

# Understanding Big Data & Artificial Intelligence

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# Agenda

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

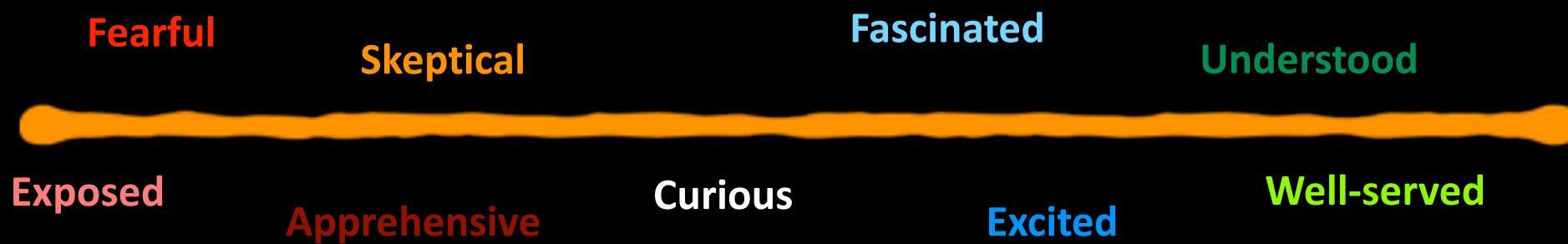
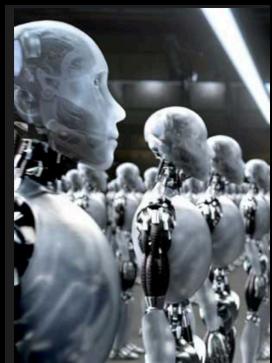
# Agenda

- Understanding Big Data
- Artificial Intelligence & Big Data
- Demo & closing thoughts

# What is AI?

# AI Perception

What do people feel about AI?



# AI Approaches

## Expert Systems

- Rely on hardcoded knowledge
- Can't deal with the unexpected, limited to pre-programmed solutions
- Inspired by logic systems



## Learning Systems

- Learn solutions from first principles
- Can generalize to new tasks, solve things we don't know how
- Inspired (& validated) by neuroscience

# 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?

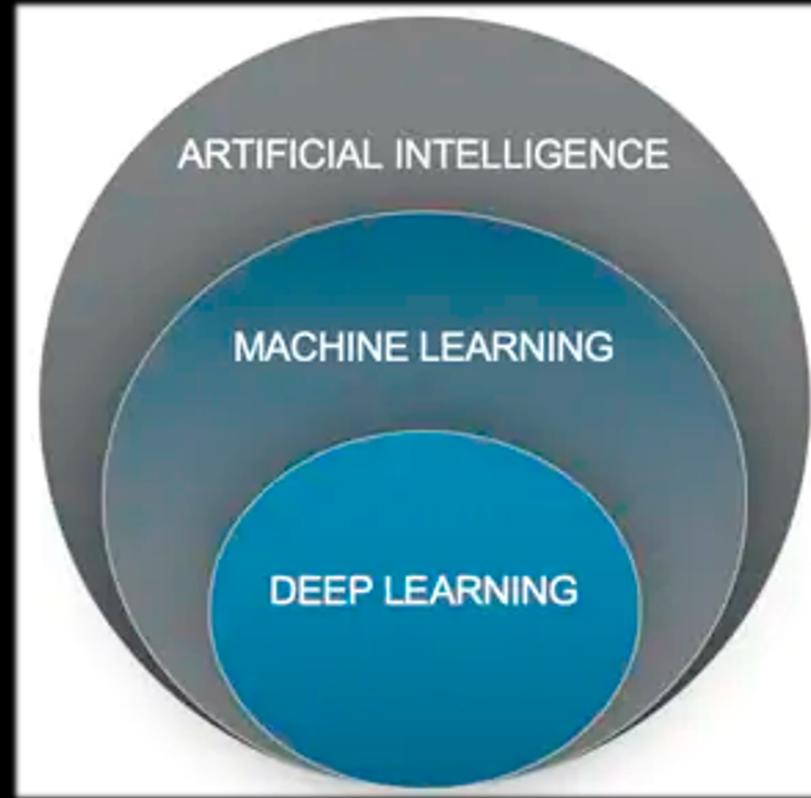
Artificial Intelligence | noun

*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

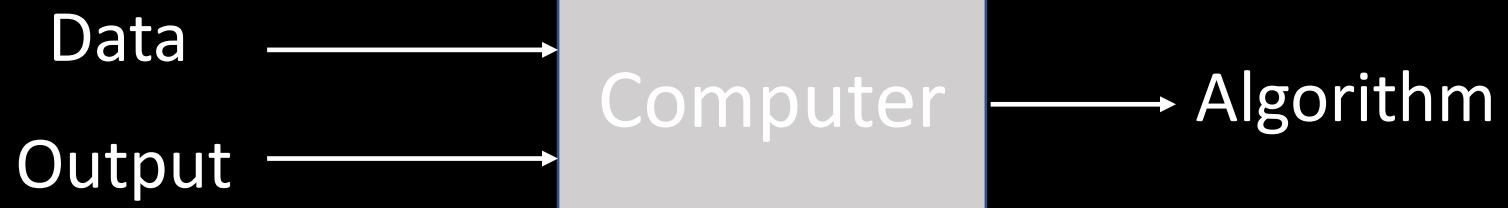


# Why AI,Machine Learning?

Traditional Programming



AI-Machine Learning



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

Intelligence demonstrated  
by GA 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?

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# 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



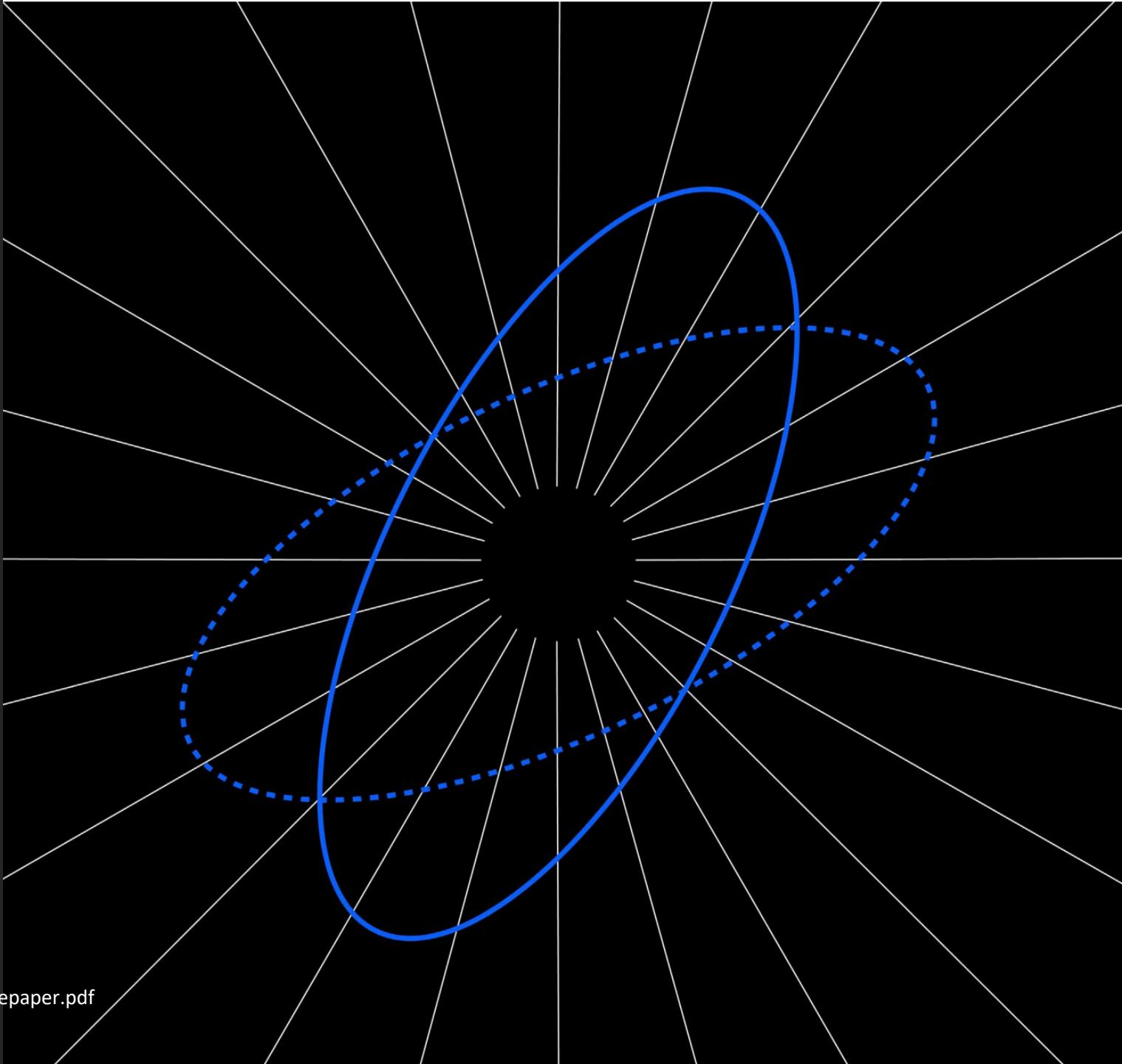
IBM makes advanced AI  
more accessible for users  
everywhere

<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.

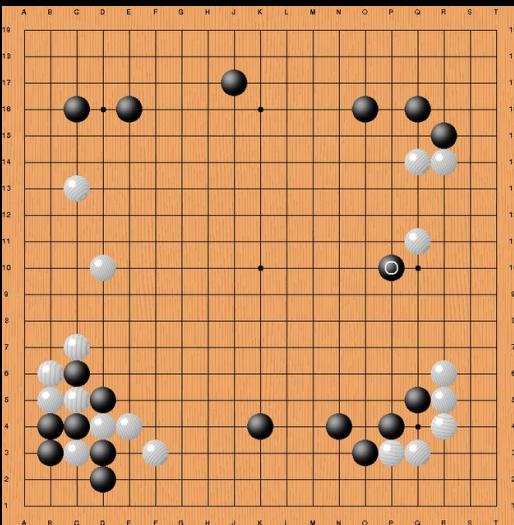
# IBM Science & Technology Outlook 2021



# AI is reinventing the way we invent



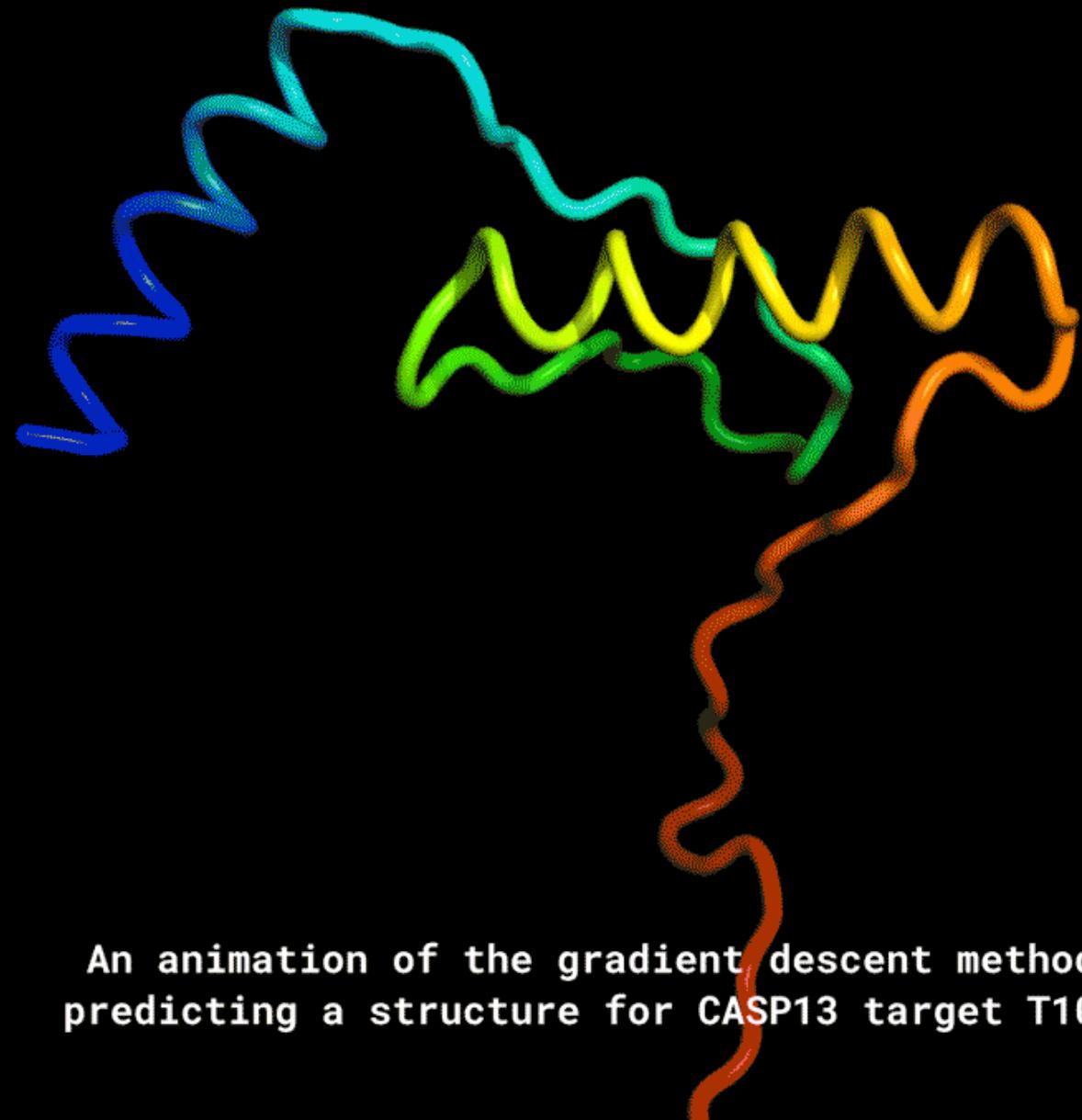
| CATEGORY 1 | CATEGORY 2 | CATEGORY 3 | CATEGORY 4 | CATEGORY 5 |
|------------|------------|------------|------------|------------|
| \$200      | \$200      | \$200      | \$200      | \$200      |
| \$400      | \$400      | \$400      | \$400      | \$400      |
| \$600      | \$600      | \$600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



# AlphaFold

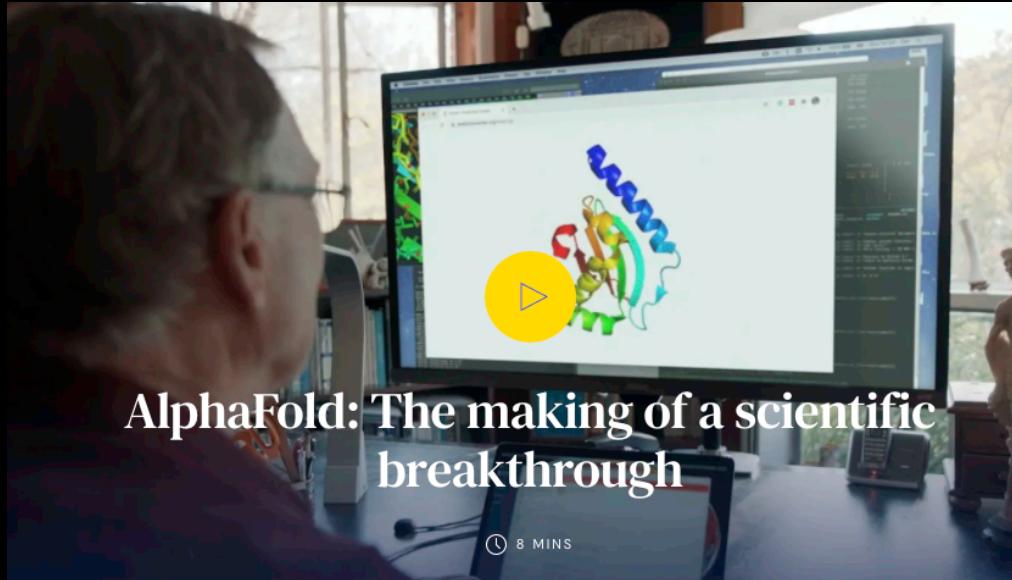
[https://deepmind.com/research/open-source/alphafold\\_casp13](https://deepmind.com/research/open-source/alphafold_casp13)

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



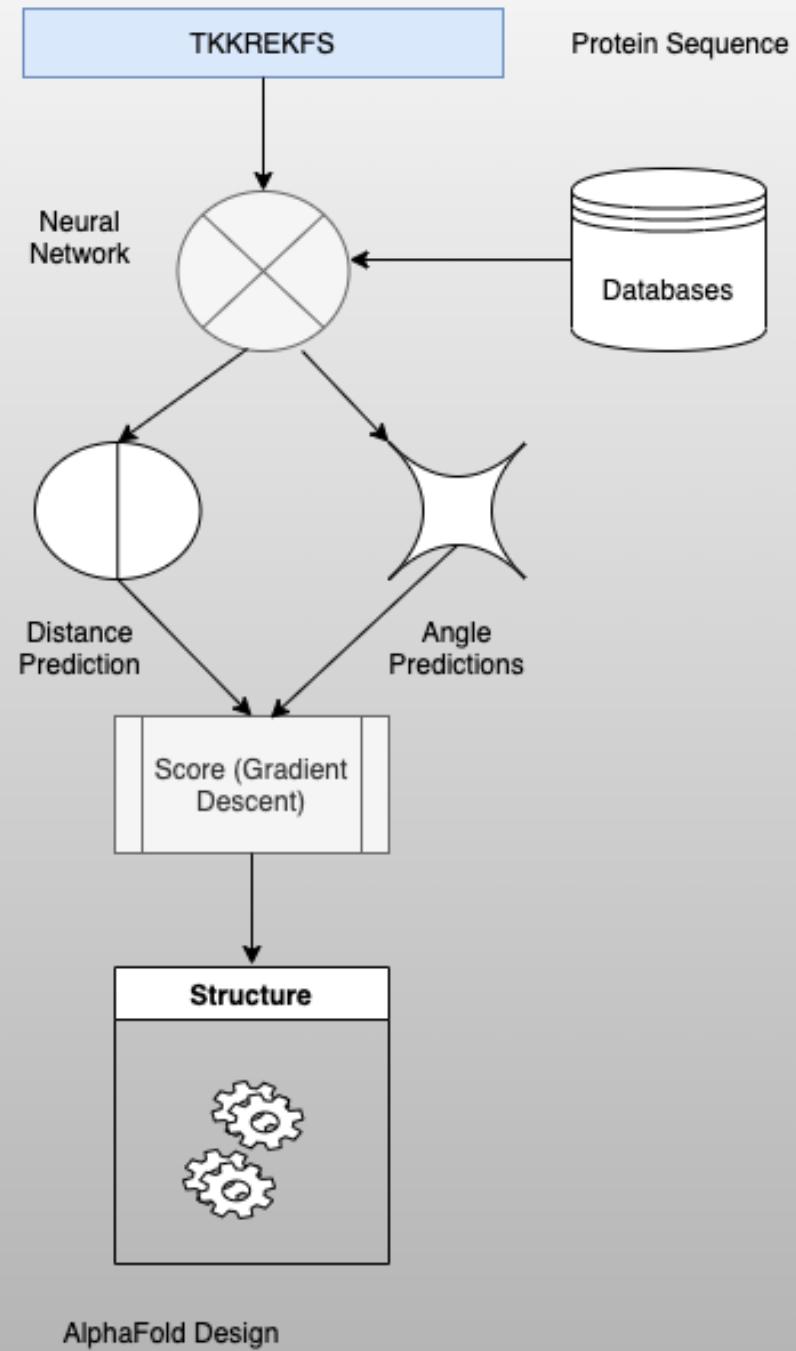
An animation of the gradient descent method predicting a structure for CASP13 target T1008

# 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**

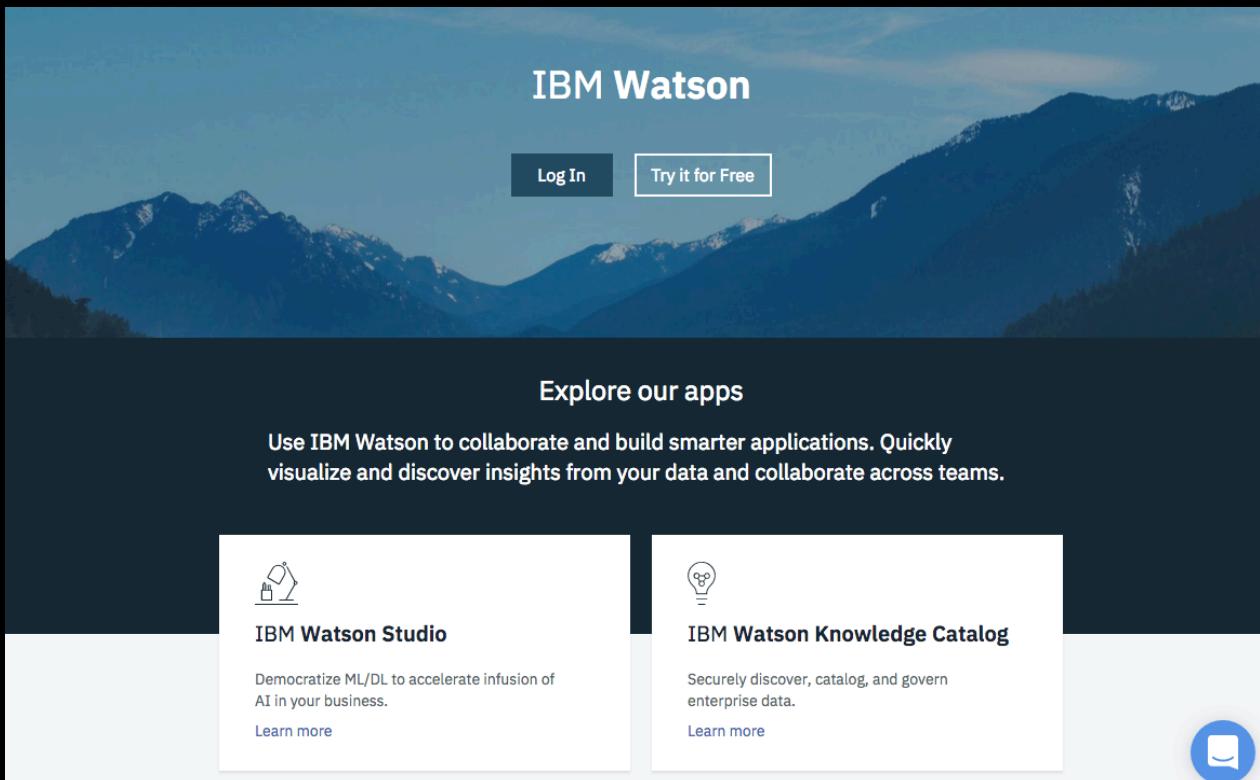
Explanation: Alice's team won the game because Alice's team had more points than the other team

✓ **Correct**

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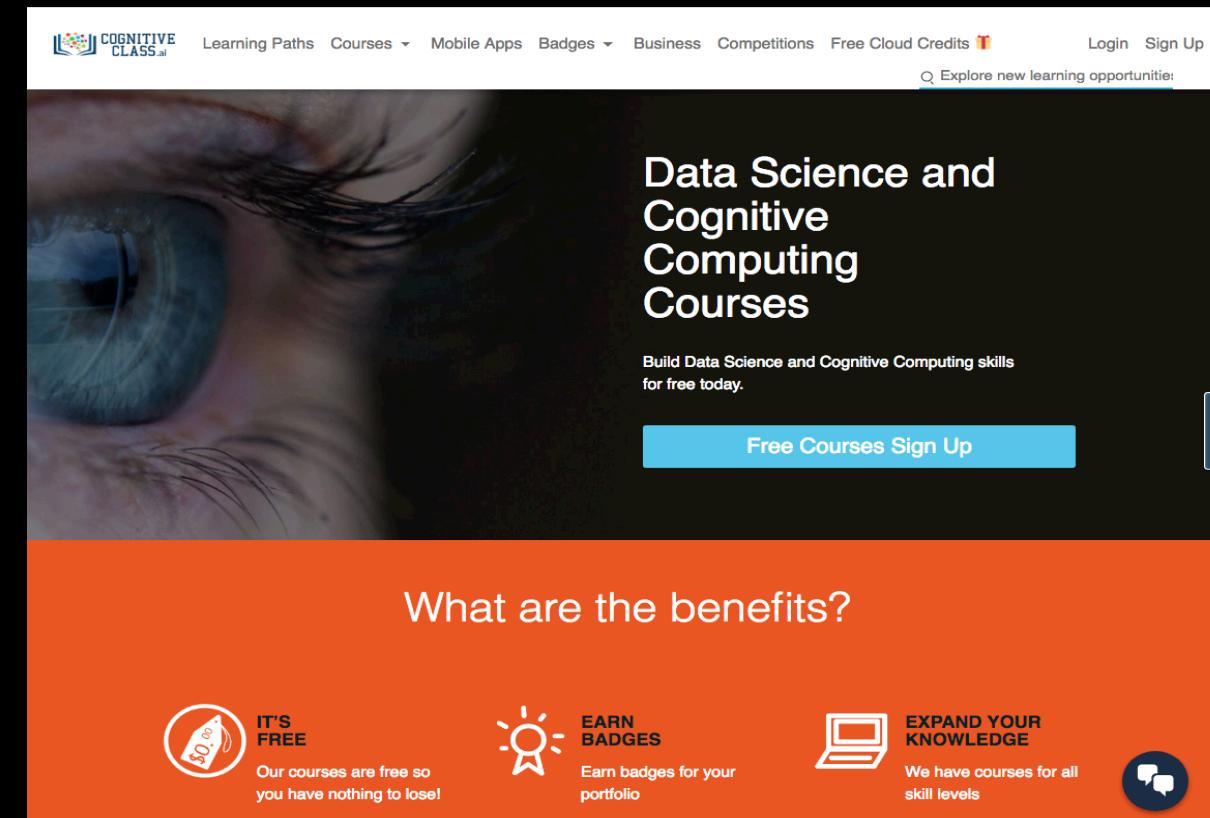
- Understanding Big Data
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<https://dataplatform.cloud.ibm.com/>



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, the text "Explore our apps" is displayed. A sub-section below it reads: "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 "Learn more" link.

<https://cognitiveclass.ai/>

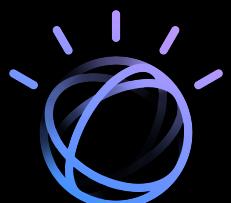


The CognitiveClass.ai homepage has a dark background featuring a close-up image of a person's eye. At the top, there is a navigation bar with links: COGNITIVE CLASS.ai, Learning Paths, Courses, Mobile Apps, Badges, Business, Competitions, Free Cloud Credits, Login, and Sign Up. A search bar is also present. The main headline on the right side reads "Data Science and Cognitive Computing Courses". Below the headline, a sub-headline says "Build Data Science and Cognitive Computing skills for free today." A "Free Courses Sign Up" button is located at the bottom right. The bottom section, which has an orange background, asks "What are the benefits?" and lists four items: "IT'S FREE" (with a price tag icon), "EARN BADGES" (with a sunburst icon), and "EXPAND YOUR KNOWLEDGE" (with a laptop icon). There is also a "We have courses for all skill levels" message and a thumbs-down icon.

# Closing Thoughts

## IBM's Principles for Trust and Transparency

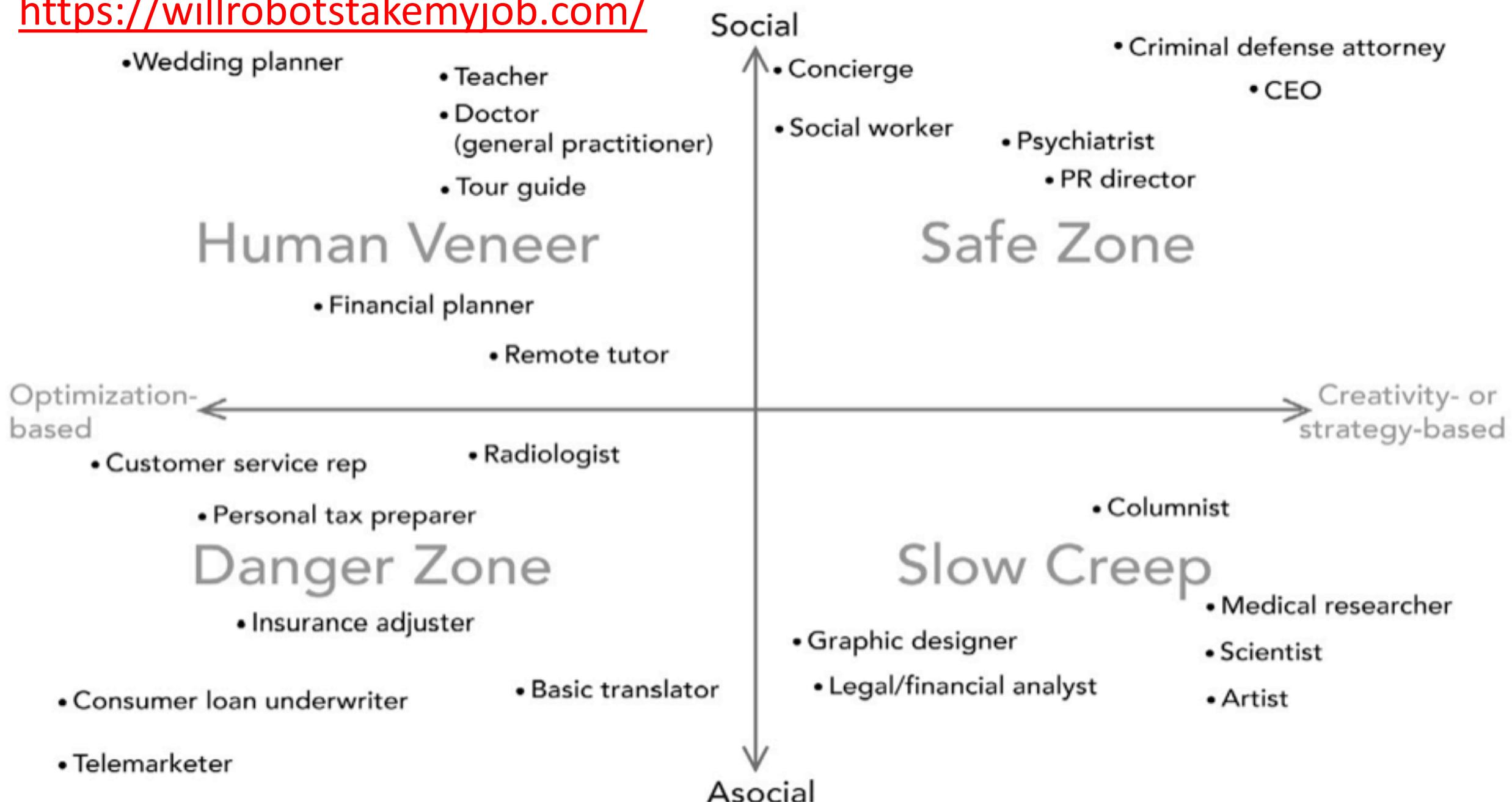
<https://www.ibm.com/downloads/cas/J45XZOAR>



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



# 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](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](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>

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