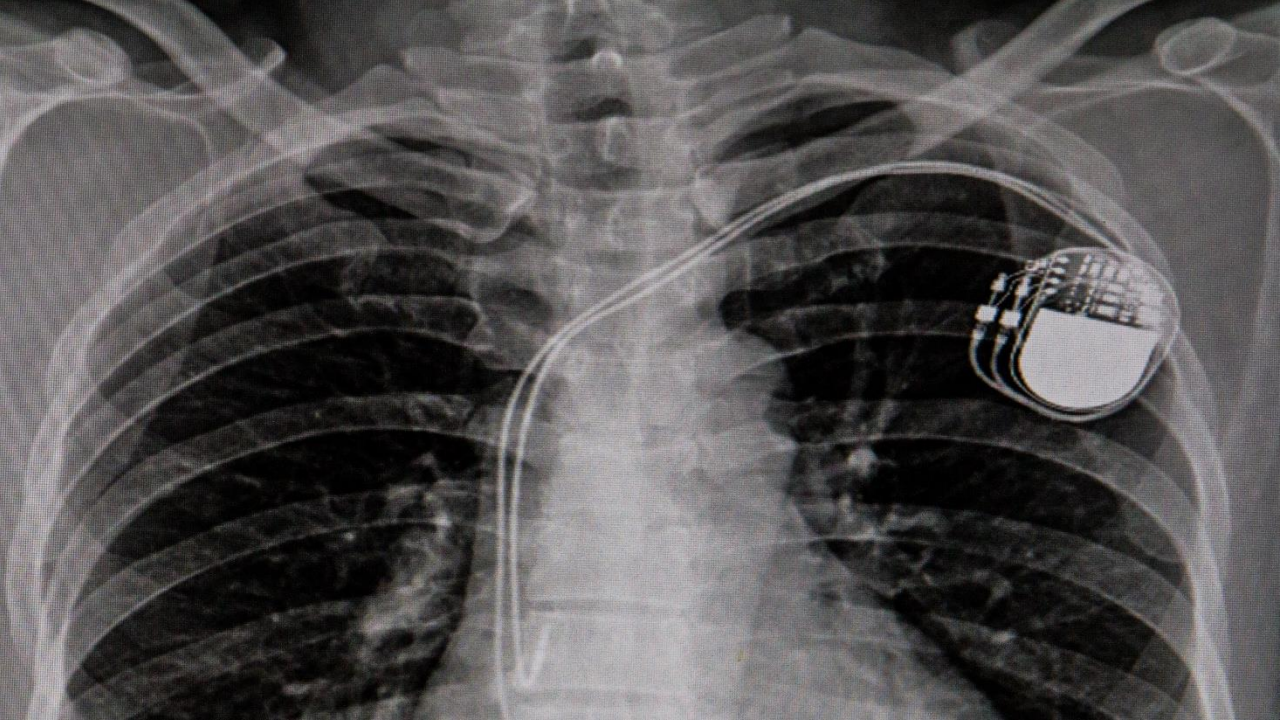


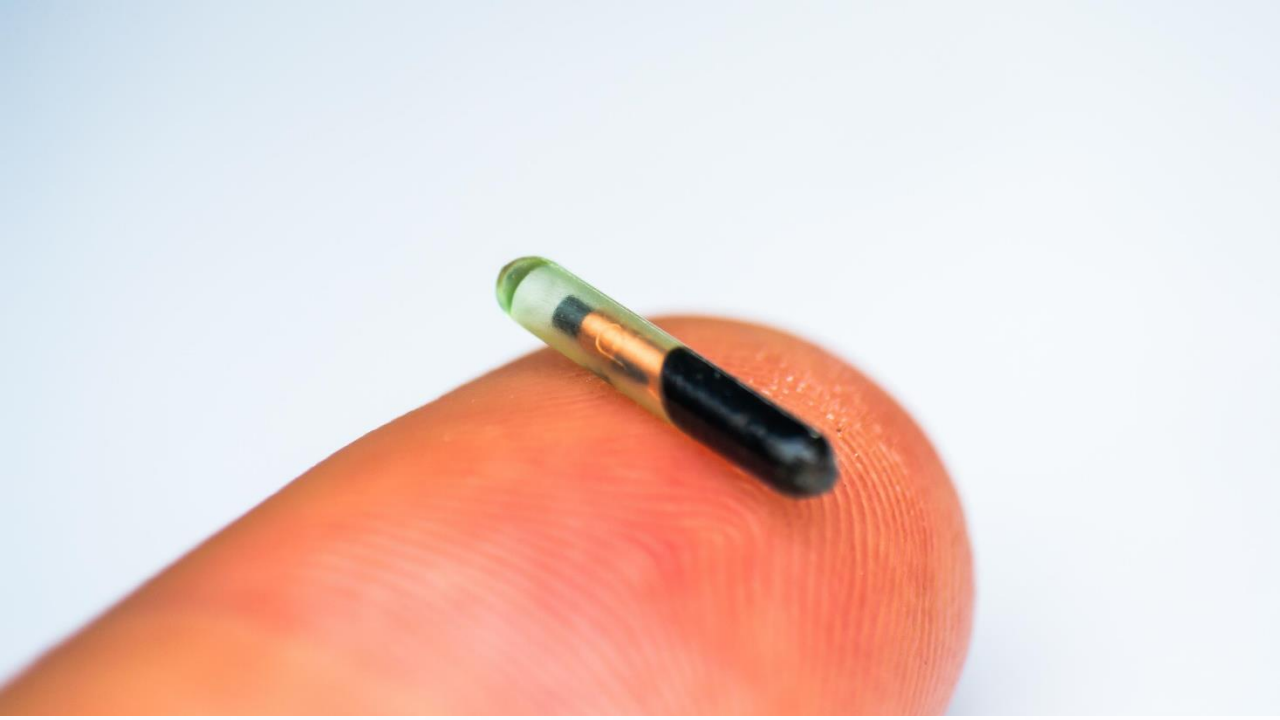
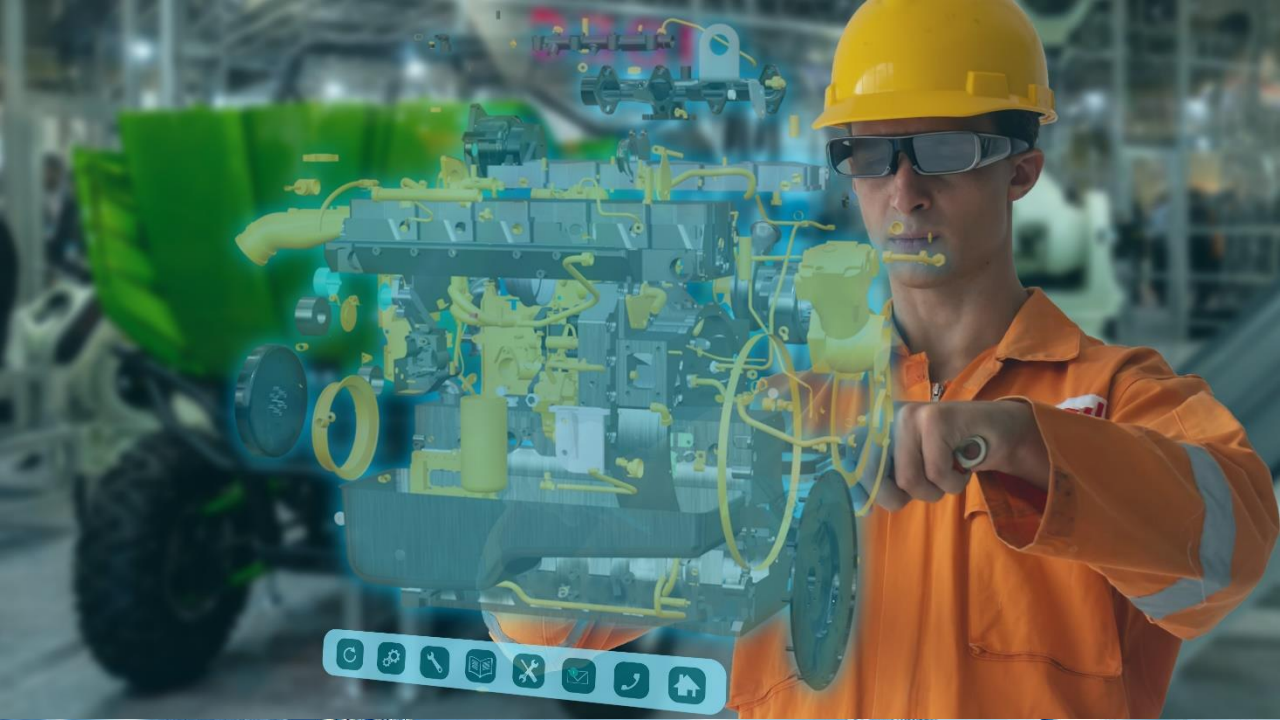
What is our purpose in a world where machines do all the work of value?



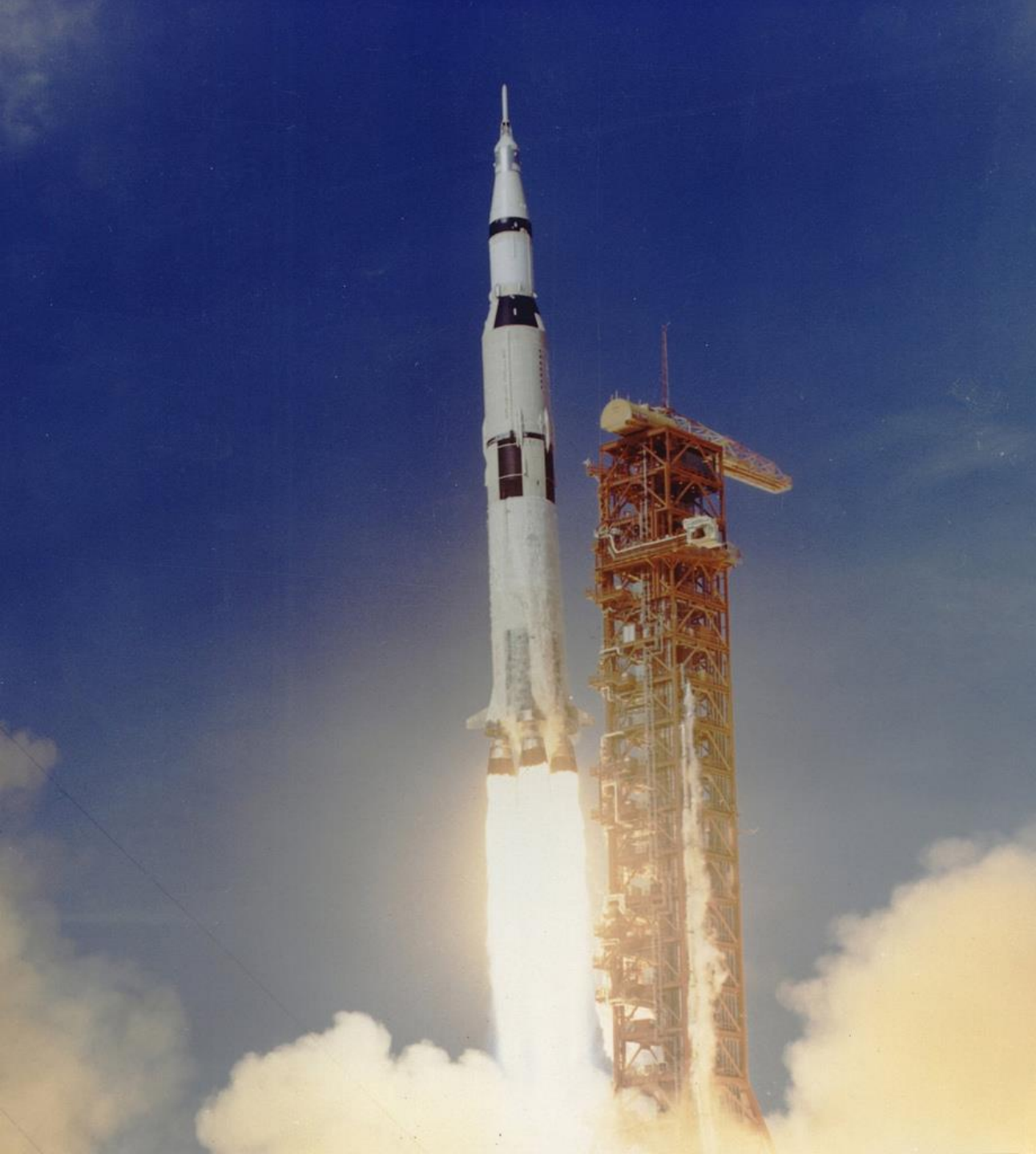


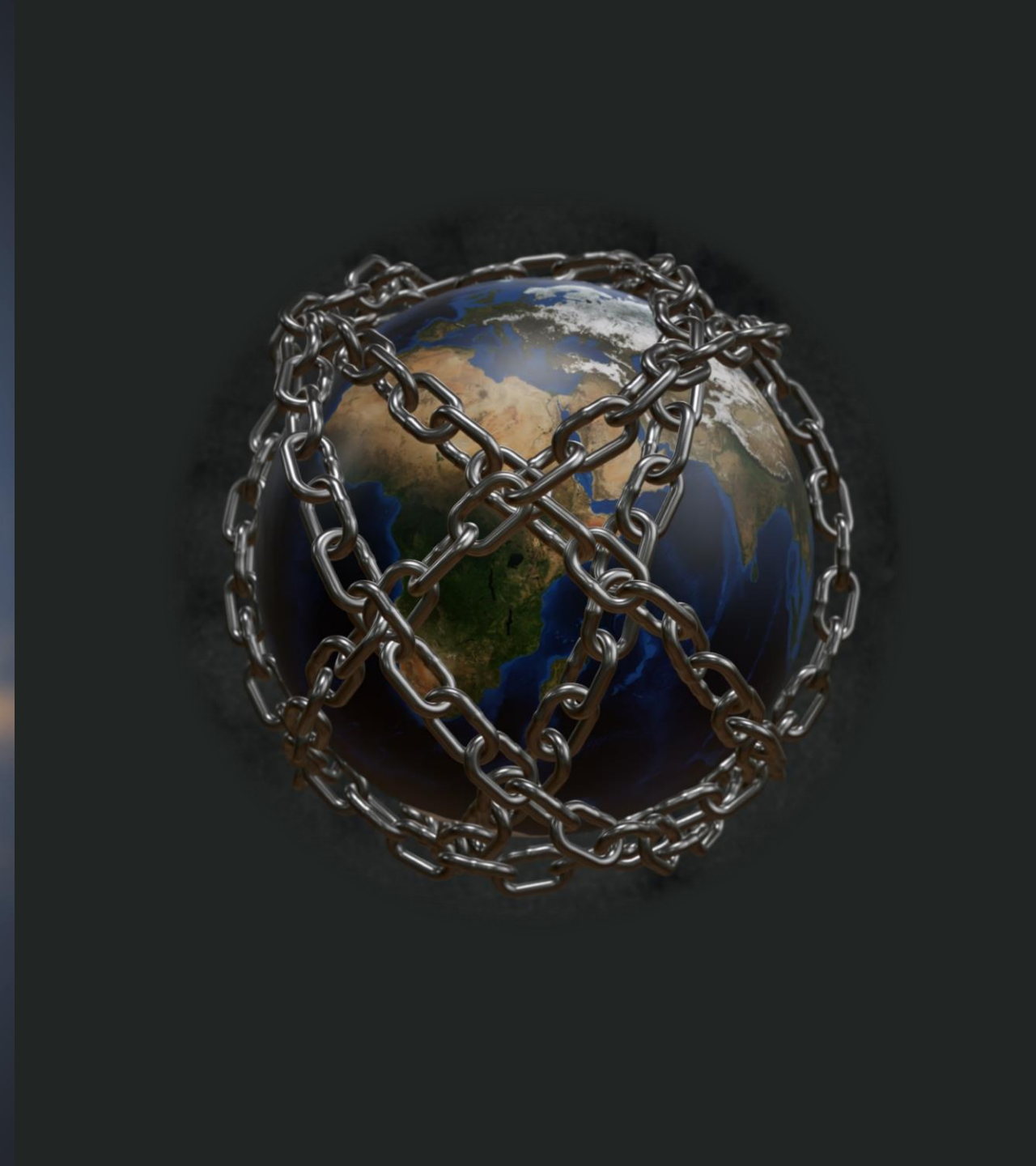












Conclusion



What AI is

Why AI is important

How will it affect you

Data Science Made Simple

[Learn More](#)

<https://matthewrenze.com>

Learn More

Artificial Intelligence: The Big Picture

The AI Developer's Toolkit

Deep Learning: The Big Picture

Data Science: The Big Picture

Data Science: Executive Briefing

Data Science with R



<https://matthewrenze.com/courses.html>



A white humanoid robot with a blue eye, looking thoughtful with its hand to its chin. The robot is semi-transparent, revealing internal mechanical parts. It has a yellow warning label on its chest with a triangle and exclamation mark, and the word "Caution" below it. The background is a bright, hazy sky with clouds.

Are you prepared?

Is your organization?

Is our world prepared?



Learn more at:
<https://matthewrenze.com>

