

Understanding Artificial Intelligence

Hosted by the CS-STEM community

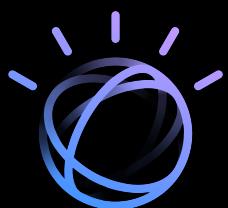


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[@jiportilla](https://github.com/jiportilla)
github.com/jiportilla/giveback



Why AI?

Why now?





Robo del siglo

<https://www.bbc.com/news/world-latin-america-28783027>

Entity Resolution

Solution at Degrees of Difficulty

<https://senzing.com>

Exactly
Same

Bob Jones
123455

Bob Jones
123455

Fuzzy

Bob Jones
123455

Robert T Jonnes
000123455

Incompatible
Features

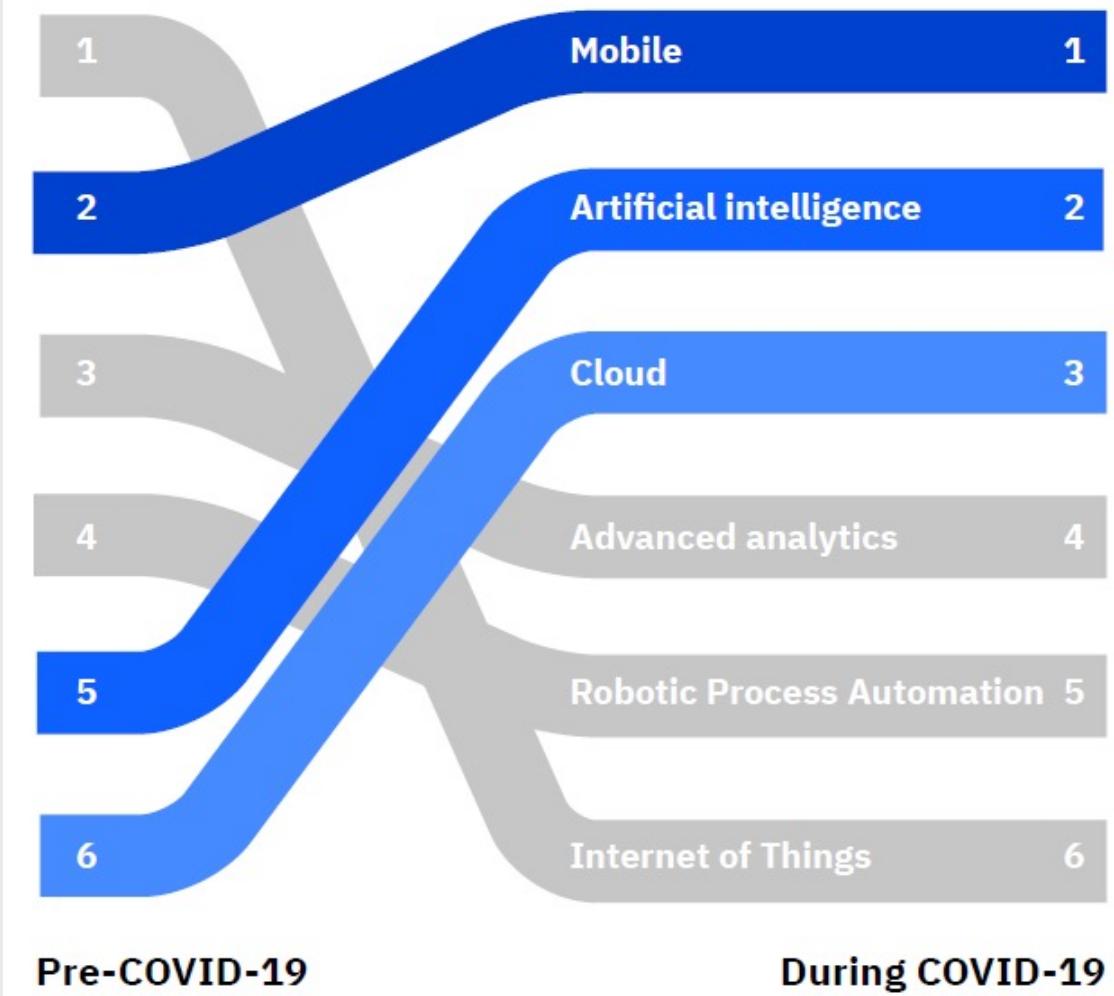
Bob Jones
123455

Companies turned to AI to address pandemic-exposed vulnerabilities

<https://www.ibm.com/thought-leadership/institute-business-value/report/digital-acceleration>

Across industries, the mix of critical technologies to performance contribution before and during COVID-19 has changed dramatically

Ranking of technologies according to revenue impact



Enterprises are struggling to capture the value of AI

Data

- Data resides in silos & is difficult to access
- Unstructured and external data isn't considered

Governance

- If the data isn't secure, self-service isn't a reality
- Understanding data lineage and getting to a system of truth is a challenge

Skills

- **Data Science skills** are in low supply and high demand
- **Nurturing new data professionals is challenging**

Tools & Infrastructure

- Need an environment that enables a “fail fast” approach
- Discrete tools present barriers to productivity

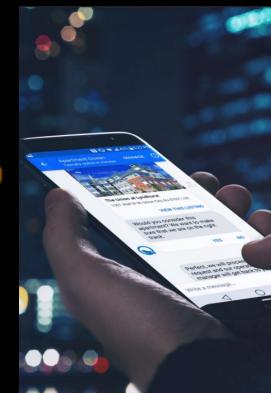
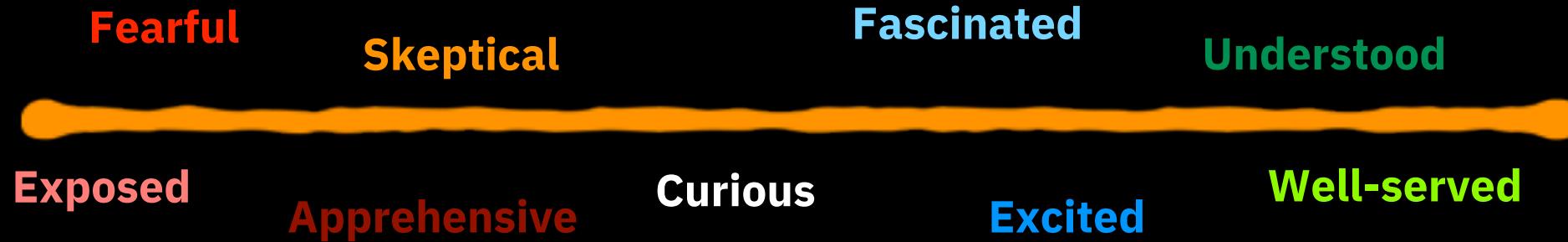
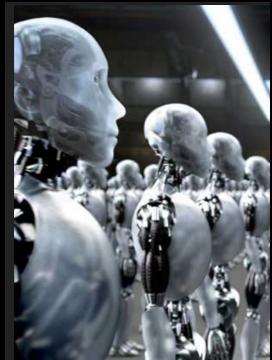
Agenda

1. Artificial Intelligence
2. Enterprise AI
3. Demo & Take-aways

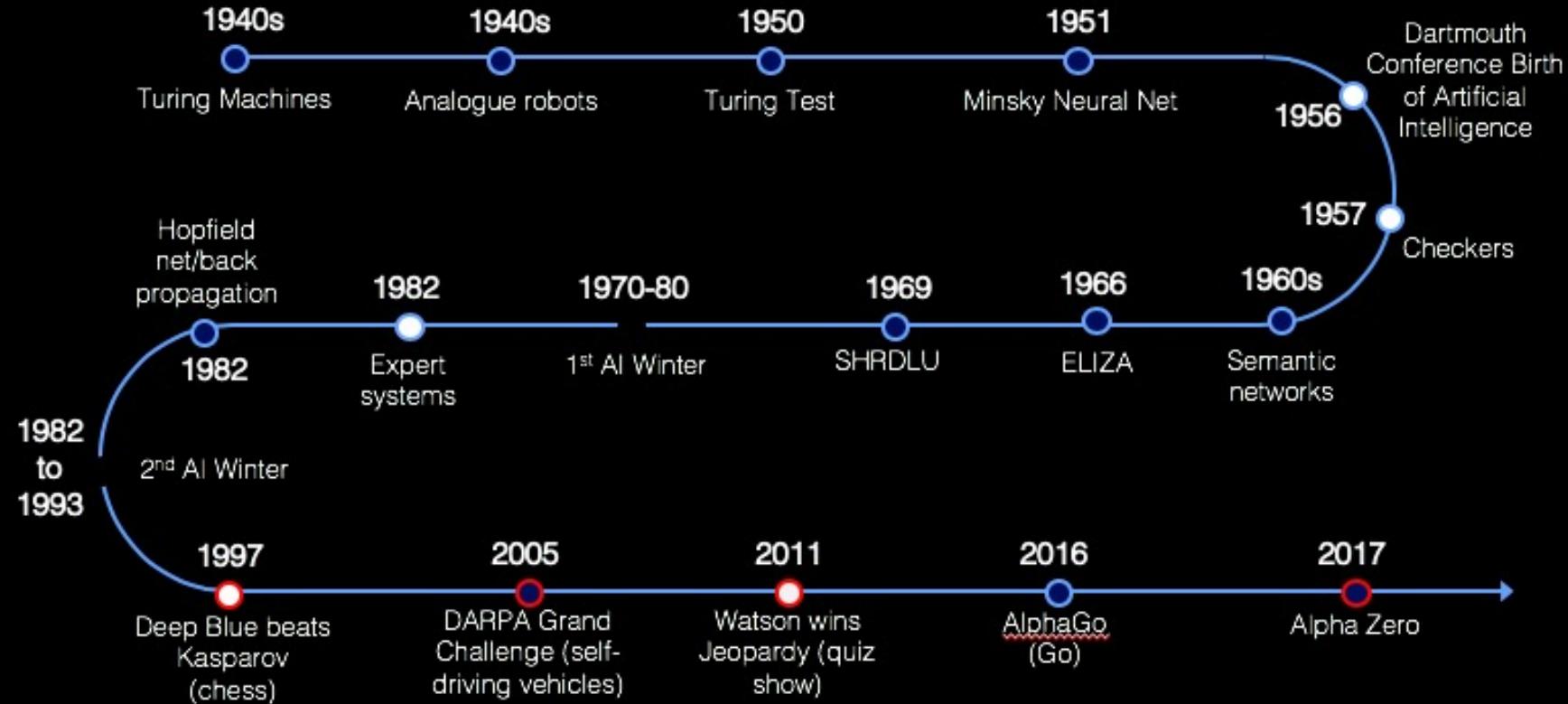


AI Perception

What do people feel about AI?



A brief history of AI



<https://www.youtube.com/watch?v=056v4OxKwlI&t=169s>

What is AI?

Artificial Intelligence | noun

An area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

What led to the prominence of AI?

Data explosion

Computing power

Deep learning algorithms

What is AI?

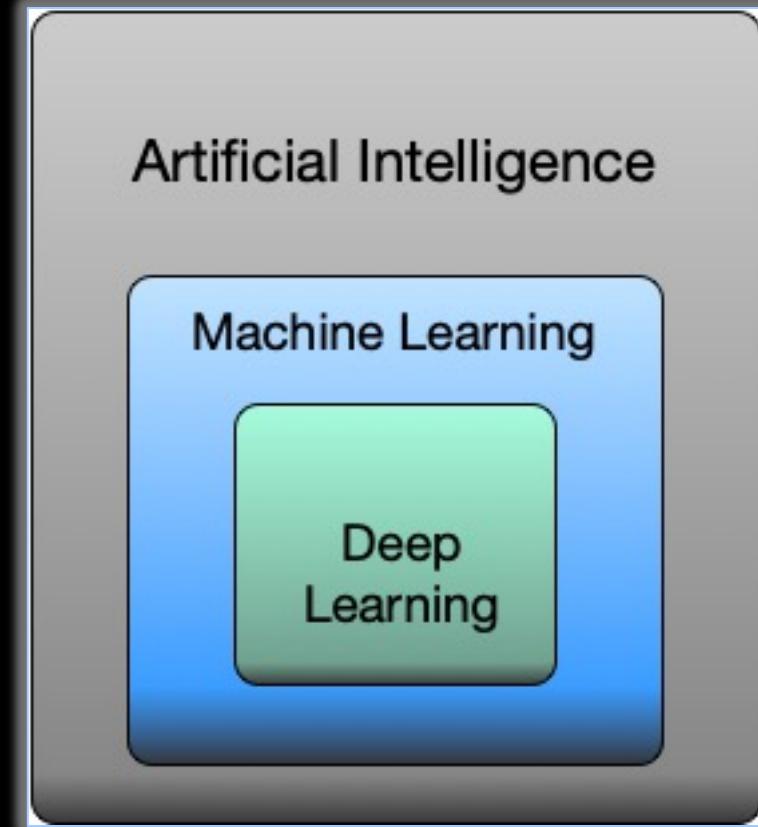
Artificial Intelligence | noun

An area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

Intelligence demonstrated
by machines

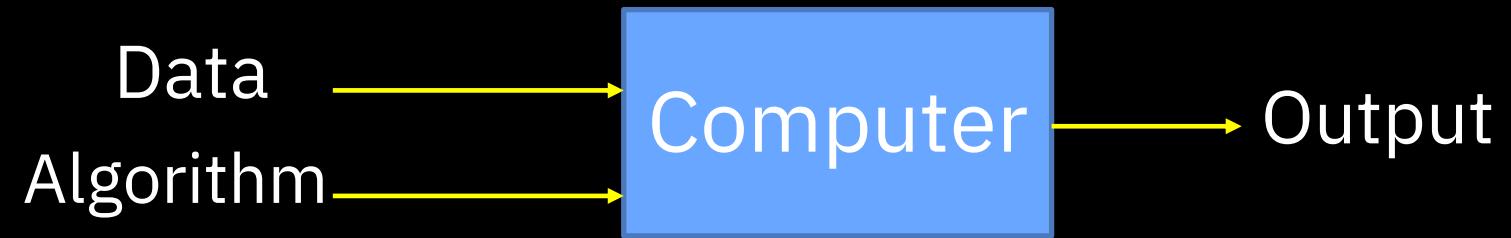
Definitions

- AI: Intelligence demonstrated by machines
- ML: Set of algorithms that allow computers to learn from (big) data
- DL: Set of learning techniques focused on models and neural networks

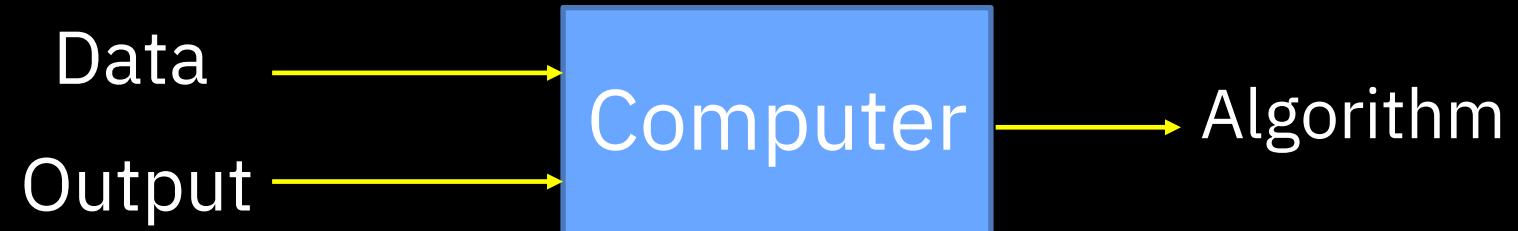


Why Machine Learning?

Traditional Programming



AI-Machine Learning



ML provides systems the ability to automatically learn from experience
(without being explicitly programmed)

AI is Everywhere

Everyone working with information technology is already relying on AI, and if not, will be soon.

AI is Everywhere

AUTOMATION



Automating actions, processes, and alerts

CONVERSATION



Understanding text and answering questions in natural language

OPTIMIZATION



Analyzing data for patterns and outliers and deriving insights

RECOMMENDING AND INSIGHTS



Understanding needs and recommending solutions

PERSONALIZING



Personalizing experiences

VISUAL RECOGNITION



Recognizing objects in images and videos

Where is AI going?

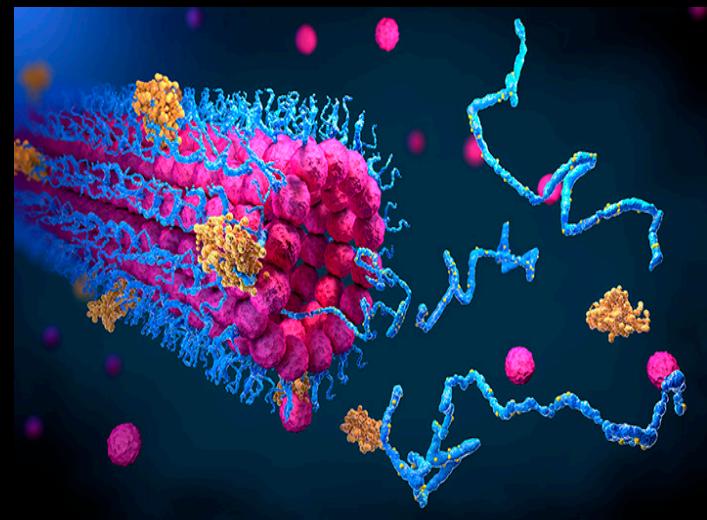
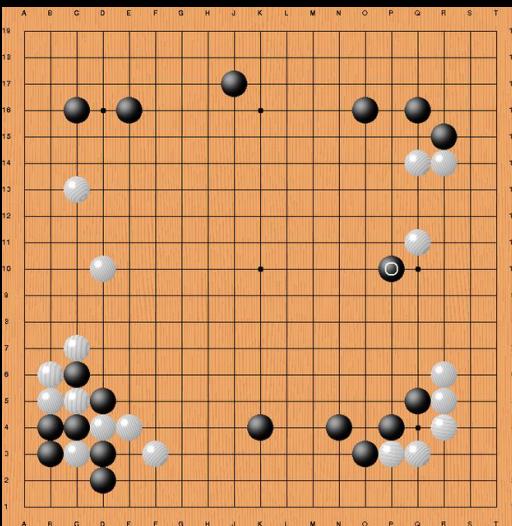
AI is reinventing the way we invent

The biggest impact of artificial intelligence will be to help humans make discoveries we couldn't make on our own.

AI is reinventing the way we invent

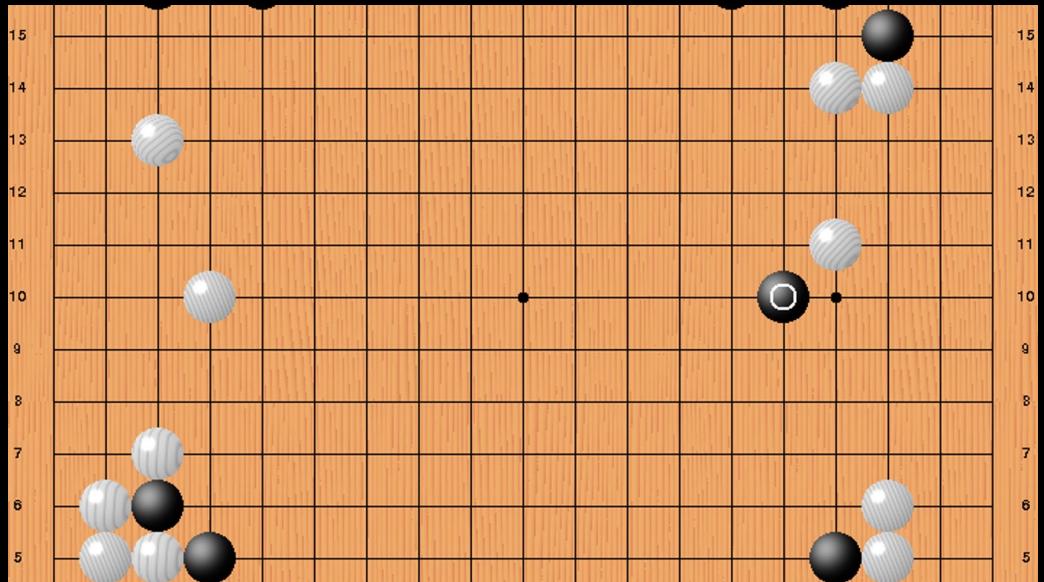


CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5
\$200	\$200	\$200	\$200	\$200
\$400	\$400	\$400	\$400	\$400
\$600	\$600	\$600	\$600	\$600
\$800	\$800	\$800	\$800	\$800



Move 37

In Game Two of AlphaGo versus Lee Sedol in March 2016, the machine made a move no human would ever think of doing.



Enterprise AI



The Evolution of AI

General AI
Revolutionary

Broad AI

Disruptive and
Pervasive

Narrow AI
Emerging

▼ We are
here

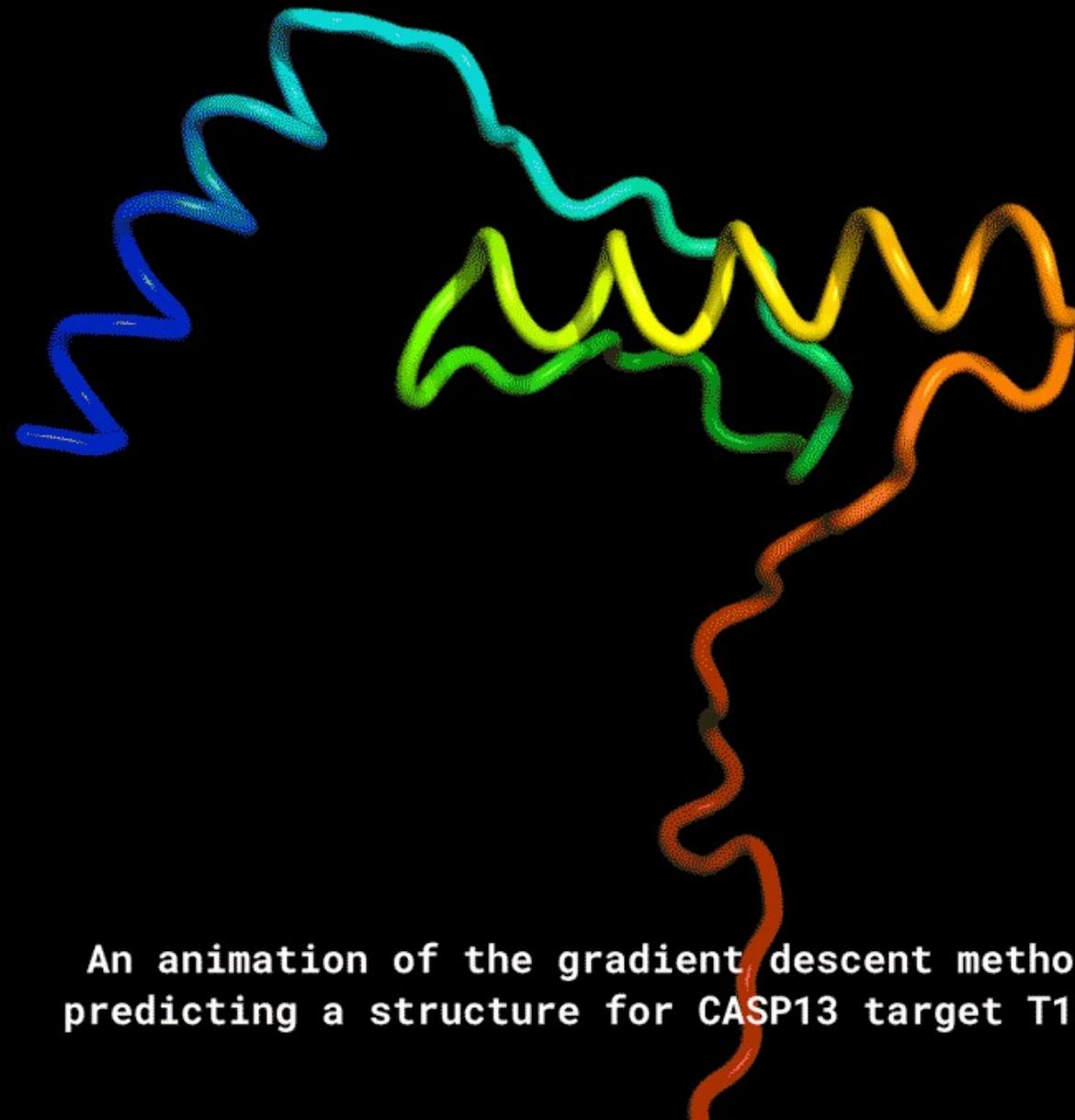
2050 and
beyond

Let's look at some interesting trends.

AlphaFold

https://deepmind.com/research/open-source/alphafold_casp13

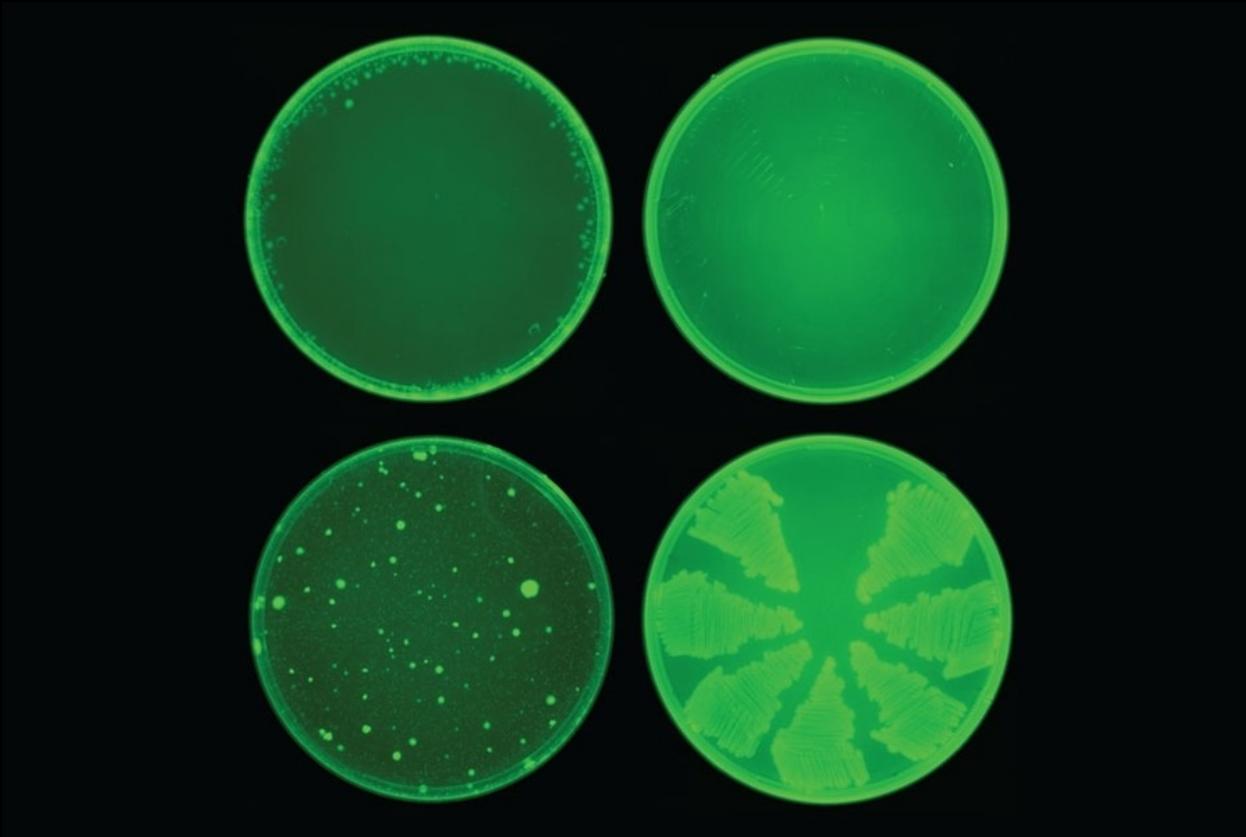
AlphaFold is an artificial intelligence program developed by Google's DeepMind which performs predictions of protein structure



An animation of the gradient descent method predicting a structure for CASP13 target T1008

AI yields new antibiotic

A deep-learning model identifies a powerful new drug that can kill many species of antibiotic-resistant bacteria



Future of AI Example (Semantic Analysis)

The Wining Shot

The soccer game was nearly over. The two teams were tied, one to one.

Alice kicked the ball. Oops! She kicked it the wrong way.

"What a bad kick," Alice thought.

But wait!. Her teammate John jumped to stop the ball. The ball went off John into the goal!.

Alice's team won the game. Hooray! It was not a bad kick, after all.

Who won the game?

Why?

Future of AI Example

The Wining Shot

The soccer game was nearly over. **The two teams were tied, one to one.**

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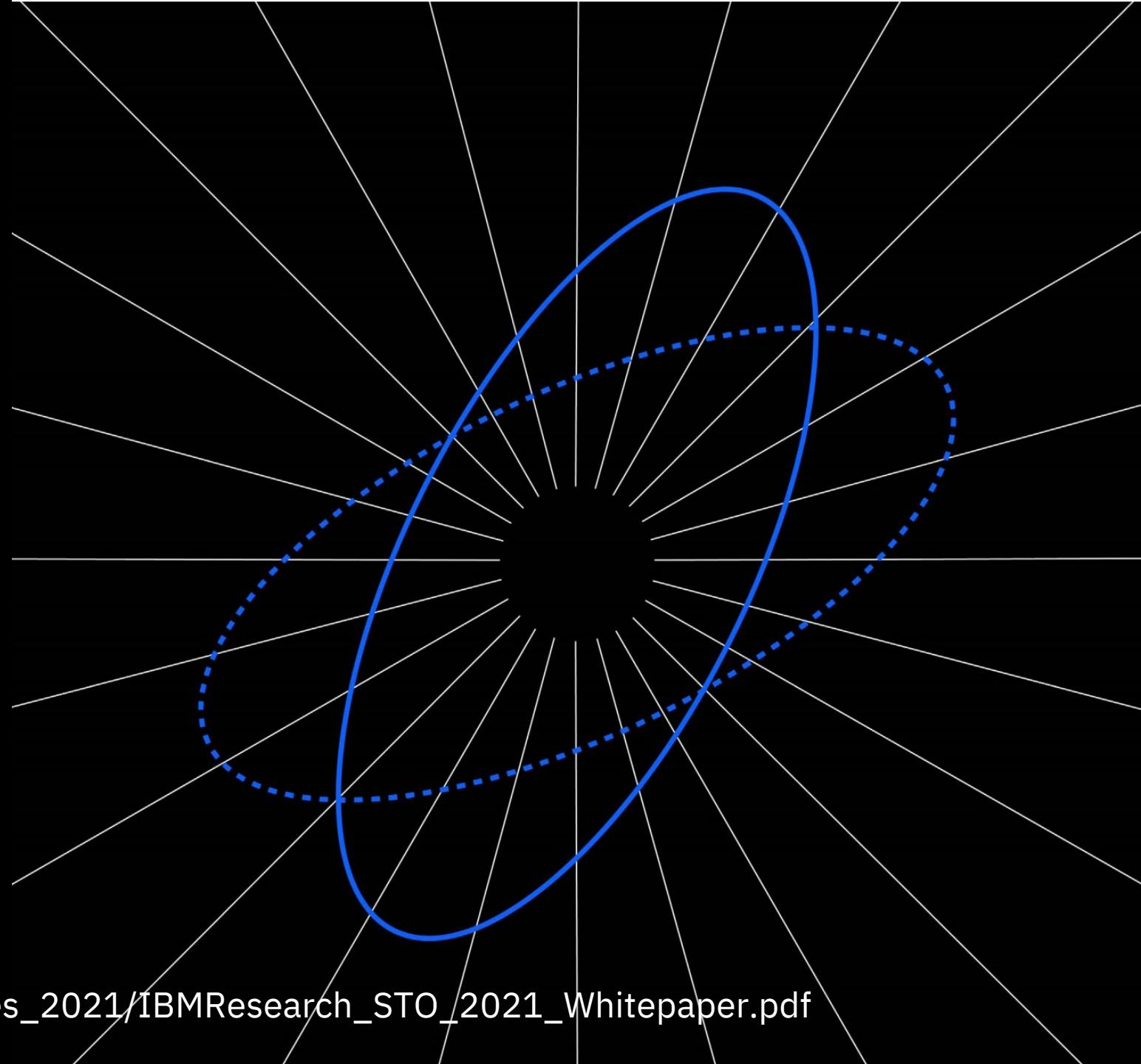
Who won the game?

Answer: Alice's team
✓ **Correct**

Explanation: Alice's team won the game because Alice's team had more points than the other team

✓ **Correct**

IBM Science &Technology Outlook 2021



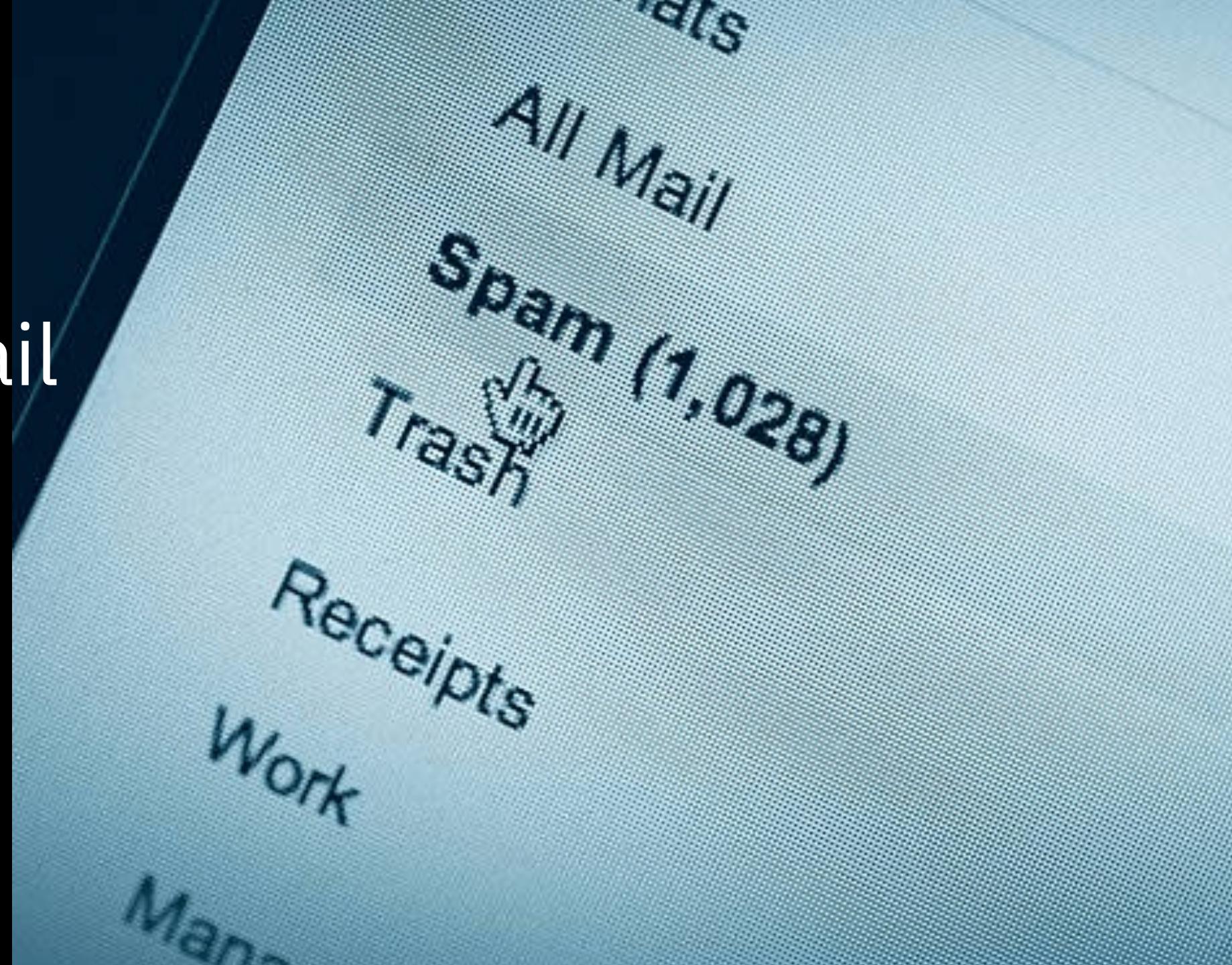
https://www.research.ibm.com/downloads/ces_2021/IBMResearch_STO_2021_Whitepaper.pdf

IBM AI Ethics

- 1.The purpose of AI is to augment human intelligence
- 2.Data and insights belong to their creator
- 3.AI systems must be transparent and explainable

Demo

SPAM Email Detection



Spam detector

 Mail thinks this message is Junk Mail. Move to Inbox

★ MARK ZUCKERBERG 

WINNING AMOUNT

Reply-To: MARK ZUCKERBERG

WINNING AMOUNT

My name is Mark Zuckerberg. A philanthropist the founder and CEO of the social-networking website Facebook, as well as one of the world's youngest billionaires and Chairman of the Mark Zuckerberg Charitable Foundation. One of the largest private foundations in the world. I believe strongly in 'giving while living' I had one idea that never changed in my mind - that you should use your wealth to help people and i have decided to secretly give { \$1,500,000.00 } to randomly selected individuals worldwide. On receipt of this email, you should count yourself as the lucky individual. Your email address was chosen online while searching at random. Kindly get back to me at your earliest convenience, so I know your email address is valid. (mzuckerberg2444@gmail.com) Email me Visit the web page to know more about me: https://en.wikipedia.org/wiki/Mark_Zuckerberg or you can google me (Mark Zuckerberg)

Regards,
MARK ZUCKERBERG

Spam detector

 Mail thinks this message is Junk Mail. Move to Inbox

★ MARK ZUCKERBERG
WINNING AMOUNT

Reply-To: MARK ZUCKERBERG

WINNING AMOUNT

My name is Mark Zuckerberg,A philanthropist the founder and CEO of the social-networking website Facebook,as well as one of the world's youngest billionaires and Chairman of the Mark Zuckerberg Charitable Foundation, One of the largest private foundations in the world. I believe strongly in'giving while living' I had one idea that never changed in my mind - that you should use your wealth to help people and i have decided to secretly give {\$1,500,000.00} to randomly selected individuals worldwide. On receipt of this email, you should count yourself as the lucky individual. Your email address was chosen online while searching at random.Kindly get back to me at your earliest convenience,so I know your email address is valid.(mzuckerberg2444@gmail.com) Email me Visit the web page to know more about me: https://en.wikipedia.org/wiki/Mark_Zuckerberg or you can google me (Mark Zuckerberg)

Regards,
MARK ZUCKERBERG

Email Length: 250 characters

Email punctuation: 6

AutoAI in Watson Studio

IBM Cloud Pak for Data All Search Upgrade ⌂

Projects / Demo-2021 ↑ ⊕ Launch IDE Add to project +

Overview Assets Environments Jobs Access Control Settings

Q What assets are you looking for?

- > Data assets
- > AutoAI experiments New AutoAI experiment +
- > Notebooks New Notebook +
- > Deep learning experiments New Deep learning experiment +
- > Models

AutoAI in Watson Studio

Projects / Demo-2021 / Spam demo



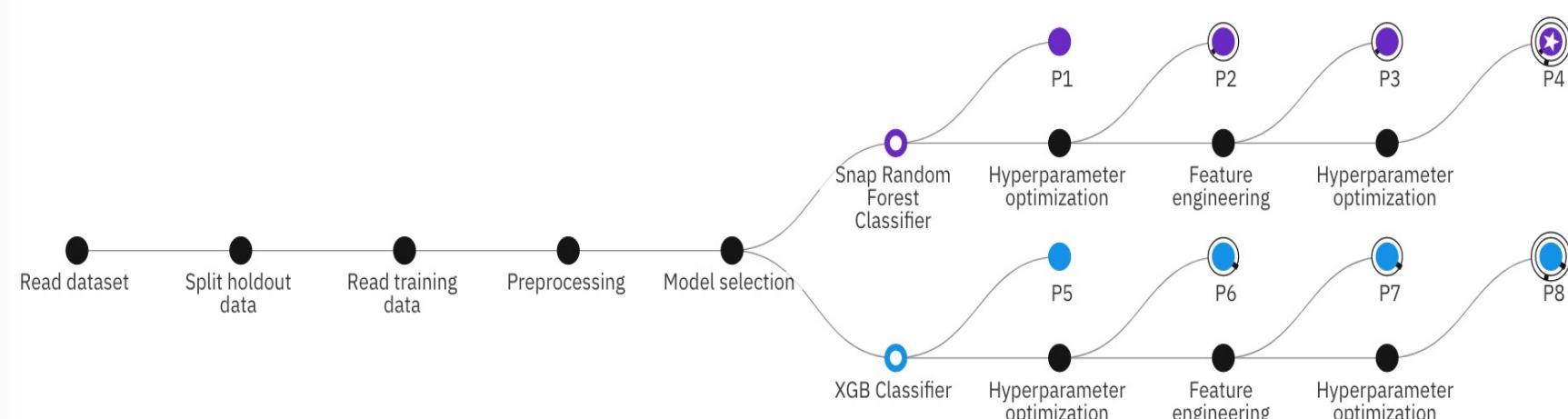
Experiment summary

Pipeline comparison

★ Rank by: Accuracy (Optimized) | Cross validation score

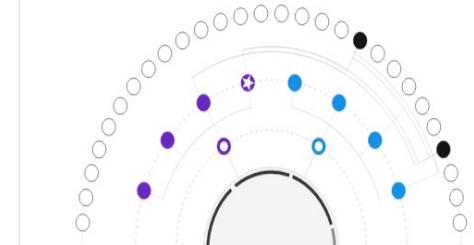
Progress map ⓘ

Prediction column: label



Relationship map

Swap view ↔



Experiment completed ✓

8 PIPELINES GENERATED

8 pipelines generated from algorithms. See pipeline leaderboard below for more detail.

Time elapsed: 3 minutes

View log

Save code

AutoAI in Watson Studio

Spam or Ham Demo Deployment ✓ Deployed Online

API reference Test

Enter input data

length
Integer

punct
Integer

Input list (1)

[150, 5]

Add to list +

Predict (1)

Result

```
0 {  
1   "predictions": [  
2     {  
3       "fields": [  
4         "prediction",  
5         "probability"  
6       ],  
7       "values": [  
8         [  
9           "spam",  
10          [  
11            0.3846211433410644  
12            0.6153788566589355  
13          ]  
14        ]  
15      ]  
16    ]  
17  }  
18}  
19
```

Take-aways AI lecture

Citizen AI

Develop critical thinking skills, have your voice heard

Big Data Advantage

When giving away your personal data, choose wisely

Intelligent Automation

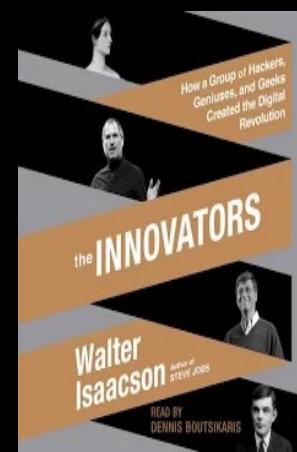
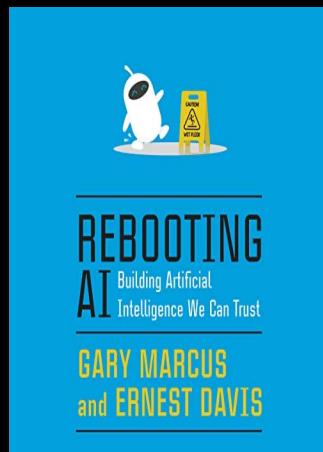
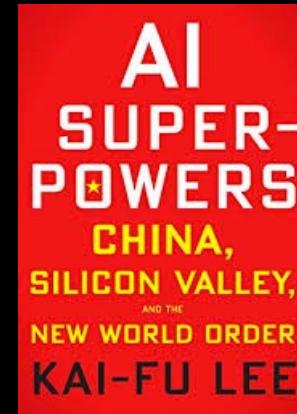
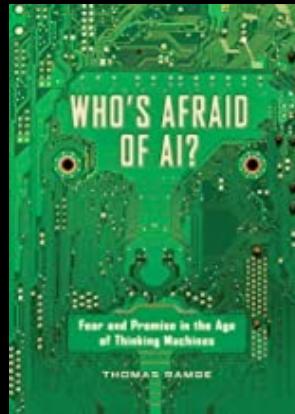
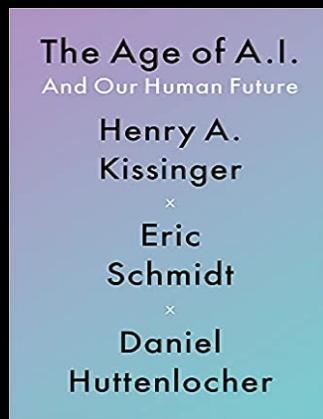
Educate yourself on AI, thrive in your profession

Q & A

Ivan Portilla

ivanp@us.ibm.com

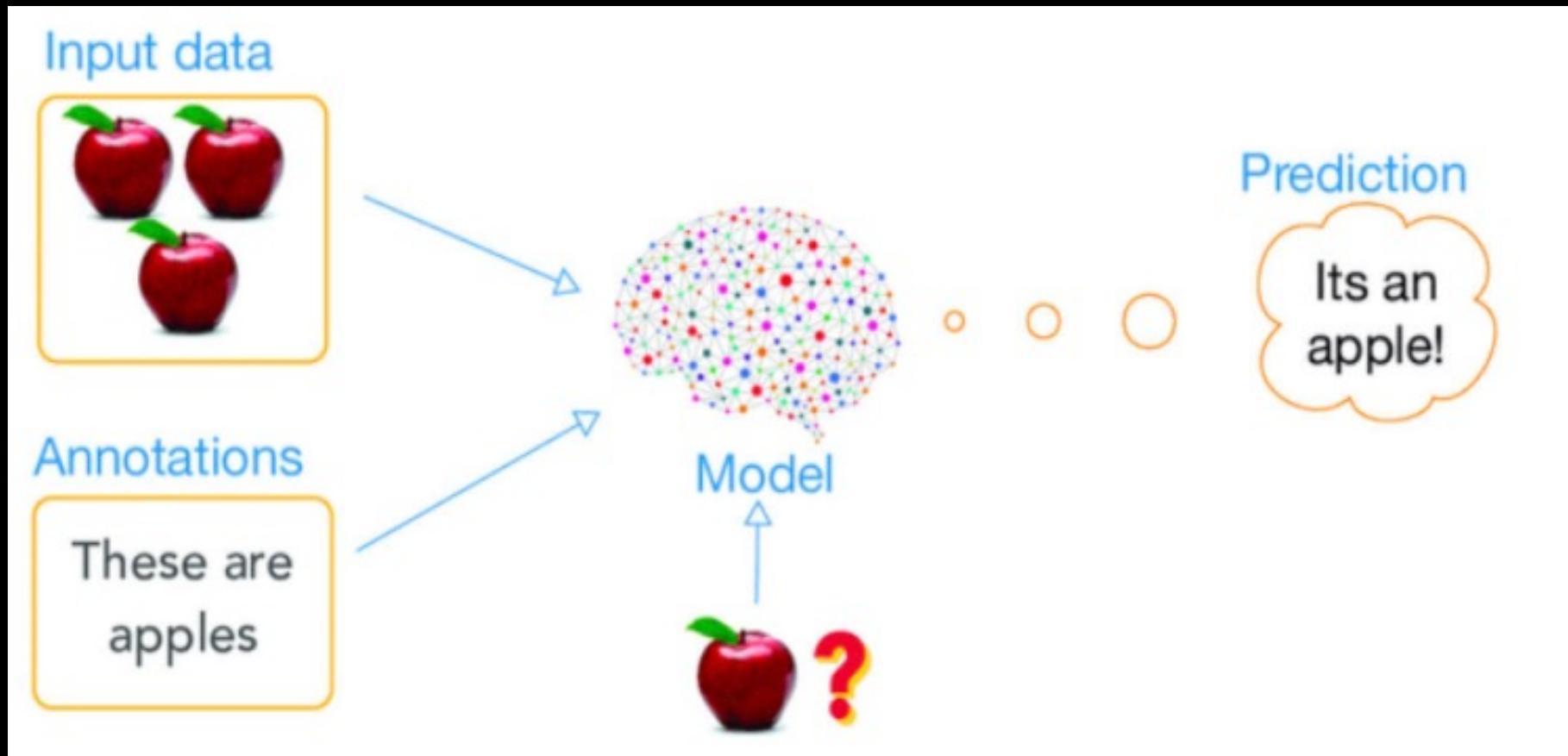
@iportilla



<https://www.ibm.com/thought-leadership/institute-business-value/technology/ai-cognitive>

Backup

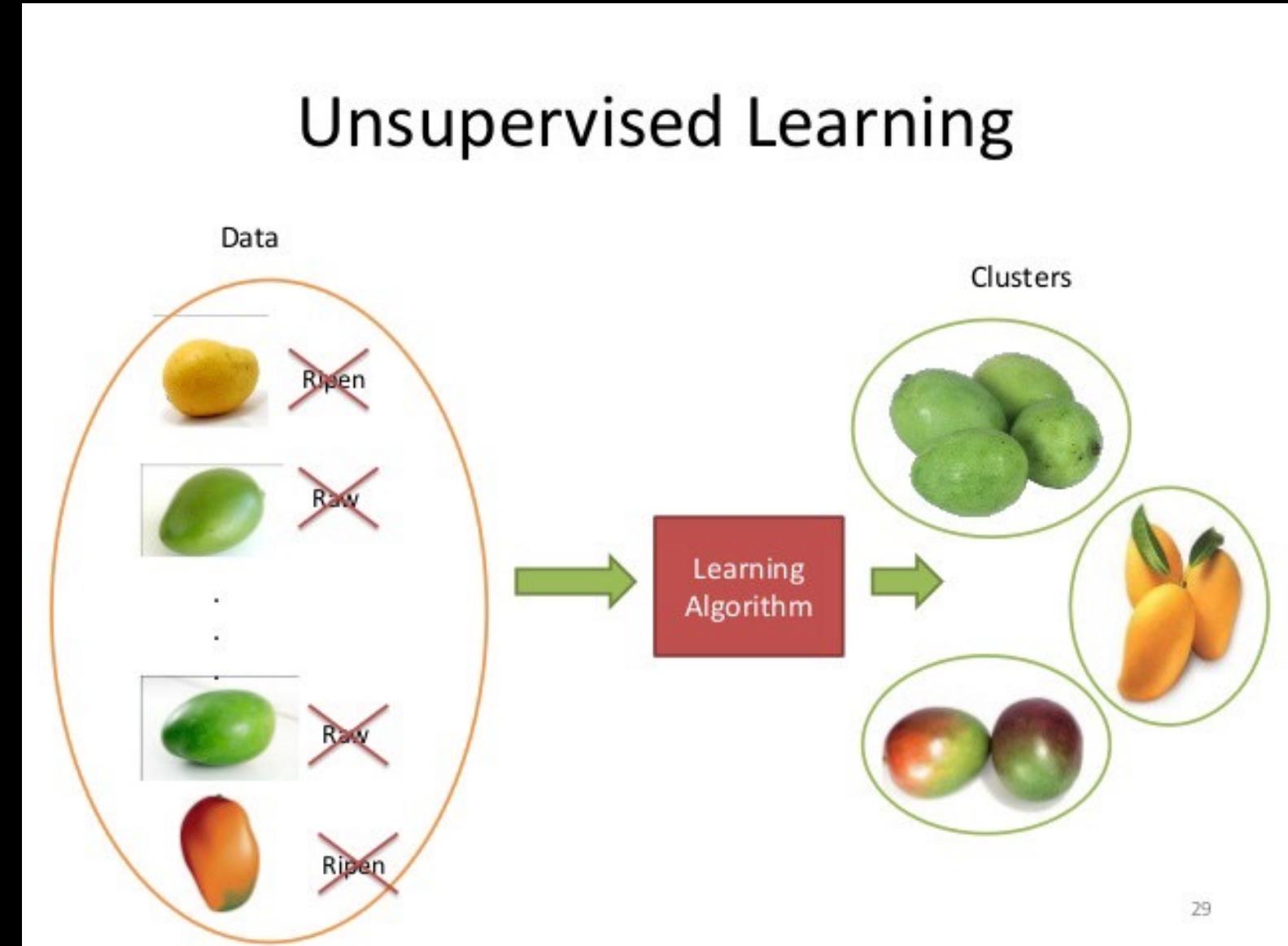
Supervised Machine Learning



Supervised machine learning algorithms can apply what has been learned in the past to **new data** using **labeled** examples to **predict** future events

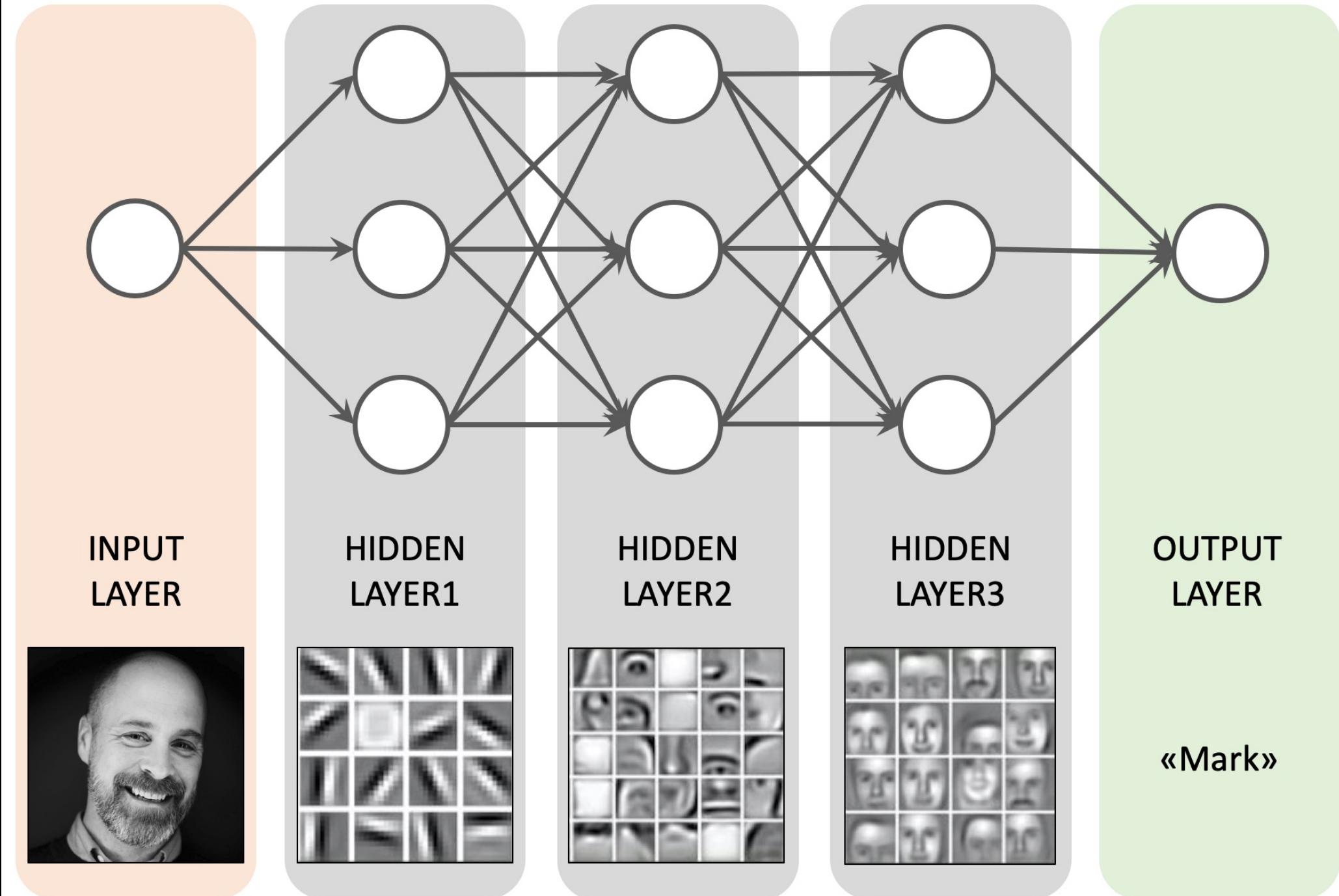
Unsupervised learning

A type of machine **learning** that uses data with no pre-existing **labels**, for the purpose of searching for **undetected** patterns.



Deep learning

A subset of **machine learning** where artificial **neural networks**, algorithms inspired by the human brain, **learn** from large amounts of data



Closing Thoughts

IBM's Principles for Trust and Transparency

<https://www.ibm.com/downloads/cas/J45XZOAR>

