

Understanding Big Data & Artificial Intelligence

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Agenda

1. Understanding Big Data
2. Artificial Intelligence & Big Data
3. Demo & Closing Thoughts

Understanding Big Data



Term	Factor	# RAMACs	# IPODs
1 Giga (GB)	10^9	200	
1 Tera (TB)	10^{12}	200K	200
1 Peta (PB)	10^{15}	200M	200K
1 Exa (EB)	10^{18}		200M
1 Zetta (ZB)	10^{21}		
?	10^{24}		
?	10^{100}		



“Every day, we create 2.5 quintillion bytes of data”



Estimates are that less than 0.5% of data is ever analyzed!

A DAY IN DATA

The exponential growth of data is undisputed, but the numbers behind this explosion – fuelled by internet of things and the use of connected devices – are hard to comprehend, particularly when looked at in the context of one day

 
500m

tweets are sent
every day

Twitter

294bn

billion emails are sent

Radicati Group

320bn

emails to be sent
each day by 2021

306bn

emails to be sent
each day by 2020


3.9bn
people use emails



4PB

of data created by
Facebook, including

350m photos

100m hours of video
watch time

Facebook Research



4TB

of data produced by a connected car

Intel

ACCUMULATED DIGITAL UNIVERSE OF DATA

4.4ZB

44ZB

DEMYSTIFYING DATA UNITS

From the more familiar 'bit' or 'megabyte', larger units of measurement are more frequently being used to explain the masses of data

Unit	Value	Size
b bit	0 or 1	1/8 of a byte
B byte	8 bits	1 byte
KB kilobyte	1,000 bytes	1,000 bytes
MB megabyte	1,000 ² bytes	1,000,000 bytes
GB gigabyte	1,000 ³ bytes	1,000,000,000 bytes
TB terabyte	1,000 ⁴ bytes	1,000,000,000,000 bytes
PB petabyte	1,000 ⁵ bytes	1,000,000,000,000,000 bytes
EB exabyte	1,000 ⁶ bytes	1,000,000,000,000,000,000 bytes
ZB zettabyte	1,000 ⁷ bytes	1,000,000,000,000,000,000,000 bytes
YB yottabyte	1,000 ⁸ bytes	1,000,000,000,000,000,000,000,000 bytes

*A lowercase "b" is used as an abbreviation for bits, while an uppercase "B" represents bytes.

65bn

messages sent over WhatsApp and
two billion minutes of voice and
video calls made

Facebook



463EB

of data will be created every day by 2025

IDC

95m

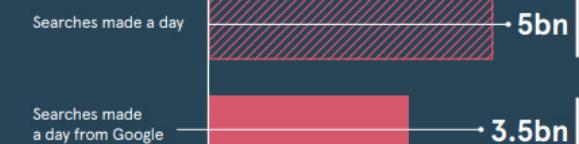
photos and videos are
shared on Instagram

Instagram Business

28PB

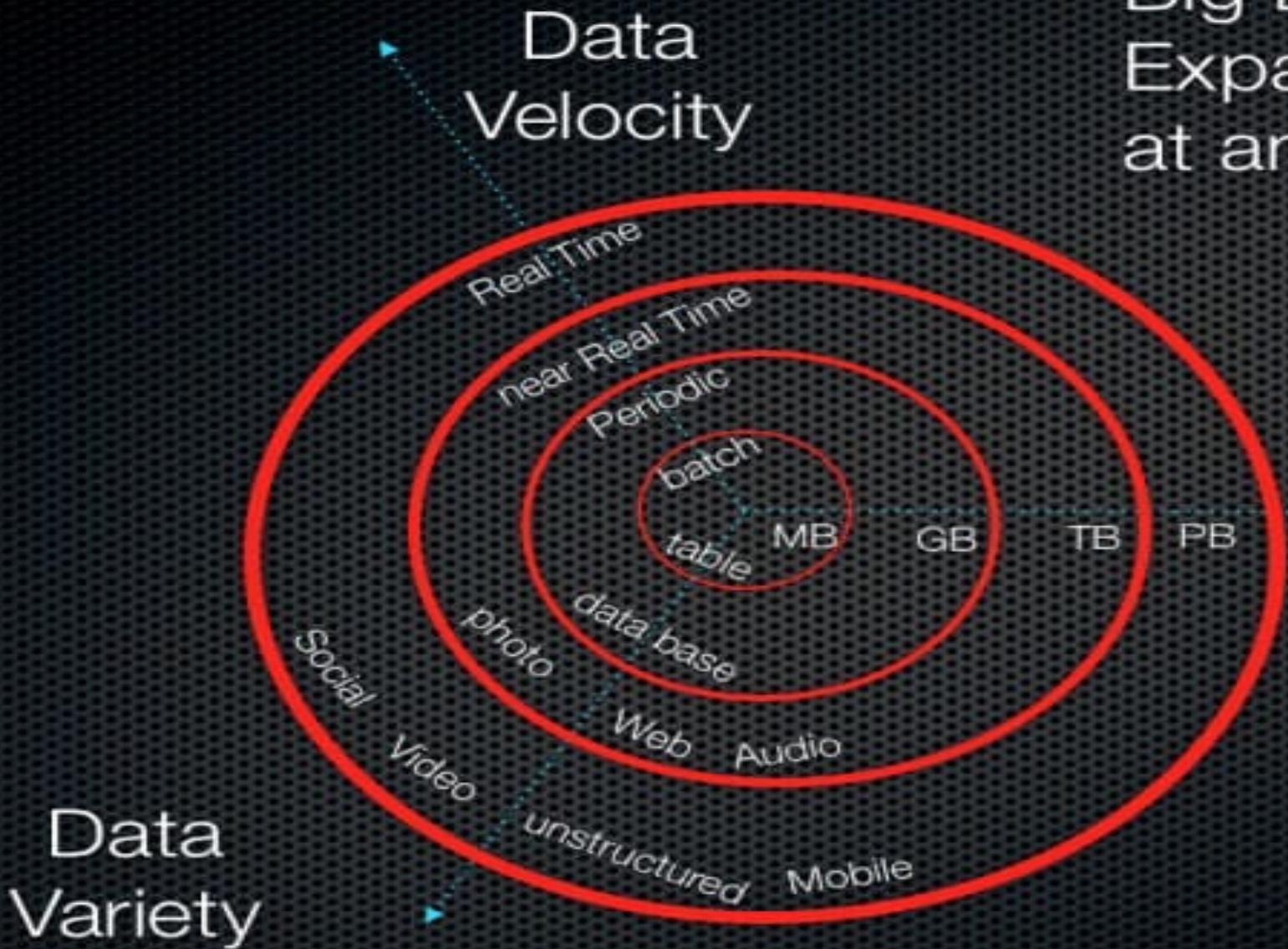
to be generated from wearable
devices by 2020

Statista



Smart Insights





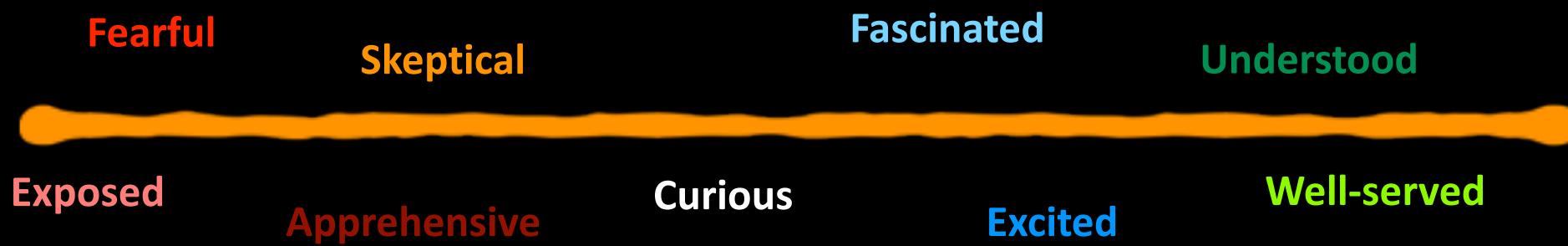
Big Data:
Expanding on 3 fronts
at an increasing rate.

Agenda

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AI Perception

What do people feel about AI?



What is AI?

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?

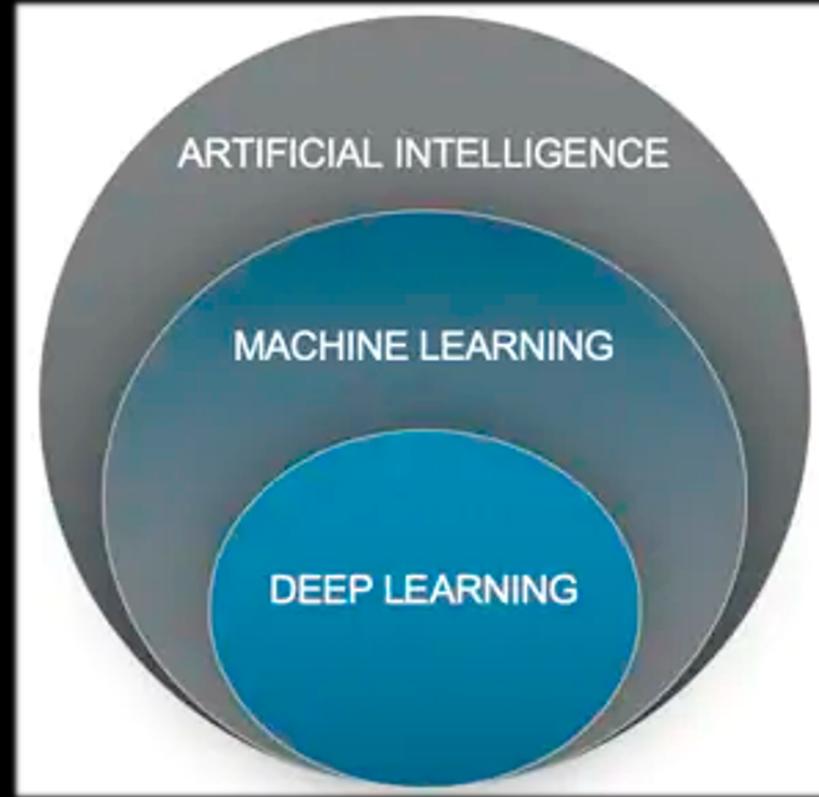
Artificial Intelligence | noun

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 AI,Machine Learning?

Traditional Programming



AI-Machine Learning



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

Intelligence demonstrated
by FRCC Students

PB & J Recipe

Exercise: how to make a Peanut Butter & Jelly sandwich?

Program how to make a Peanut Butter & Jelly sandwich

1. Get ingredients (PB, Jelly, Bread)
2. Get cooking utensils (plate, knives)
3. Get two slices of bread
4. Open PB, Jelly jars
5. With a knife spread 2 Tablespoons of peanut butter on one piece of bread
6. With a different knife, spread 2 Tablespoons of jelly on the other slice of bread
7. Put the slices together
8. Toddler adaptation: cut off crusts before serving.
9. Place on plate & serve



How is AI being used today?

AI is Everywhere

AUTOMATION

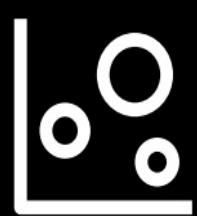
CONVERSATION

OPTIMIZATION

RECOMMENDING
AND INSIGHTS

PERSONALIZING

VISUAL RECOGNITION



Automating actions, processes, and alerts

Understanding text and answering questions in natural language

Analyzing data for patterns and outliers and deriving insights

Understanding needs and recommending solutions

Personalizing experiences

Recognizing objects in images and videos

A large, abstract graphic on the right side of the slide features a sphere composed of numerous small, glowing purple and blue dots. The dots are densely packed along the equator and become more sparse towards the poles, creating a sense of depth and curvature.

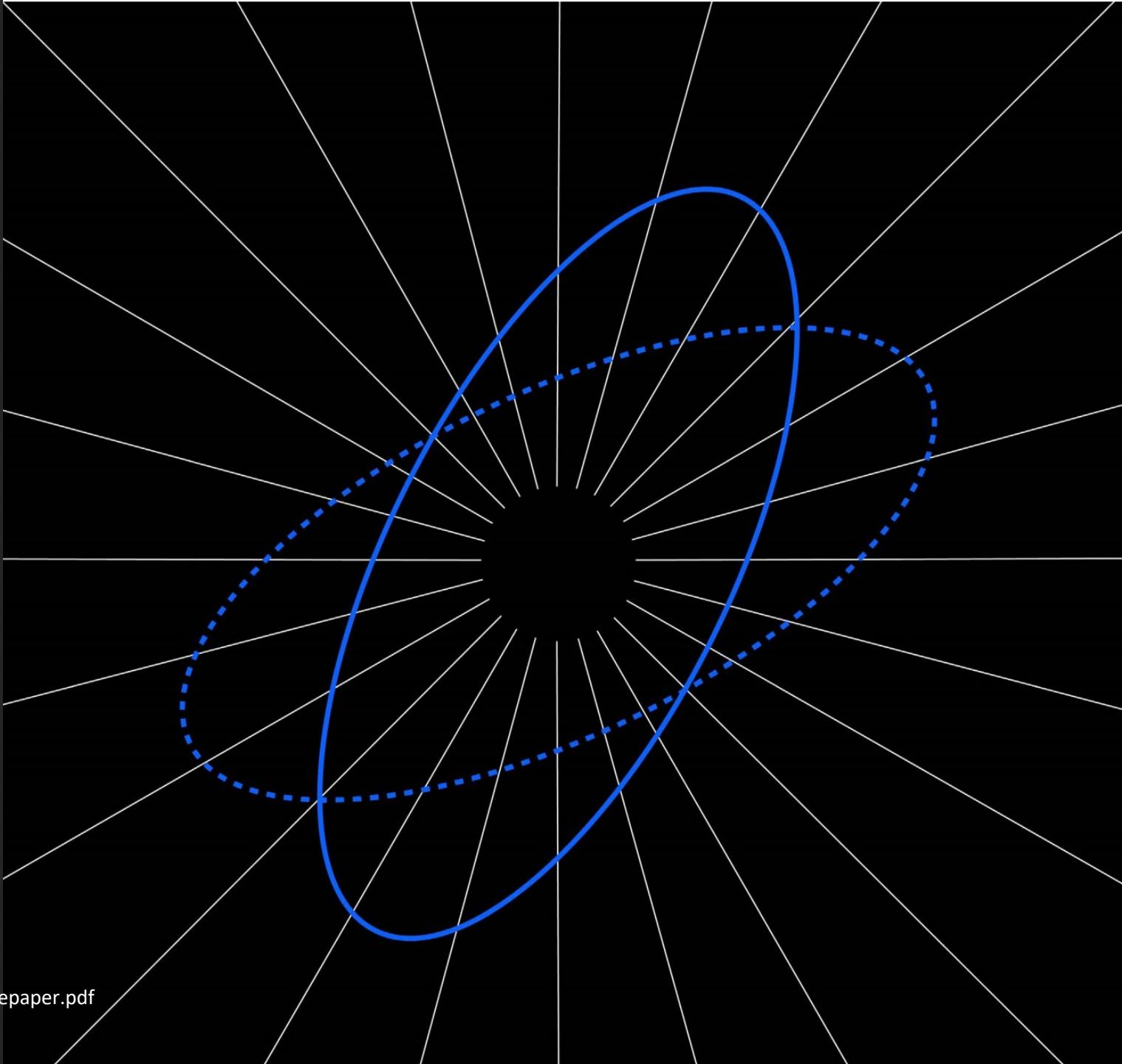
IBM makes advanced AI
more accessible for users
everywhere

<https://www.ibm.com/artificial-intelligence>

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.

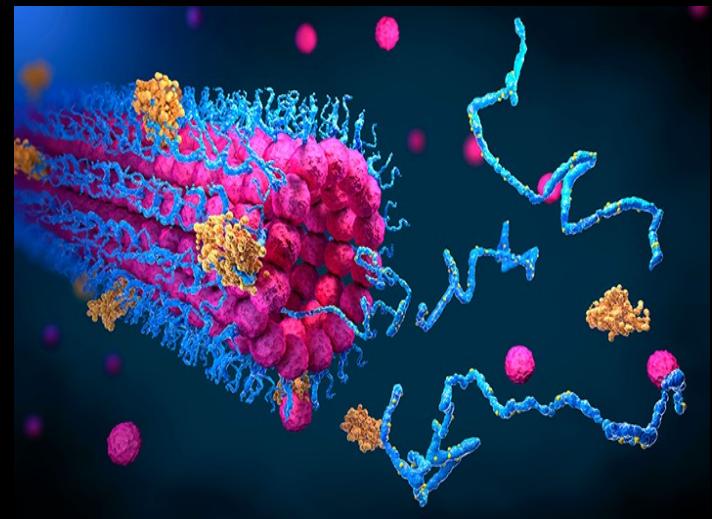
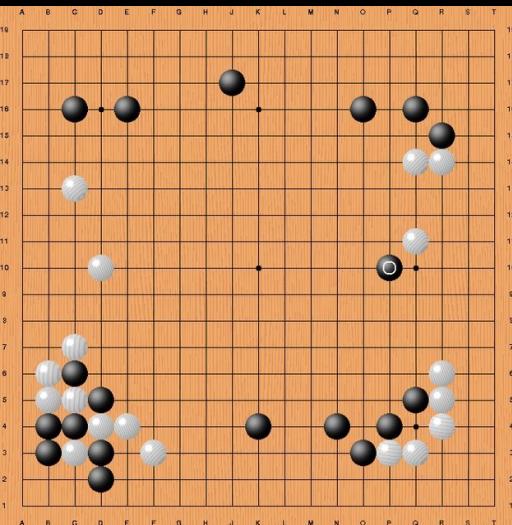
IBM Science & Technology Outlook 2021



AI is reinventing the way we invent



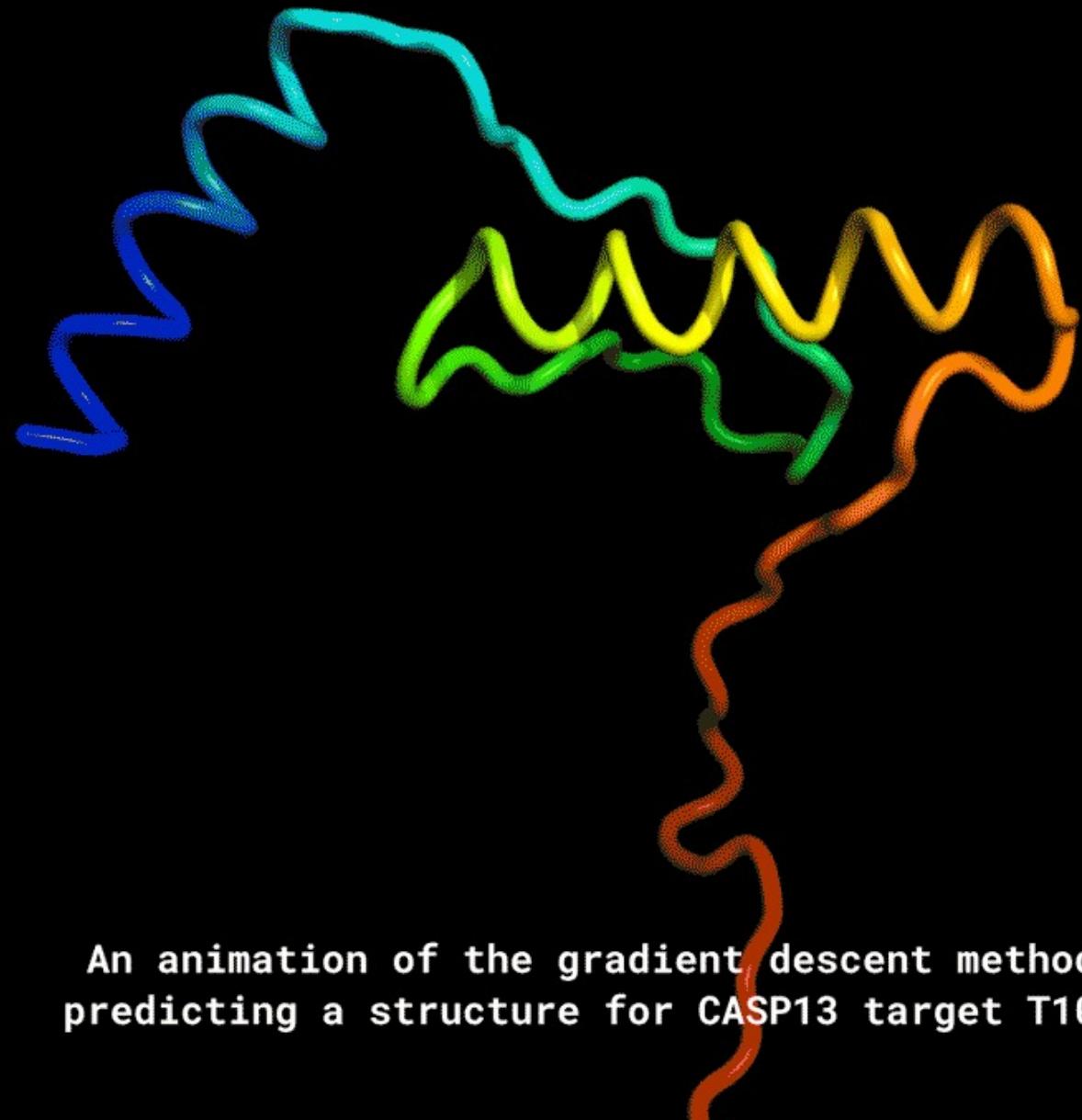
CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5
\$200	\$200	\$200	\$200	\$200
\$400	\$400	\$400	\$400	\$400
\$600	\$600	\$600	\$600	\$600
\$800	\$800	\$800	\$800	\$800



AlphaFold

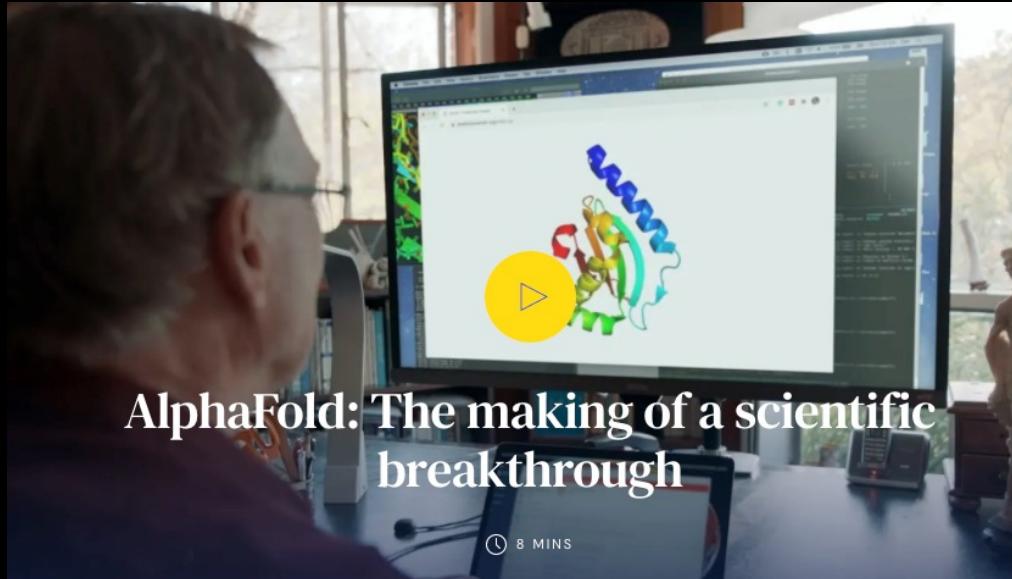
https://deepmind.com/research/open-source/alphafold_casp13

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



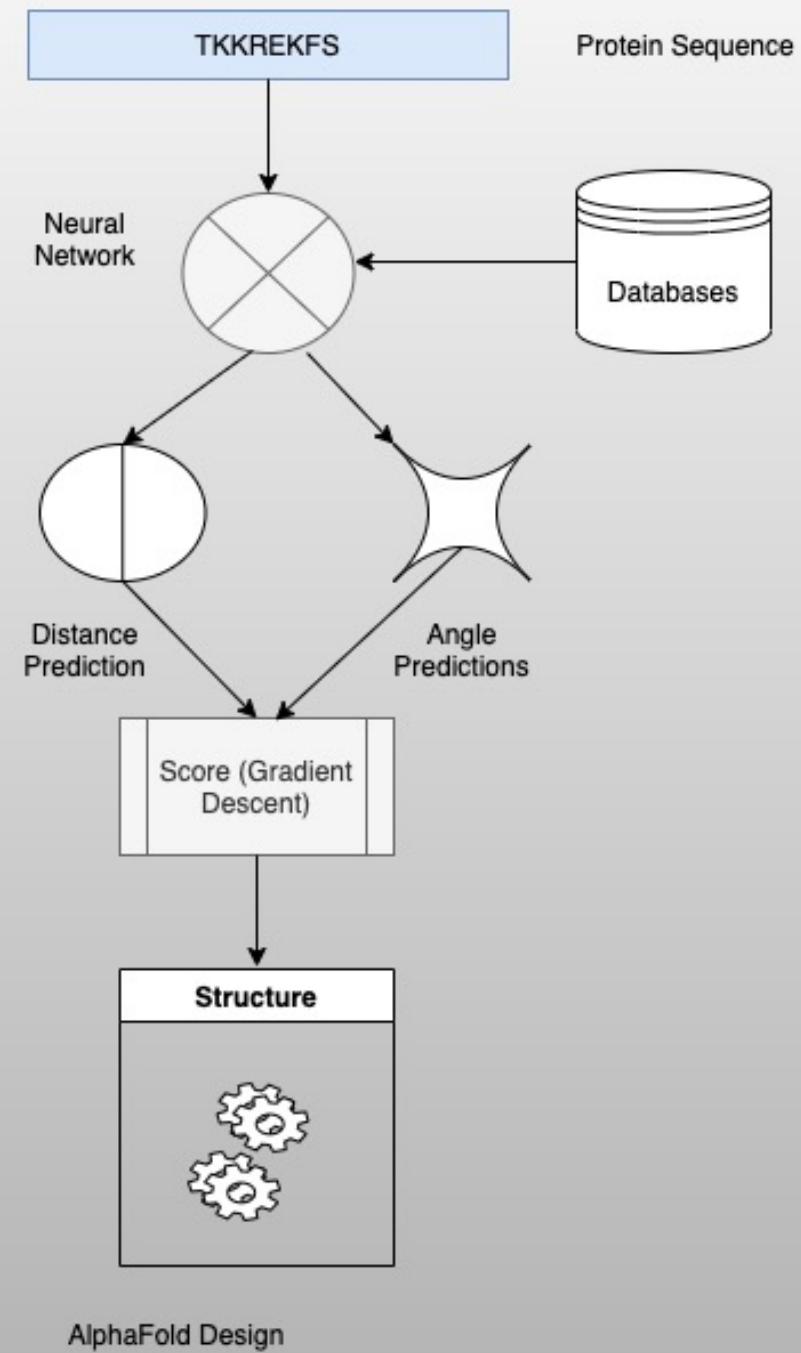
An animation of the gradient descent method predicting a structure for CASP13 target T1008

AlphaFold



AlphaFold: The making of a scientific breakthrough

<https://youtu.be/gg7WjuFs8F4>



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.**

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?

Answer: Alice's team
Correct

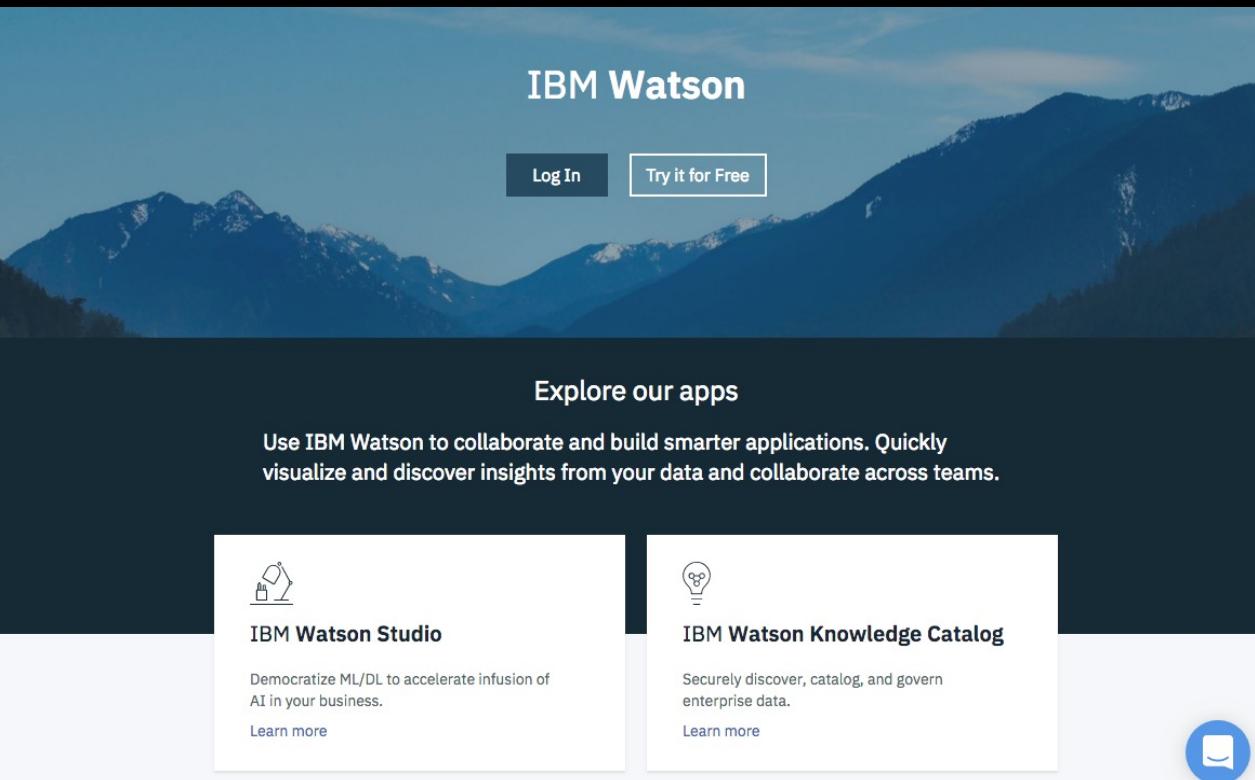
Explanation: Alice's team won the game because Alice's team had more points than the other team

✓ **Correct**

Agenda

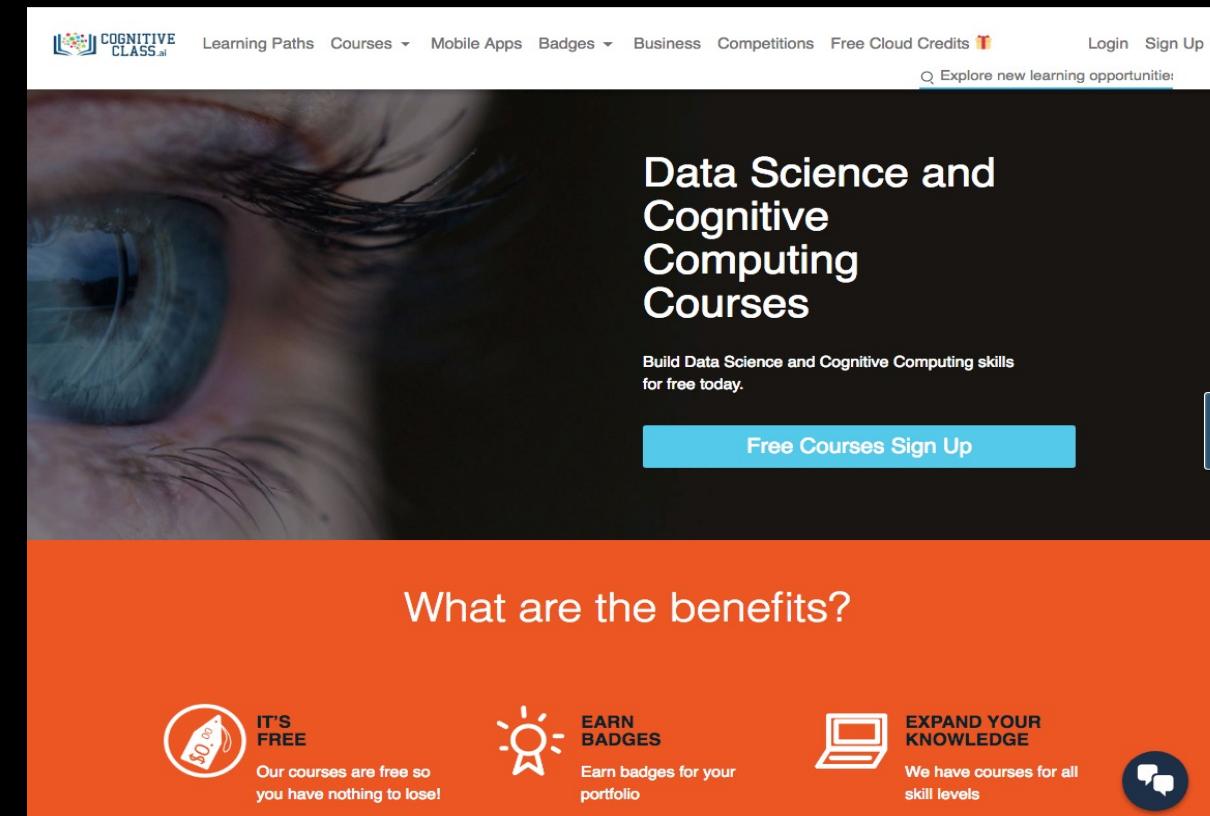
- Understanding Big Data
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<https://dataplatform.cloud.ibm.com/>



The IBM Watson homepage features a large background image of mountains under a blue sky. At the top, there are two buttons: "Log In" (dark blue) and "Try it for Free" (white). Below the header, a dark banner contains the text "Explore our apps" and a subtext: "Use IBM Watson to collaborate and build smarter applications. Quickly visualize and discover insights from your data and collaborate across teams." Two main service cards are shown: "IBM Watson Studio" (with a lightbulb icon) and "IBM Watson Knowledge Catalog" (with a speech bubble icon). Both cards include a brief description and a "Learn more" link.

<https://cognitiveclass.ai/>

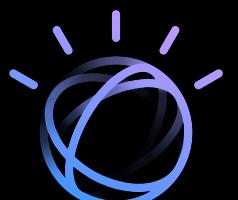


The CognitiveClass.ai homepage has a dark background featuring a close-up image of a person's eye. At the top, the navigation bar includes links for "Learning Paths", "Courses", "Mobile Apps", "Badges", "Business", "Competitions", "Free Cloud Credits", "Login", and "Sign Up". A search bar says "Explore new learning opportunities". The main title "Data Science and Cognitive Computing Courses" is displayed prominently. Below the title, a subtitle reads "Build Data Science and Cognitive Computing skills for free today." A large blue button says "Free Courses Sign Up". On the right side, there is a "Support" link. The bottom section, set against an orange background, asks "What are the benefits?" and lists three: "IT'S FREE" (with a price tag icon), "EARN BADGES" (with a sunburst icon), and "EXPAND YOUR KNOWLEDGE" (with a laptop icon). A small "We have courses for all skill levels" note is also present.

Closing Thoughts

IBM's Principles for Trust and Transparency

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



1.The purpose of AI is to augment human intelligence

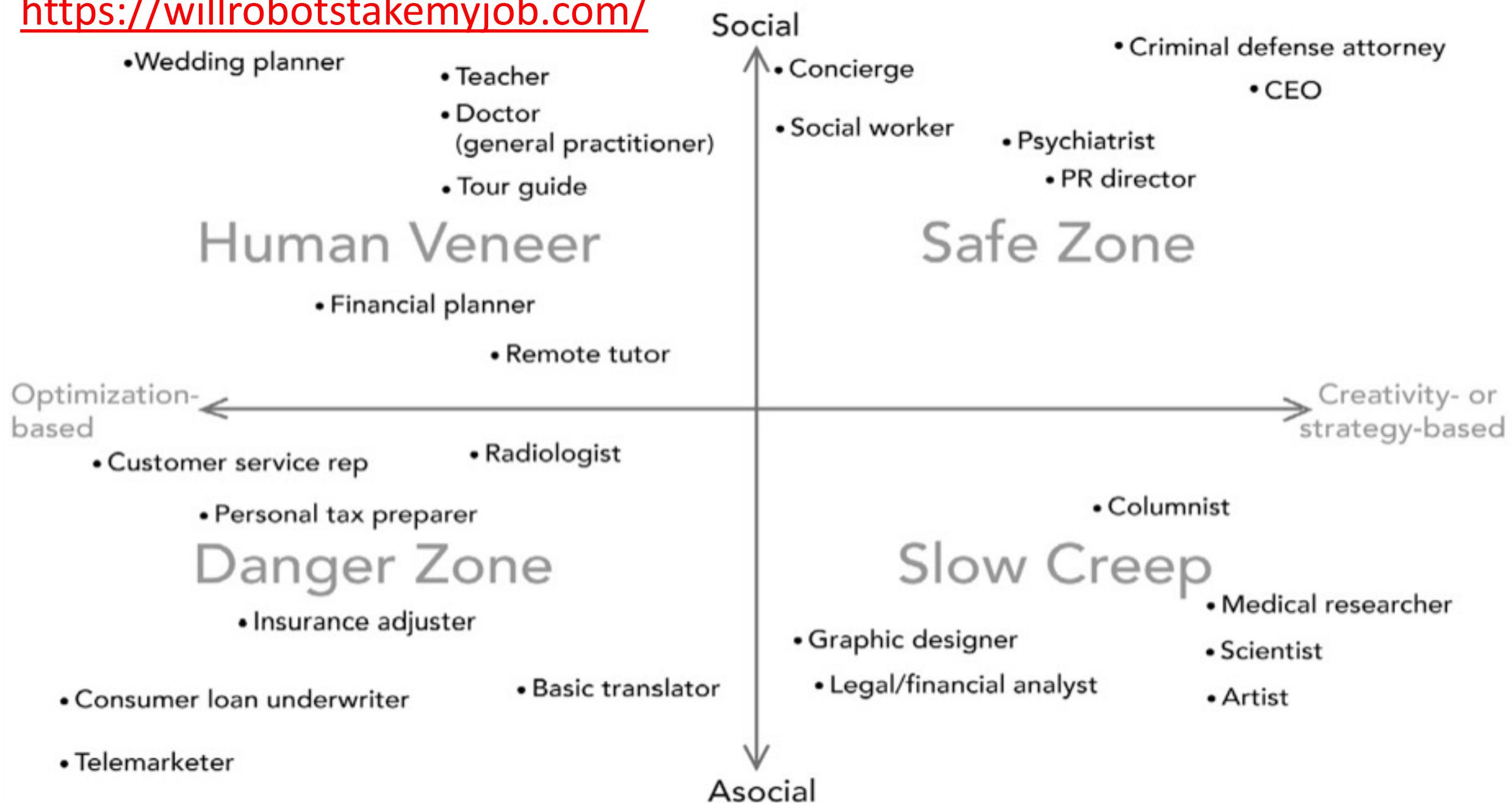
2.Data and insights belong to their creator

3.AI systems must be transparent and explainable

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



Takeaways AI lecture

Citizen AI:

Develop critical thinking skills, have your voice heard

<https://www.accenture.com/cz-en/insight-explainable-citizen-ai>

Big Data Advantage:

When giving away your personal data, choose wisely

<https://www.slideshare.net/RobertoVII/ai-and-big-data-for-business-and-people-advantage>

Intelligent Automation:

Educate yourself on AI, thrive in your profession

https://1.dam.s81c.com/m/3de136737e51fb20/original/IBM-Automation-Whitepaper_Final.pdf

Q&A

Resources

Cognitive Class for AI

- <https://cognitiveclass.ai/>

Open P-Tech

- <https://www.ptech.org/open-p-tech/>

Open Data Science for All

- <https://github.com/odpi/OpenDS4All>

In the Age of AI | FRONTLINE

- https://www.youtube.com/watch?v=5dZ_lvDgevk

Welcome to The Age of AI.| YouTube

- <https://www.youtube.com/watch?v=5lvQ3fYKnfM>

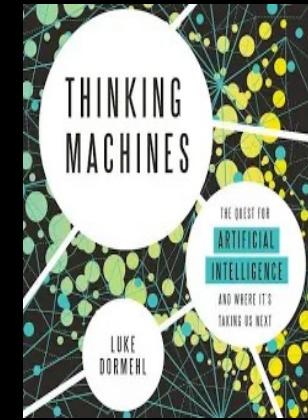
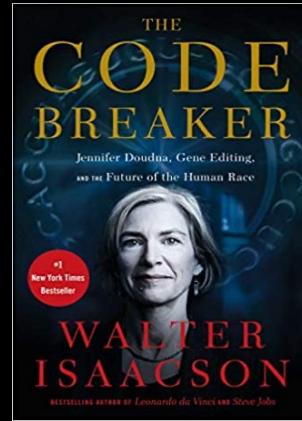
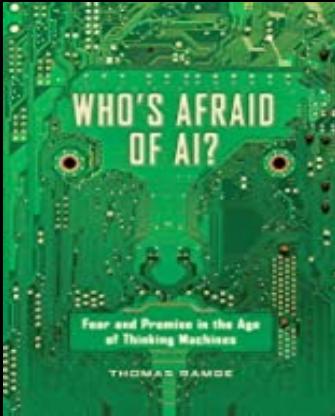
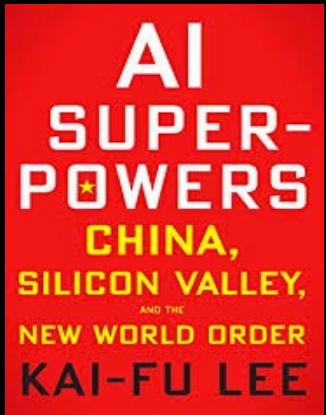
IBM Data & AI Platform

- <https://dataplatform.cloud.ibm.com/>

Ivan's recent contributions

- <https://github.com/jiportilla/giveback>

Ivan Portilla



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