



Piyush Sharma

Artificial Intelligence

Essential AI for Everyone

Now in
Singapore!

A Technology-Business-People Playbook!



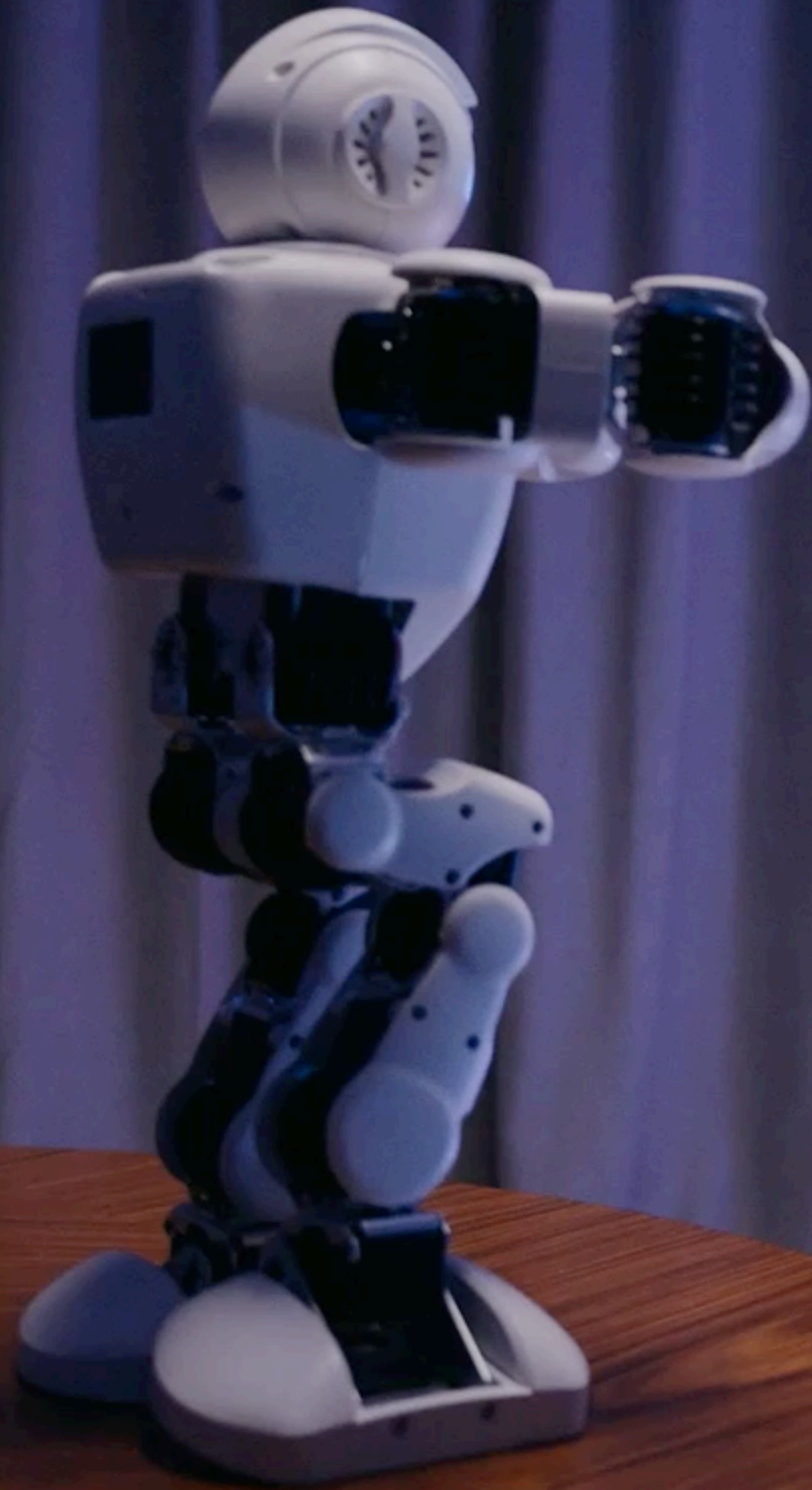
The course draws heavily upon curated resources from the best of the best. While in most cases these have a built-in acknowledgement of the source; in rare cases if it is not there and if it is a graph, chart, image, infographics or a video - it may be brought to my attention and I will be happy to attribute sources. The general videos to create engagement and interest are already sourced from 'free-to-use' or 'creative-commons attribution sites.'





Mark Cuban (born July 31, 1958) is an American billionaire entrepreneur, television personality, and media proprietor whose net worth is an estimated **\$4.3 billion**, according to Forbes, and ranked #177 on the 2020 Forbes 400 list.

Course Introduction



AI Concepts

**1.
Technology**

**2.
Business**

**3.
People**



1.
Technology



2.
Business



3.
People



1.
Understanding AI -
Course Introduction



2.
Understanding AI -
Deep-Dive 1



3.
Understanding AI -
Deep-Dive 2



4.
Understanding ML -
Deep-Dive



5.
Understanding DL -
Deep-Dive



6.
Implementing AI -
Projects



7.
AI Trends -
State of AI



8.
AI for
Business Leadership



9.
Ethics
In AI



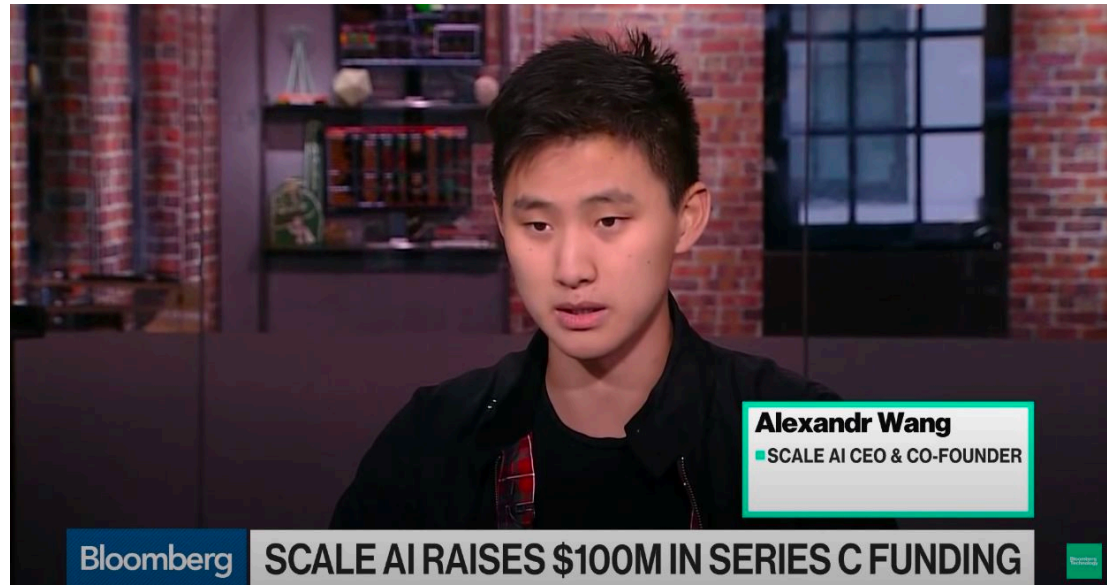
10.
AI in
Singapore +
AI in action!



11.
Understanding AI -
Applications



12.
Future
of AI



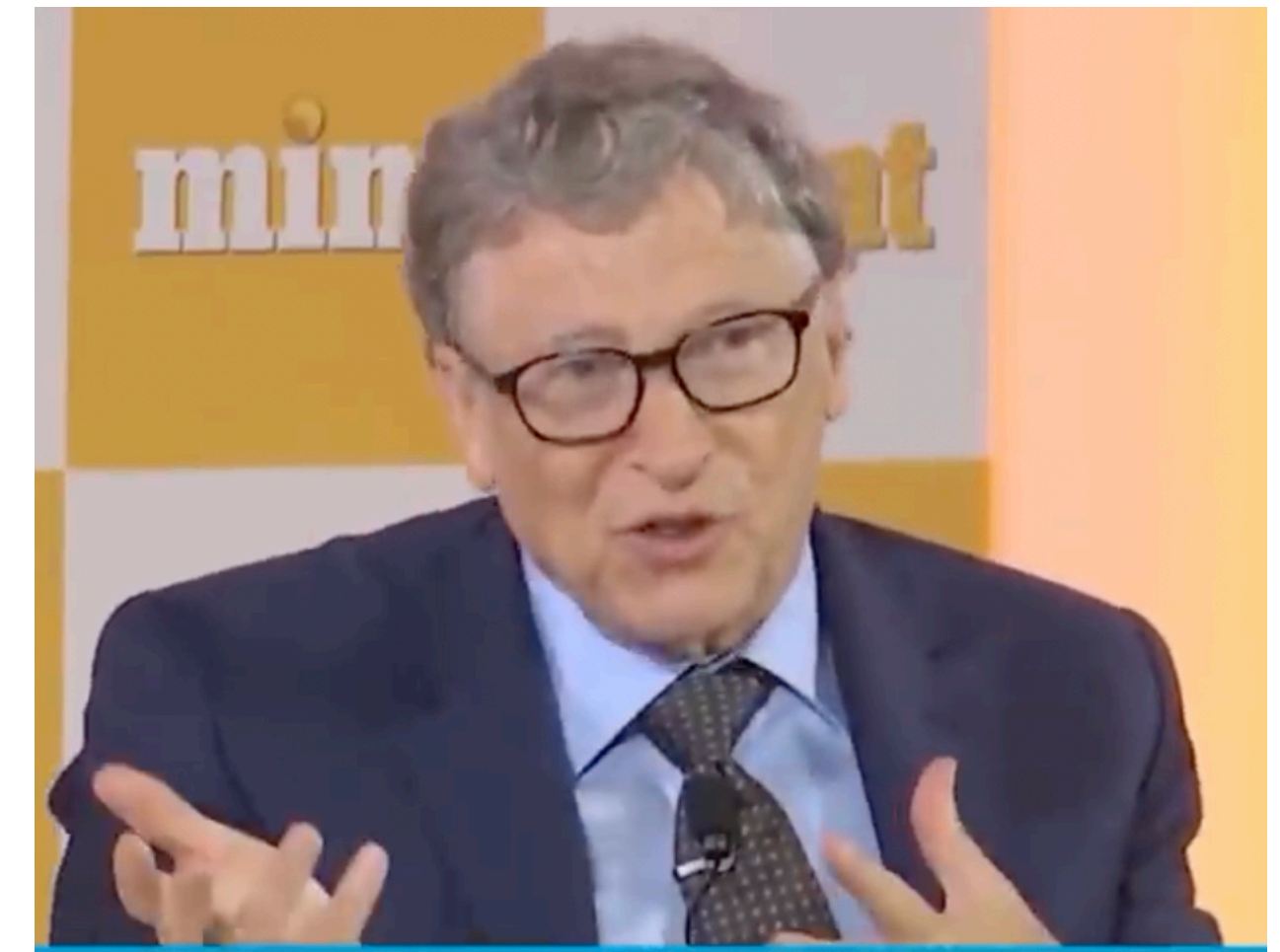




Kay Firth-Butterfield
Head of AI / Machine Learning, World Economic Forum



HENG SWEE KEAT
Singapore Deputy Prime Minister



Tim Cook
CEO of Apple



1.
Understanding AI-
Pre-introduction!

1.
Understanding AI-
Pre-introduction!



Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

I/ Understanding AI - Pre-Introduction

How did we get here!

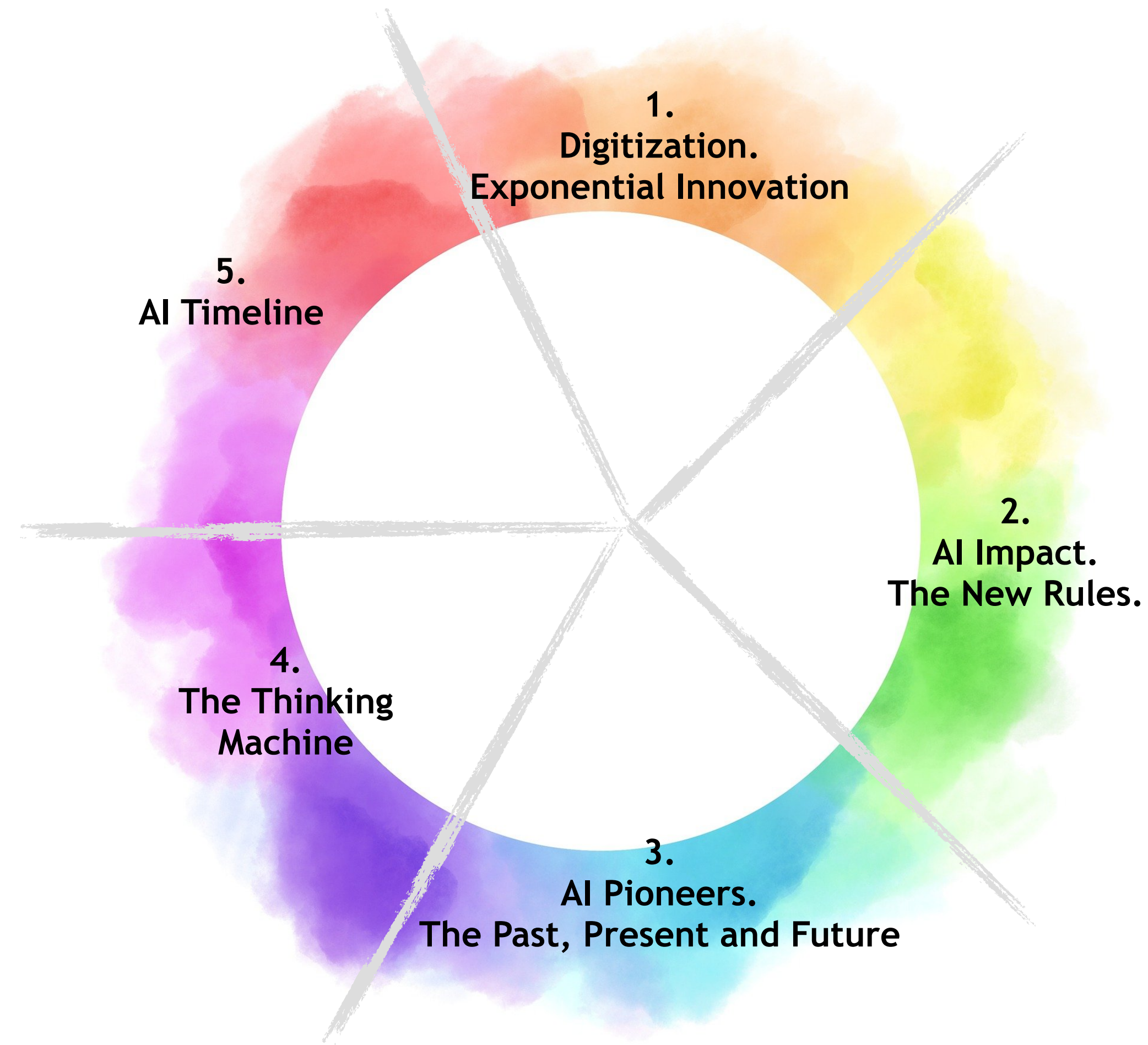


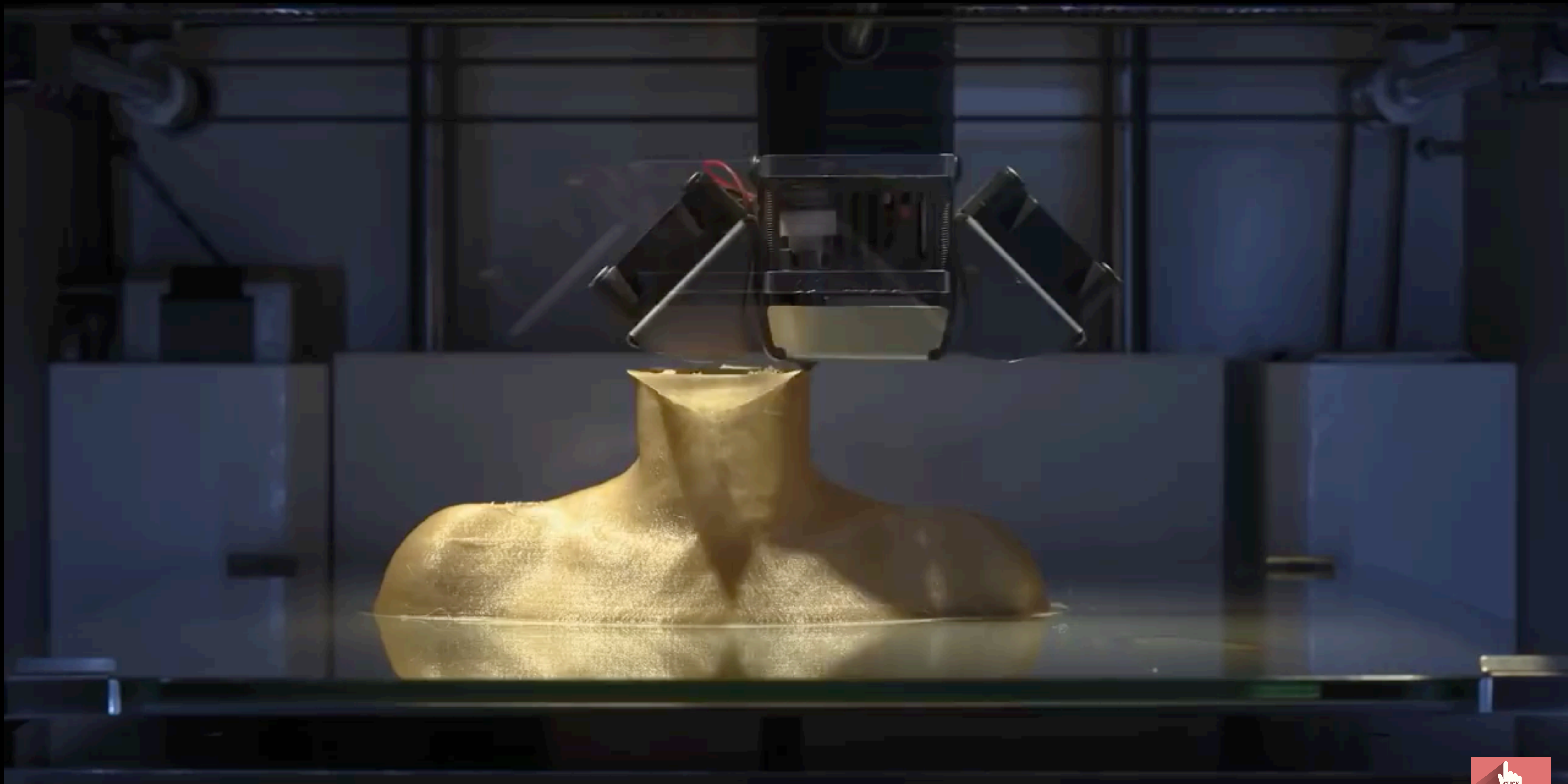
Backdrop!



Demystifying AI

I - Understanding AI - Pre-Introduction





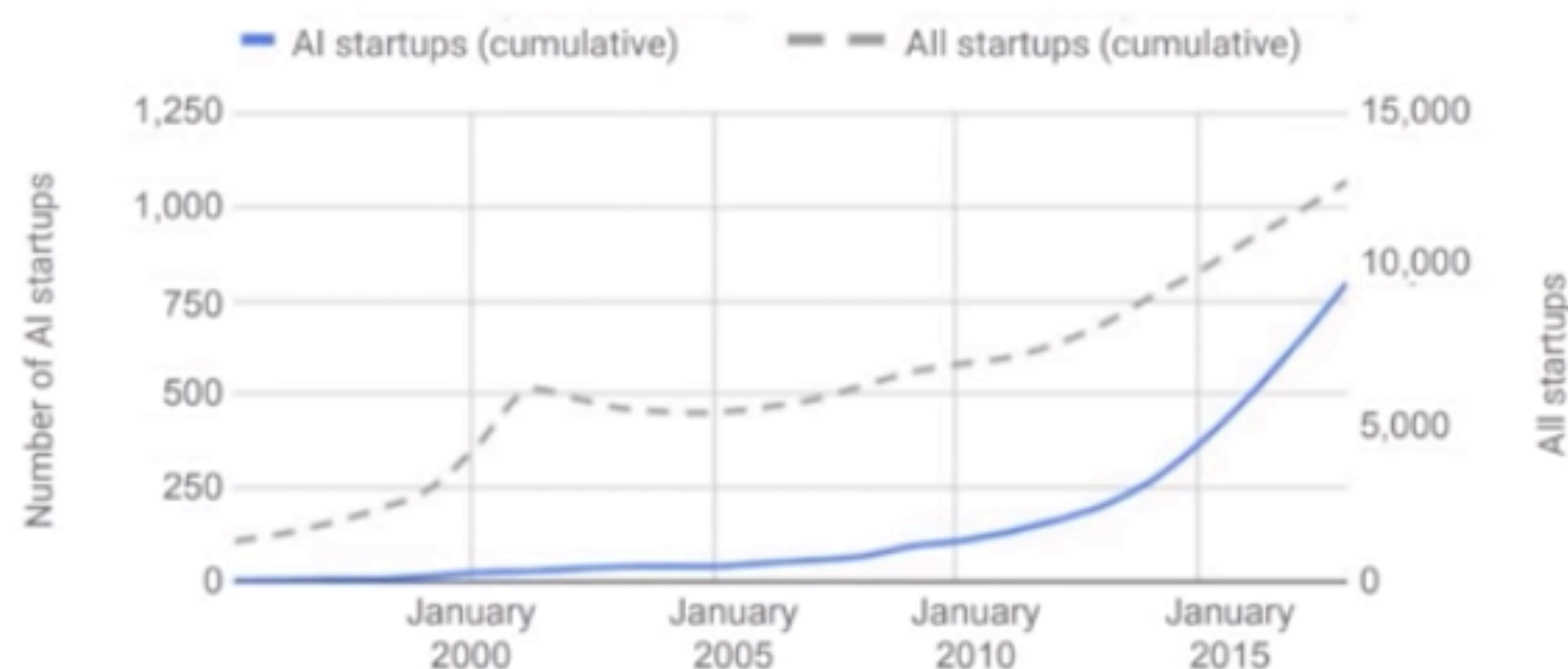
Boom in AI Startups

All startups vs. AI startup growth

- AI startups have seen exponential growth, while all active startups have remained steady.
- AI active startups increased 2.1x, while all active startups increased 1.3x.

AI startups (U.S., January 1995 – January 2018)

Source: Sand Hill Econometrics



Note: The majority of the AI startups above develop AI systems. A minority use AI as an integral part of business, but do not develop the systems themselves. See appendix for more details.

VC investment in all startups vs. AI startups

- VC investment follows the same trend.
- AI VC funding increased 4.5x, while all VC funding increased 2.08x.

Annual VC funding of AI startups (U.S., 1995 – 2017)

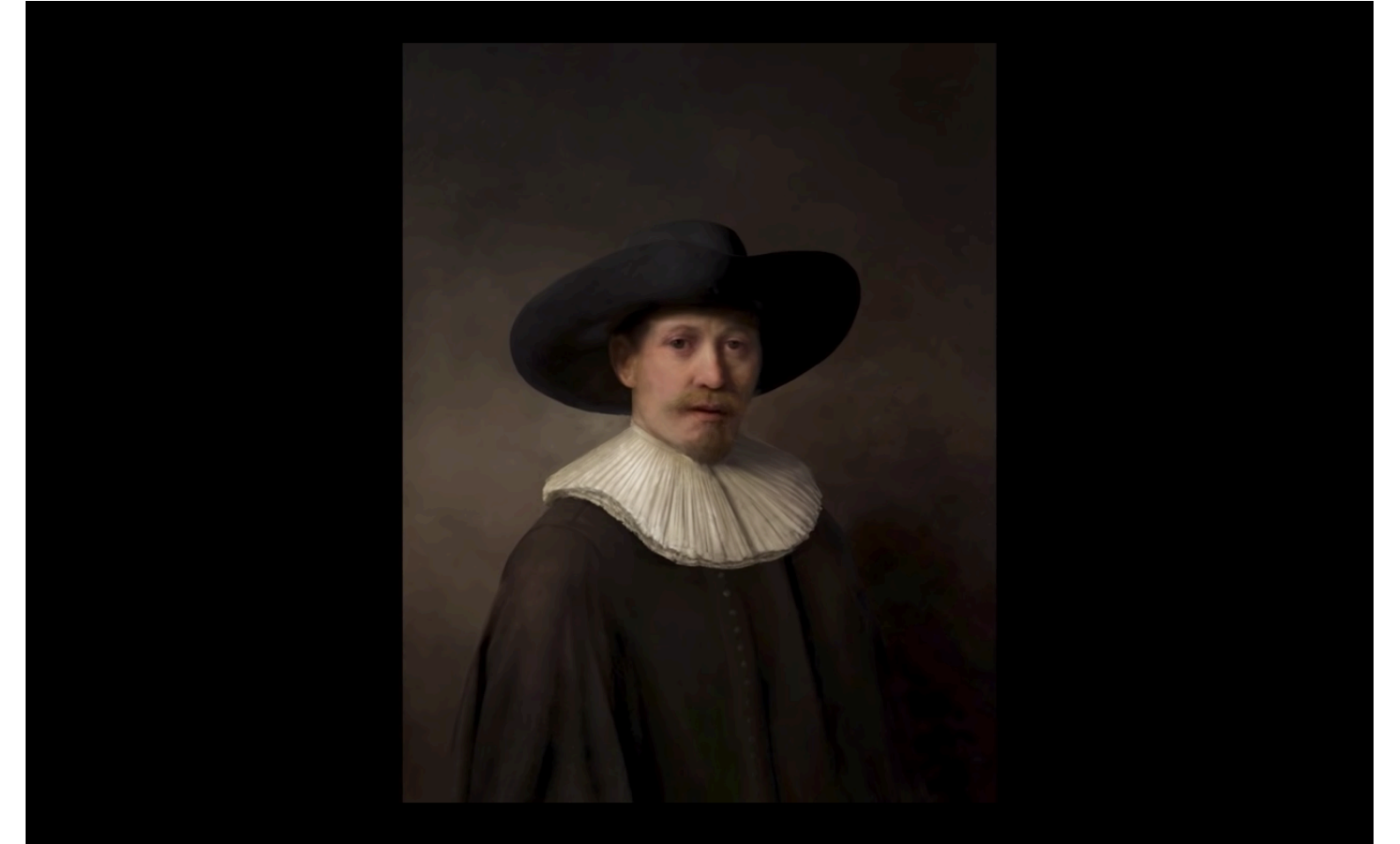
Source: Sand Hill Econometrics



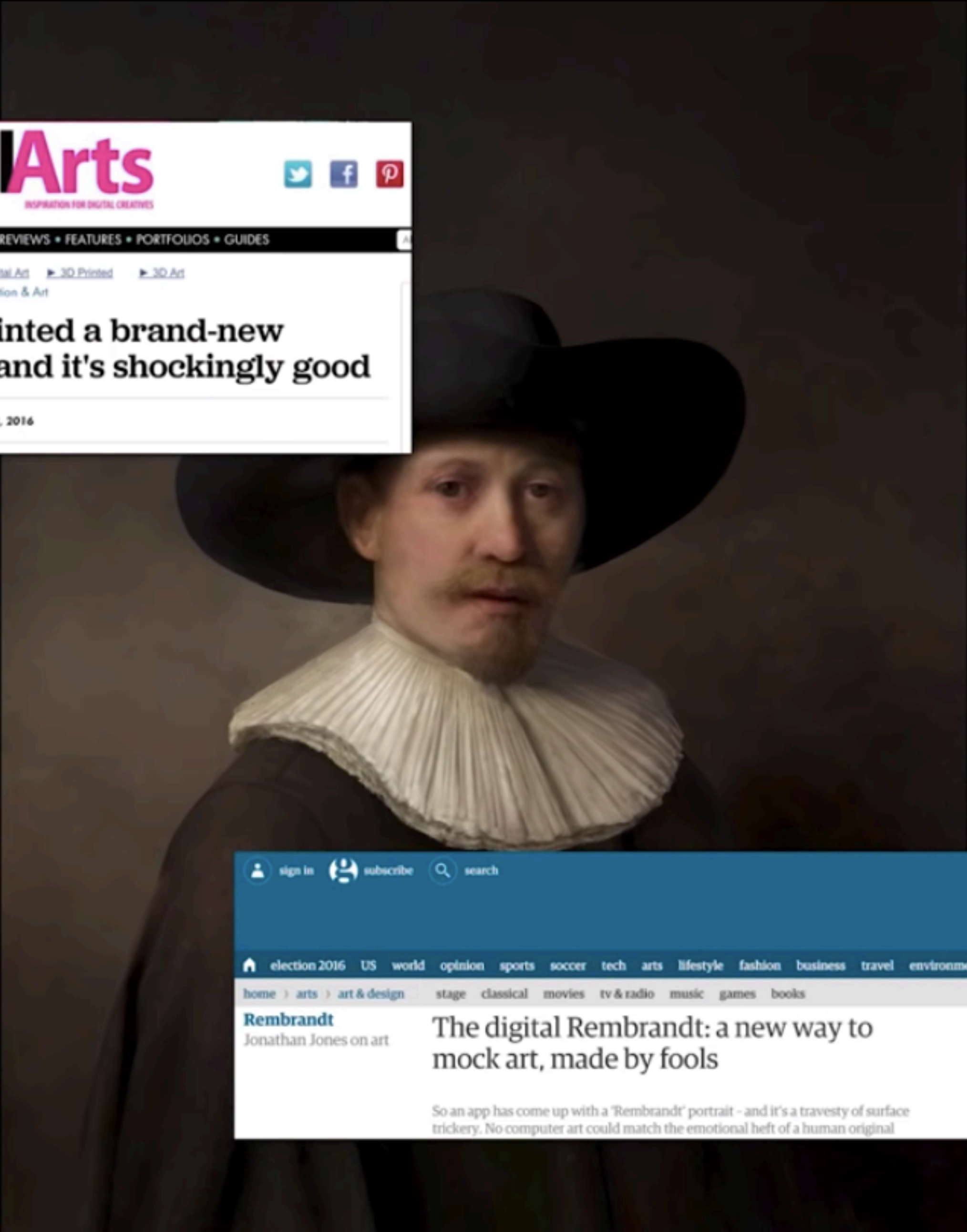
1/ Understanding AI - Pre-Introduction

Understanding the art world to understand AI

1. Rembrandt?
2. Headline takeaways







DigitalArts
INSPIRATION FOR DIGITAL CREATIVES

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AI just 3D printed a brand-new Rembrandt, and it's shockingly good

By Katherine Noyes | on April 08, 2016

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theguardian

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home > arts > art & design stage classical movies tv & radio music games books

Rembrandt
Jonathan Jones on art

The digital Rembrandt: a new way to mock art, made by fools

So an app has come up with a "Rembrandt" portrait - and it's a travesty of surface trickery. No computer art could match the emotional heft of a human original

Future of AI

ExpertSpeak - Gates, Cook, Musk, Pichai, Bezos



Quick Poll...1!

How many jobs may face medium to high exposure to automation?

a/ >10%

b/ >25%

C/ >40%

d/ >60%



FUTURE OF WORK Insights for 2021 and Beyond

KEVIN KLOWDEN AND QUINTUS LIM

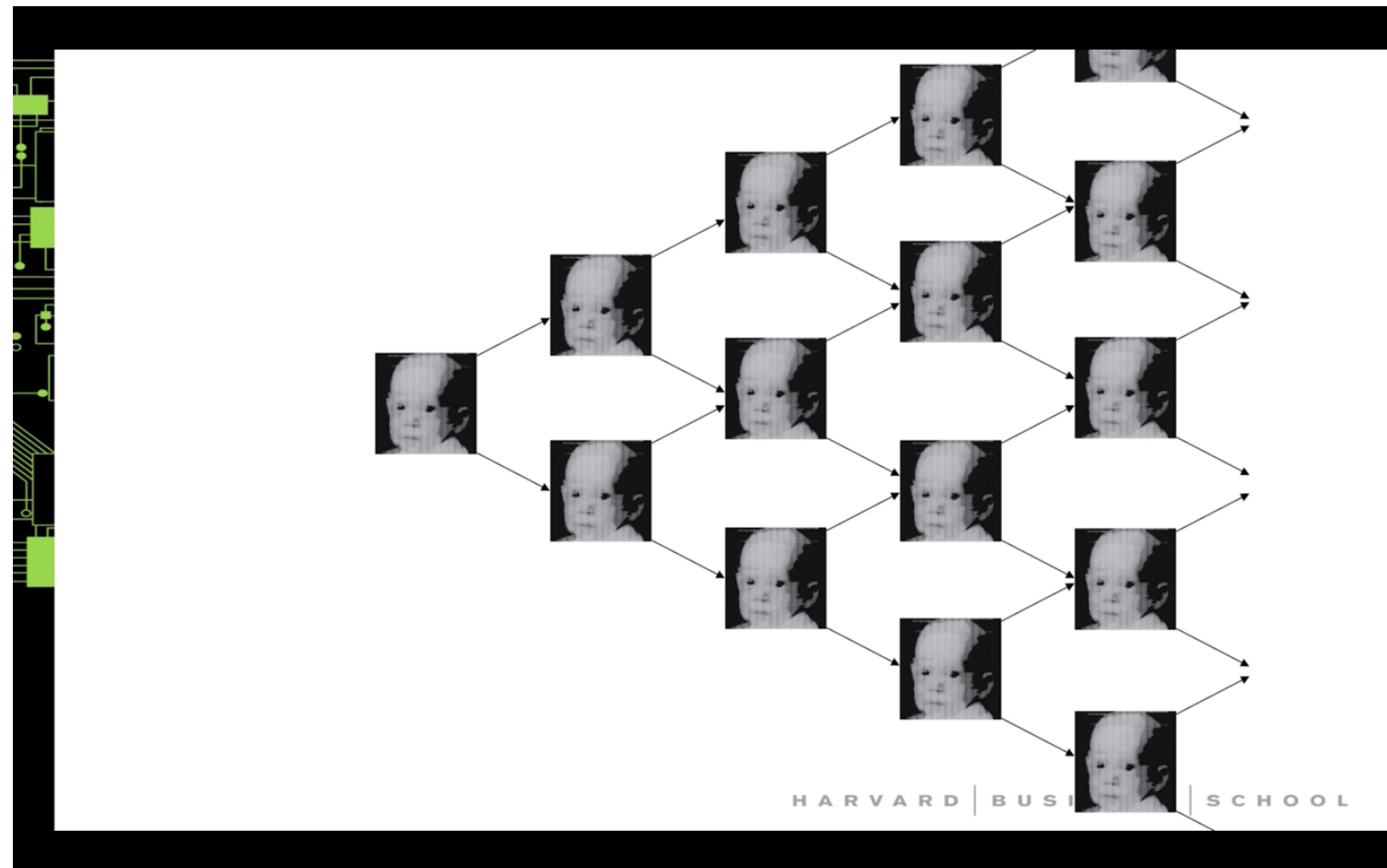
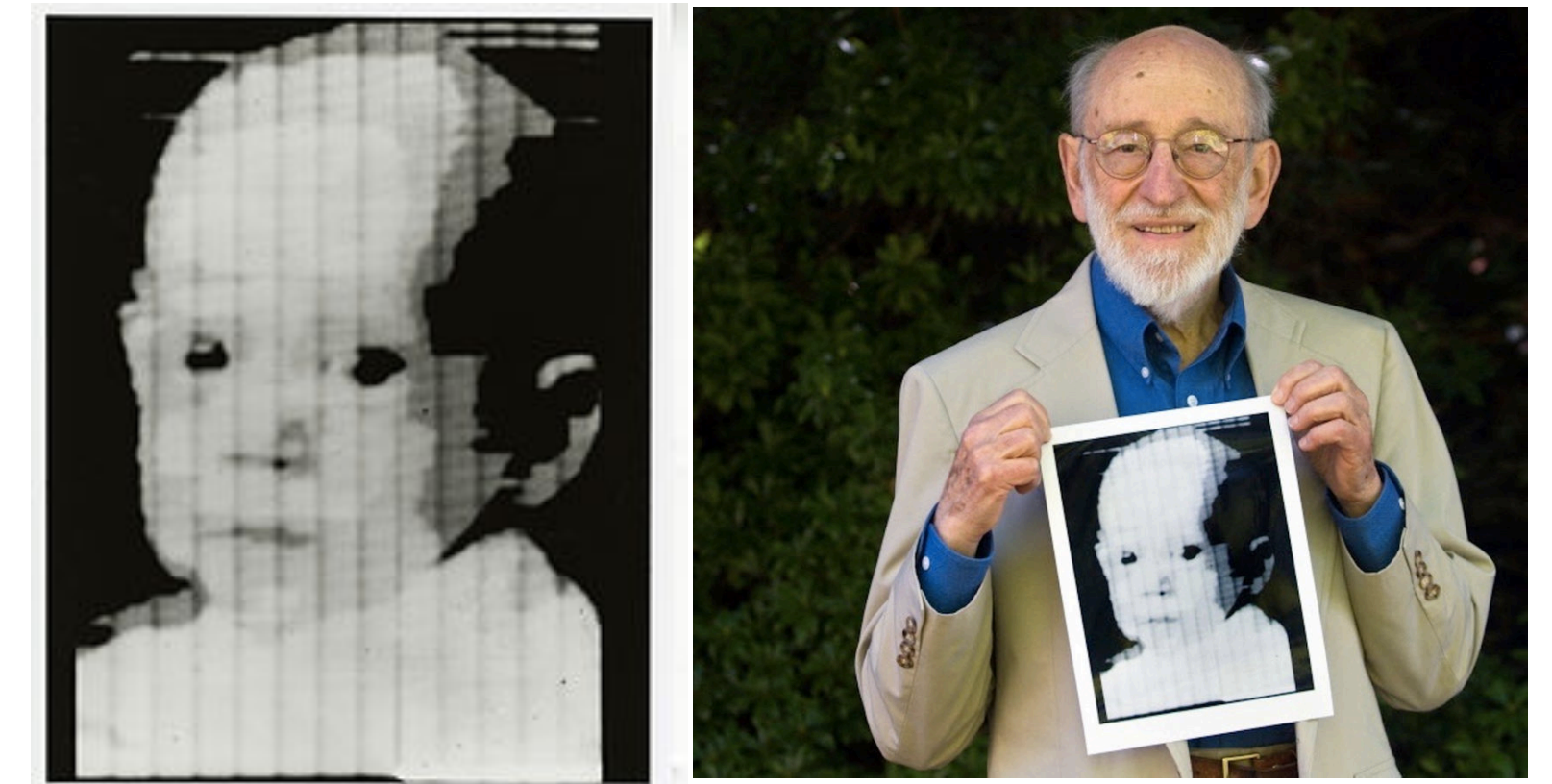




1/ Understanding AI - Pre-Introduction

Digitization

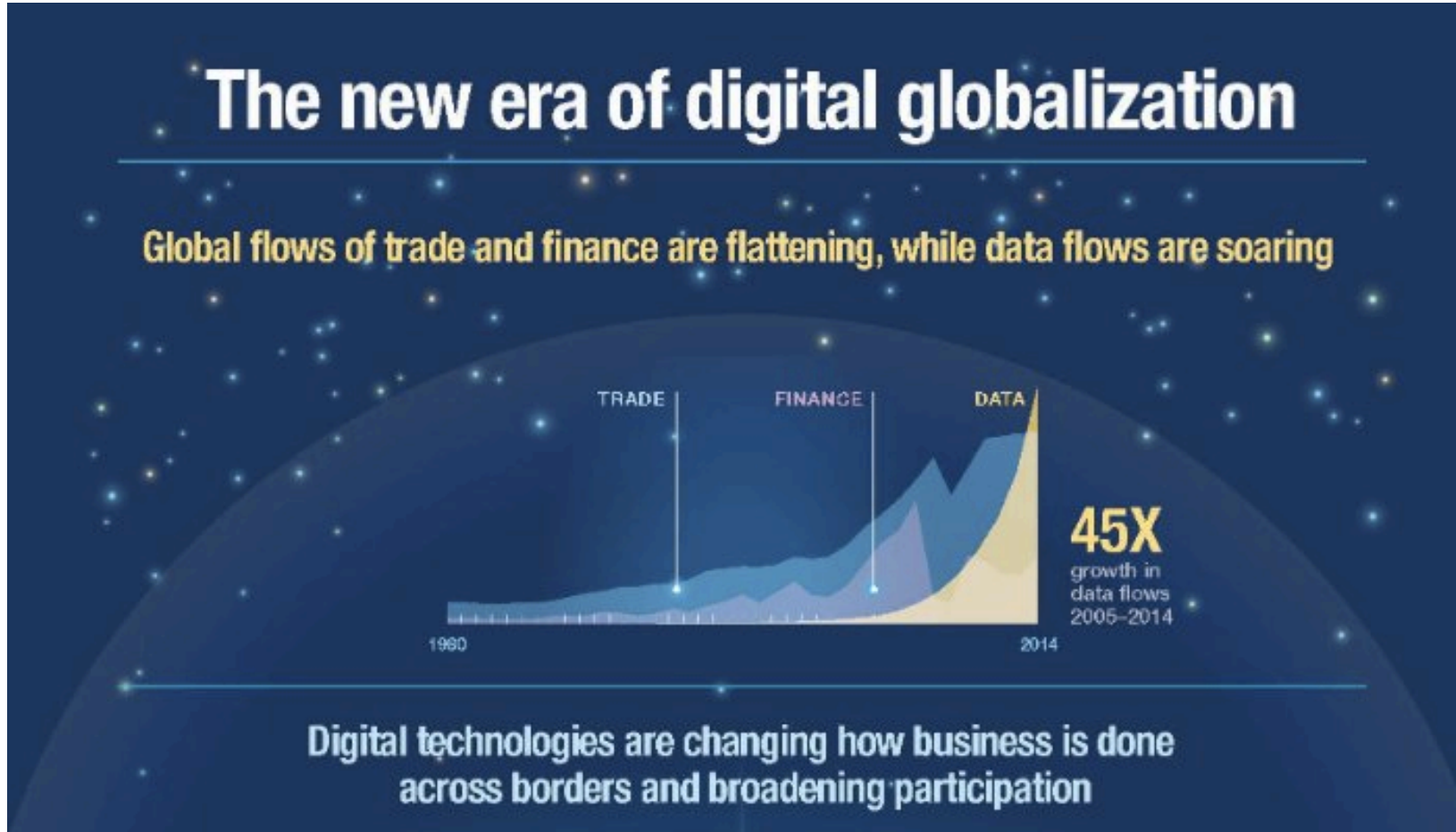
1. The Walden story
2. Kodak Digital Camera
3. Headline takeaways



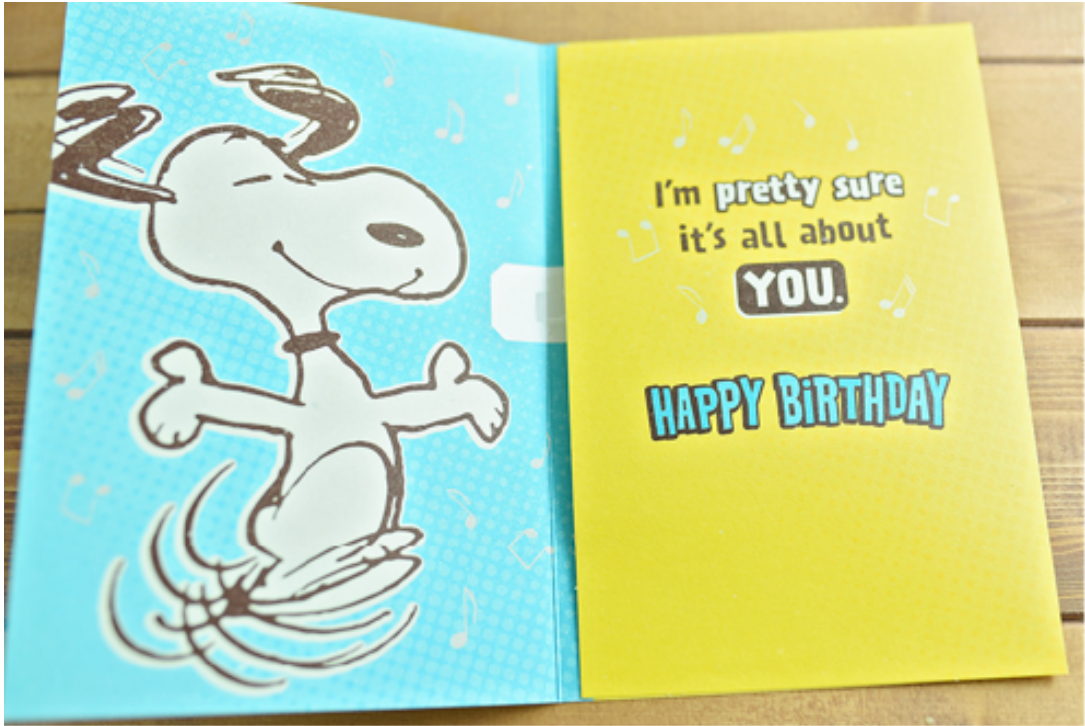
1/ Understanding AI - Pre-Introduction

Understanding exponential innovation to understand AI

1. Key growth drives in the past
2. Data flows v/s Trade Flows and Finance Flows
3. Apollo Mission to the moon
4. NASA Rover Curiosity
5. The accelerating pace of change
6. Headline takeaways

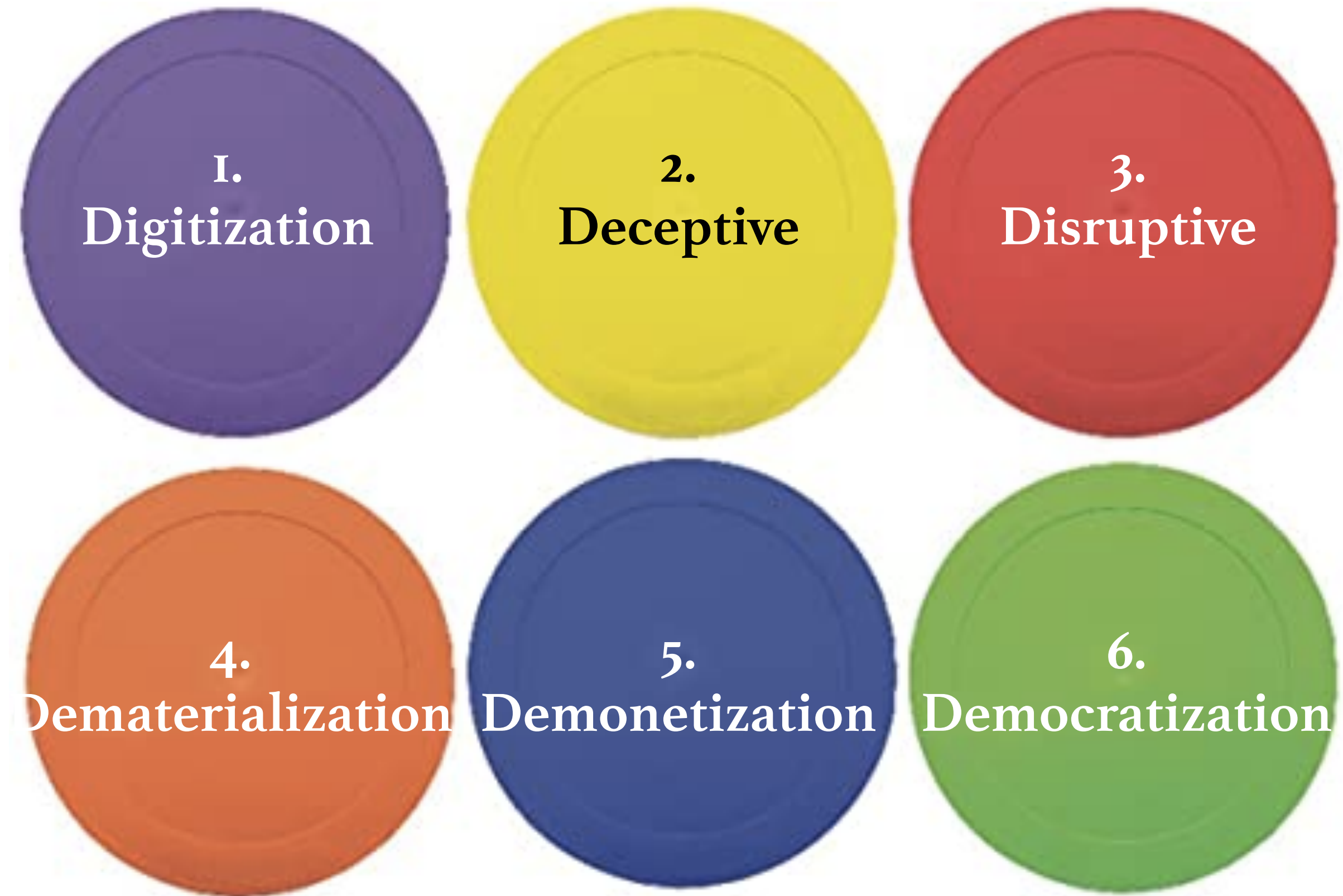


Apollo Guidance Computer	
Invented by	MIT Instrumentation Laboratory
Manufacturer	Raytheon
Introduced	August 1966
Discontinued	July 1975
Processor	Discrete IC RTL based
Frequency	2.048 MHz
Memory	16-bit word, 2048-word RAM (random-access memory); 36,864-word ROM
Power consumption	55 W
Weight	70 lb (32 kg)
Dimensions	24 in. × 12.5 in. × 6.5 in. (61 cm × 32 cm × 17 cm)



Processor: 200 Mhz
Storage: 256 MB RAM, 2 GB SSD

6 D's driving Exponential Growth



0.01 to 0.02, 0.04, 0.08...

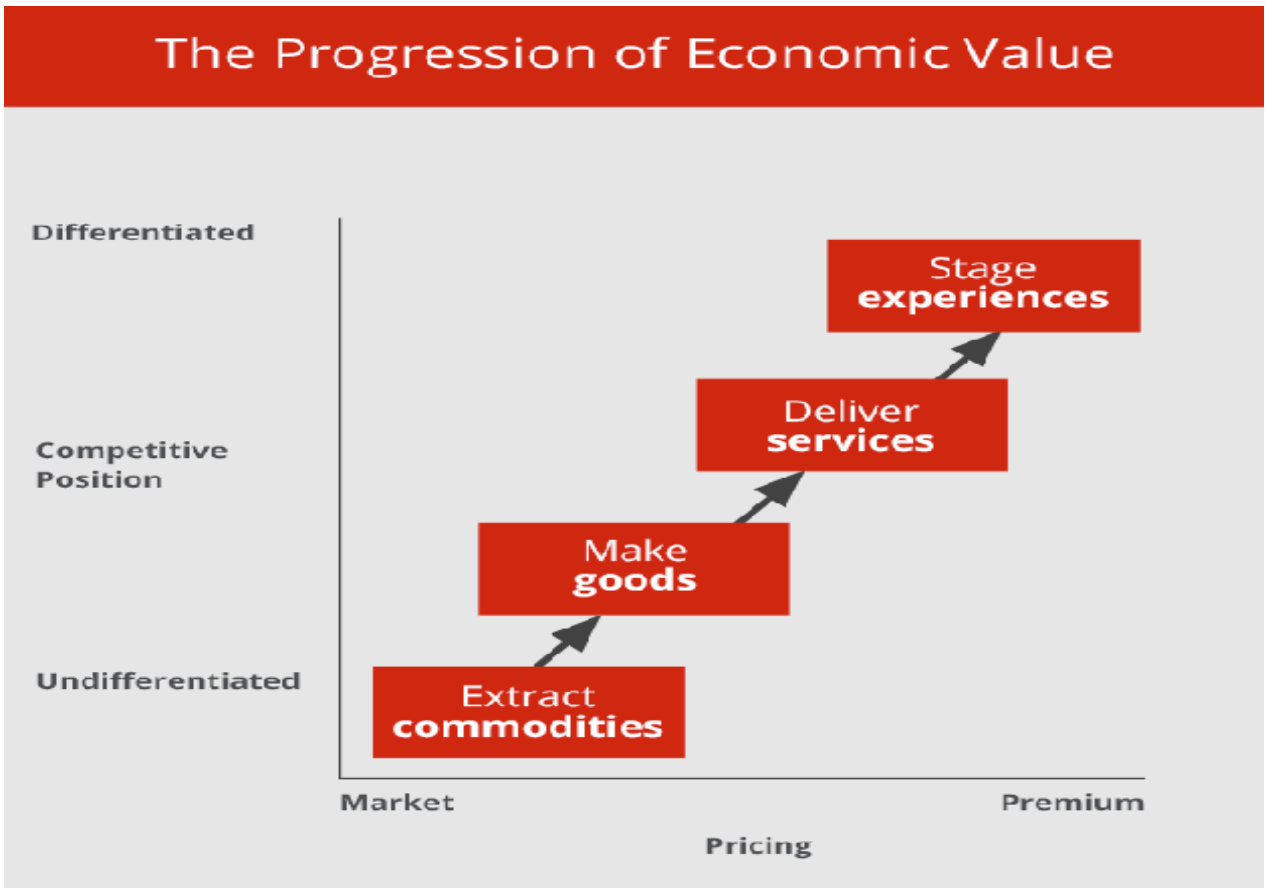
•

Bold; Peter Diamandis et al; Simon & Schuster; 2015

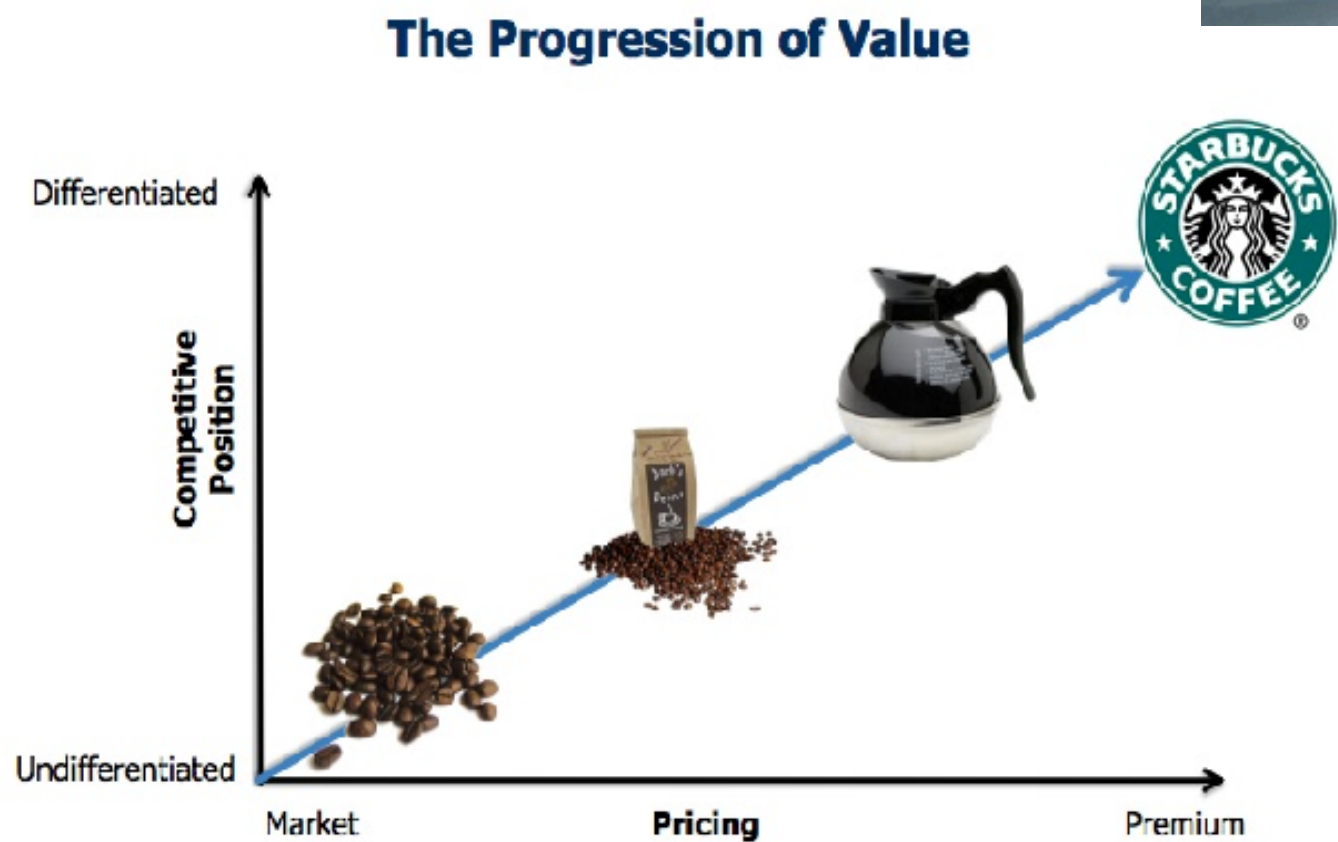
1/ Understanding AI - Pre-Introduction

Understanding exponential innovation to understand AI

1. 6 D's driving exponential growth
2. Instagram v/s Kodak
3. The experience economy
4. Headline takeaways



Pine & Gilmore; *The Experience Economy*;
Harvard Business Press



Pine & Gilmore; *The Experience Economy*;
Harvard Business Press

COMMODITY	GOODS	SERVICE	EXPERIENCE
Prevailing prices for various coffee offerings 1¢-2¢ Per Cup Agricultural Economy	5¢-25¢ Per Cup Industrial Economy	75¢-\$1.50 Per Cup Service Economy	\$2-\$5 Per Cup Experience Economy



蚂蚁金服
ANT FINANCIAL

Diagram 14: User engagement across Ant's expanding ecosystem



Source: Alibaba Group Investor Day, June 2016

Ant Financial is a Multisided Financial Services Platform



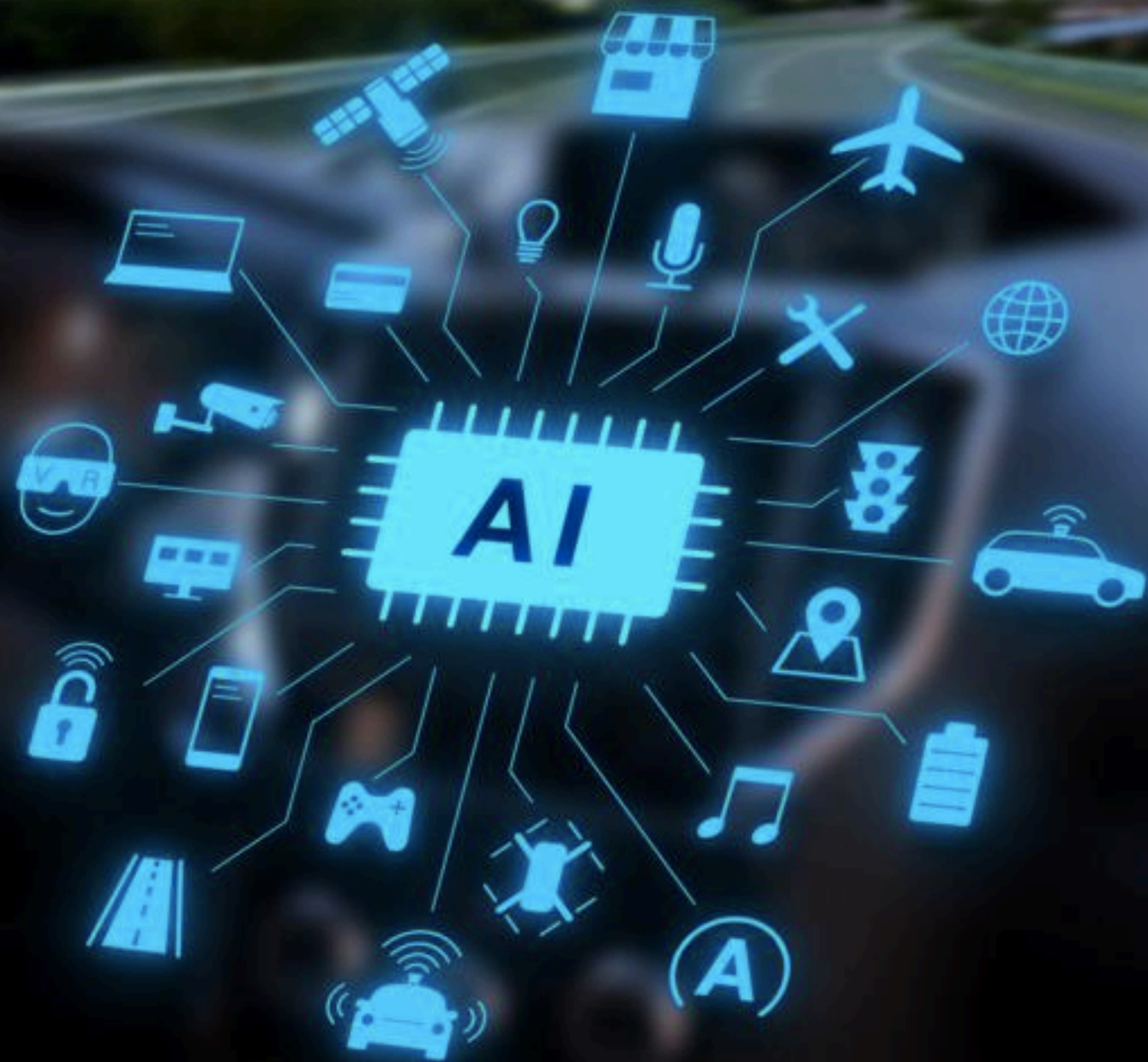
Firms like Ant have to use AI to Drive Digital Scale



At Ant traditional human centered processes are digitized to connect with market opportunities at near zero marginal cost. Operational bottlenecks are digitized.

"AI is the new runtime that is going to shape all that we do"

- Satya Nadella



1/ Understanding AI - Pre-Introduction

The new rules - The Impact of AI

1. Systemic change
2. Turbulence - VUCA
3. Universality
4. Recombination
5. Hub formation
6. Digital ethics
7. Leadership imperatives
8. A call to action
9. Headline takeaways



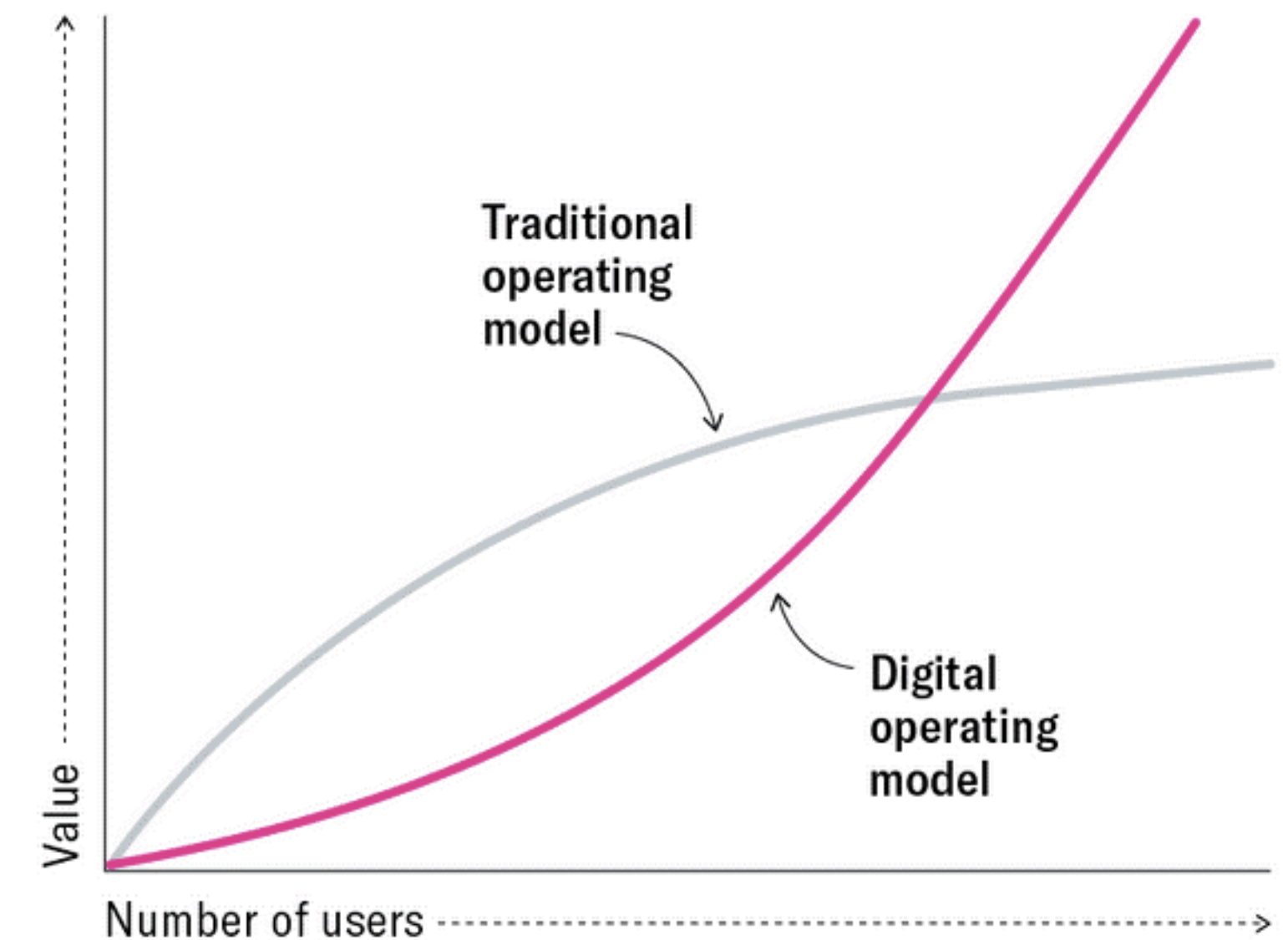
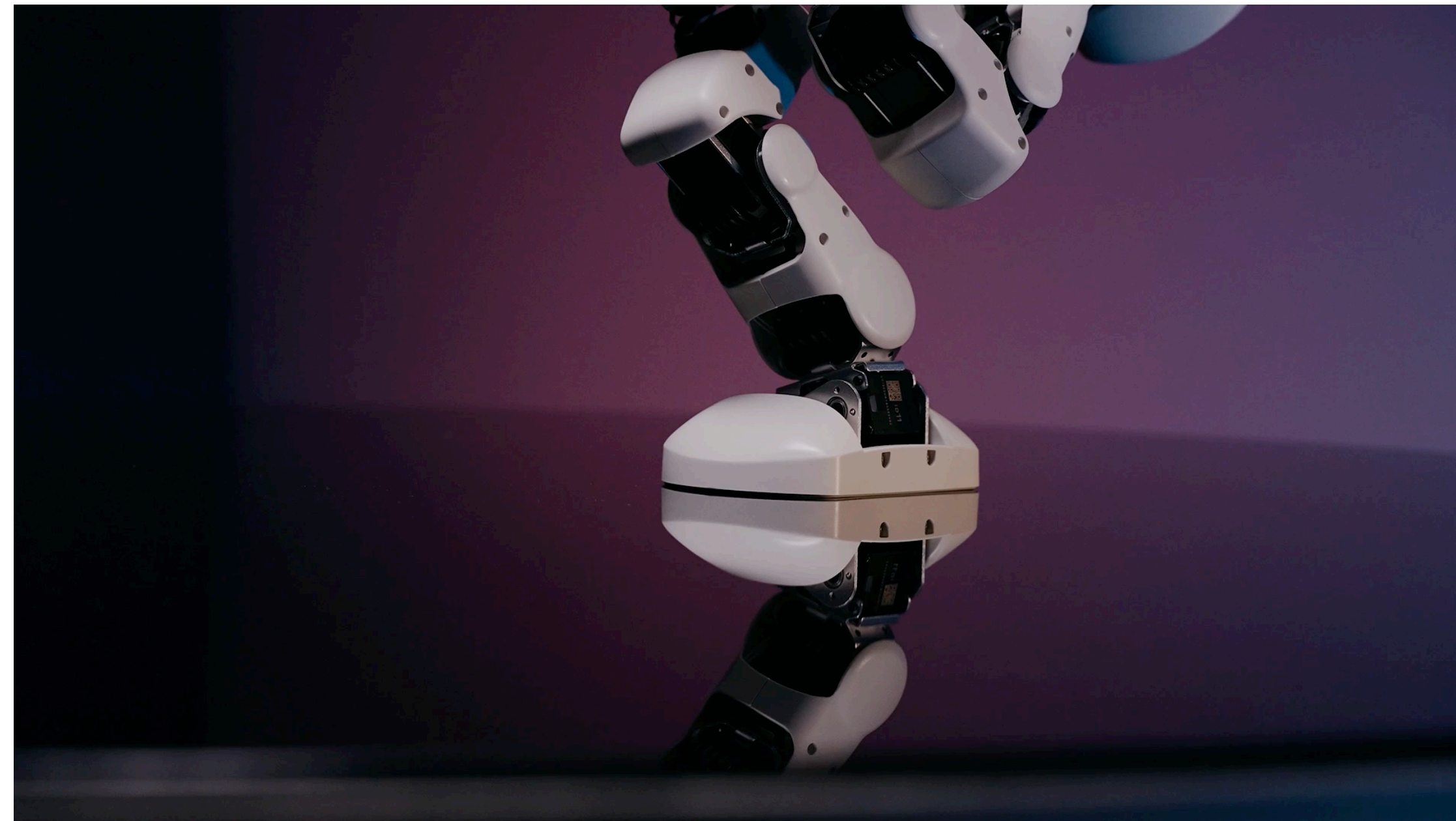
1/ Understanding AI - Pre-Introduction

AI: From tool to business transformation

1. Scale
2. Scope
3. Learning
4. Headline takeaways

How AI-Driven Companies Can Outstrip Traditional Firms

The value that scale delivers eventually tapers off in traditional operating models, but in digital operating models, it can climb much higher.

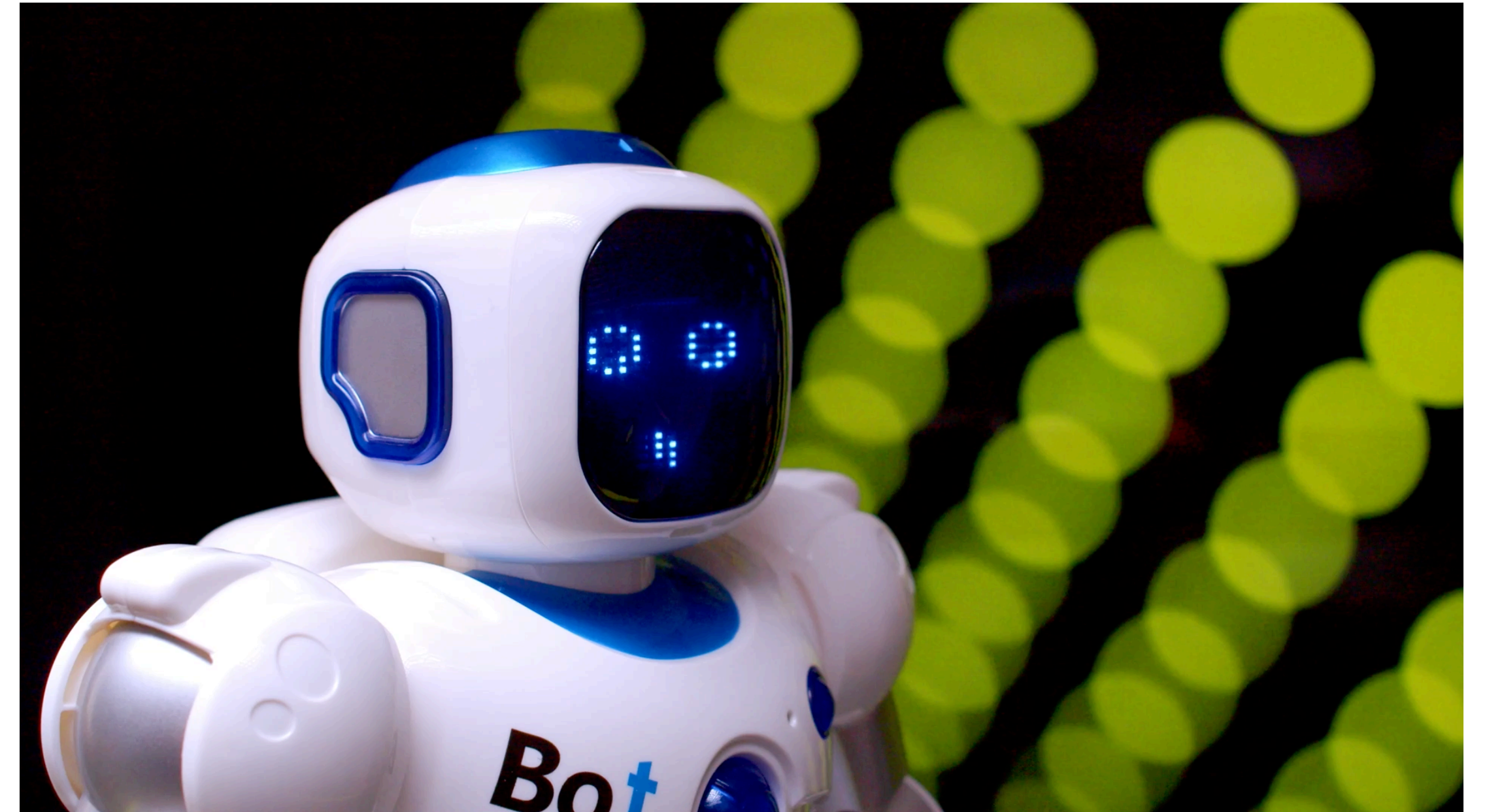


From: "Competing in the Age of AI," by Marco Iansiti and Karim R. Lakhani, January–February 2020

1/ Understanding AI - Pre-Introduction

The Past, Present and future

1. A brief history
2. AI Pioneers
3. AI Timeline and Famous Applications
4. The Thinking Machine - MIT 1961
5. Headline Takeaways



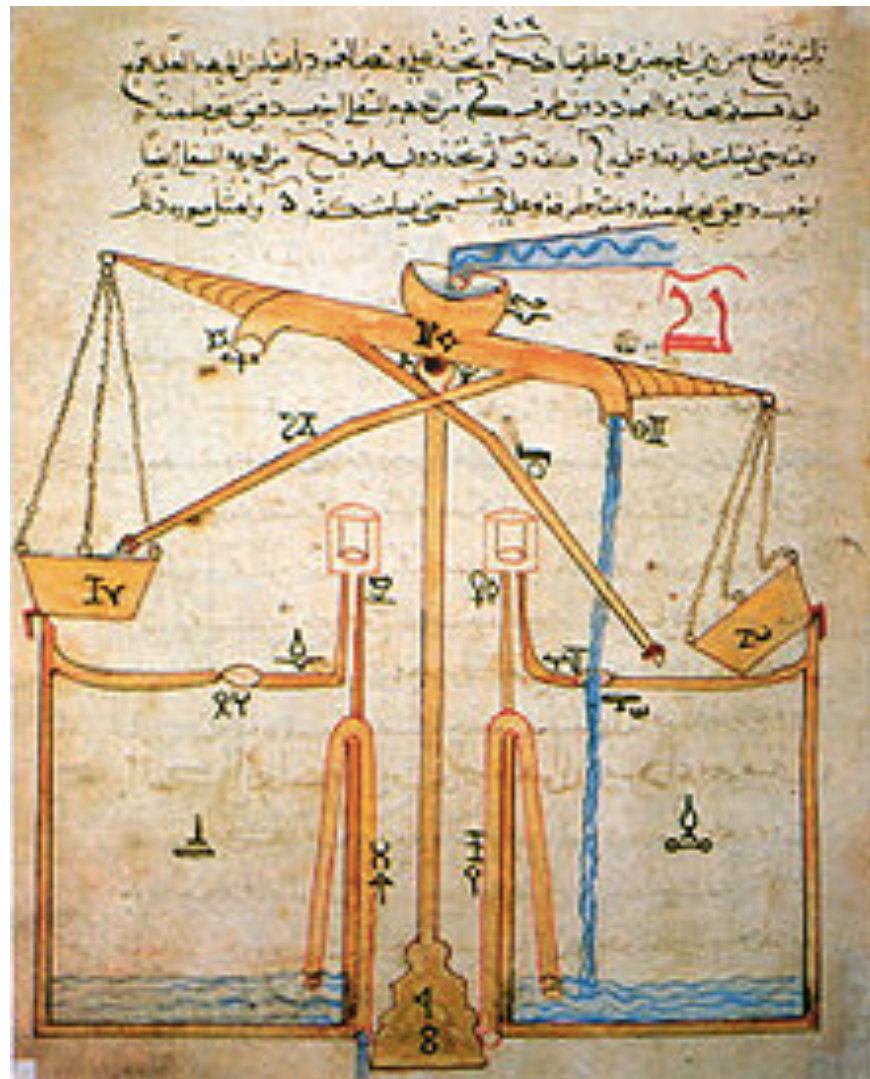


Diagram of a hydropowered perpetual flute from *The Book of Knowledge of Ingenious Mechanical Devices* by Al-Jazari in 1206.



Al-Jazari's Peacock Fountain



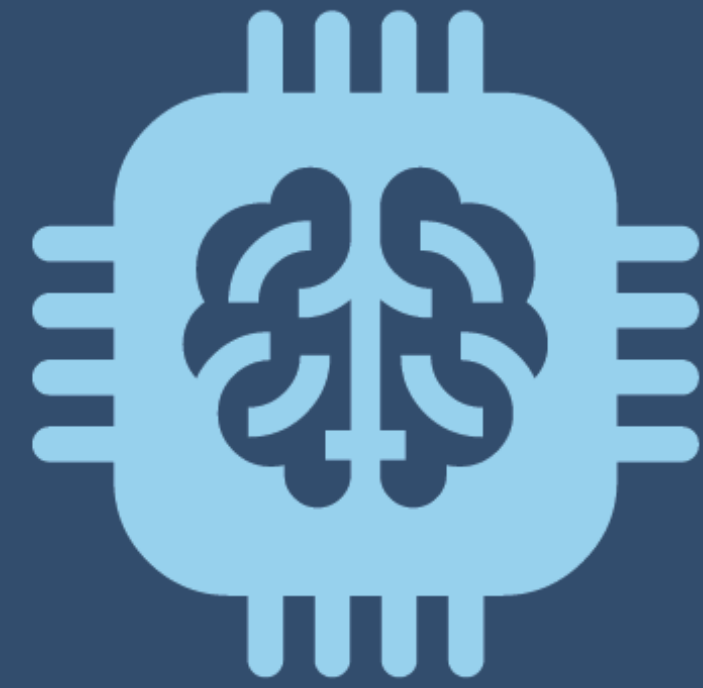
Silver [didrachma](#) from [Crete](#) depicting [Talos](#), an ancient mythical [automaton](#) with artificial intelligence



Al-Jazari's musical [robot](#) band.

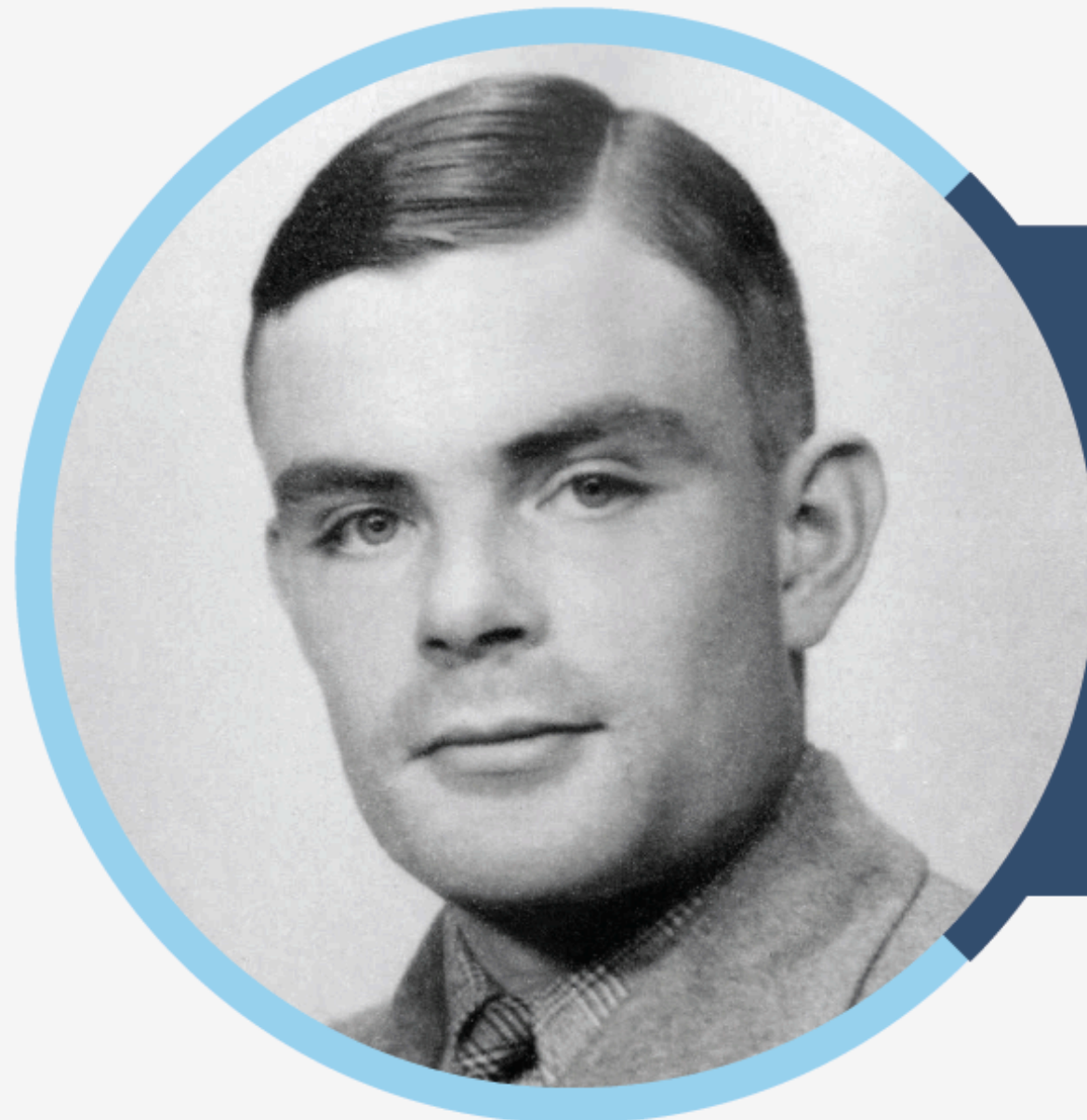


The water-clock of the drummers



AI TIMELINE and PIONEERS OF AI

1912 - 1954



Alan Turing

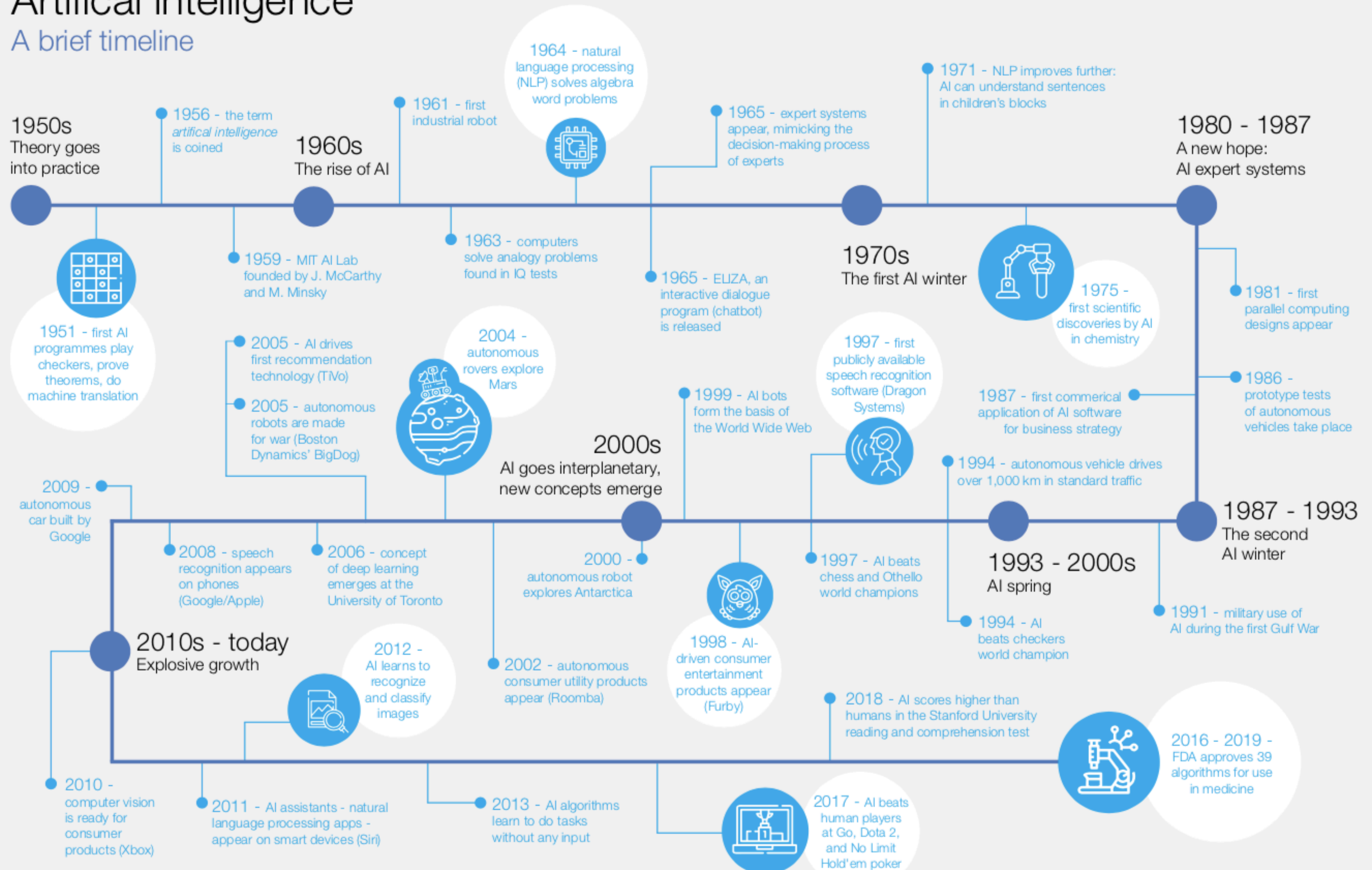
- Known as the “father of theoretical computer science and artificial intelligence.”
- Developed the Turing Test to test a machine’s ability to appear human.

"AI is the science and engineering of making intelligent machines, especially intelligent computer programs."

– Alan Turing

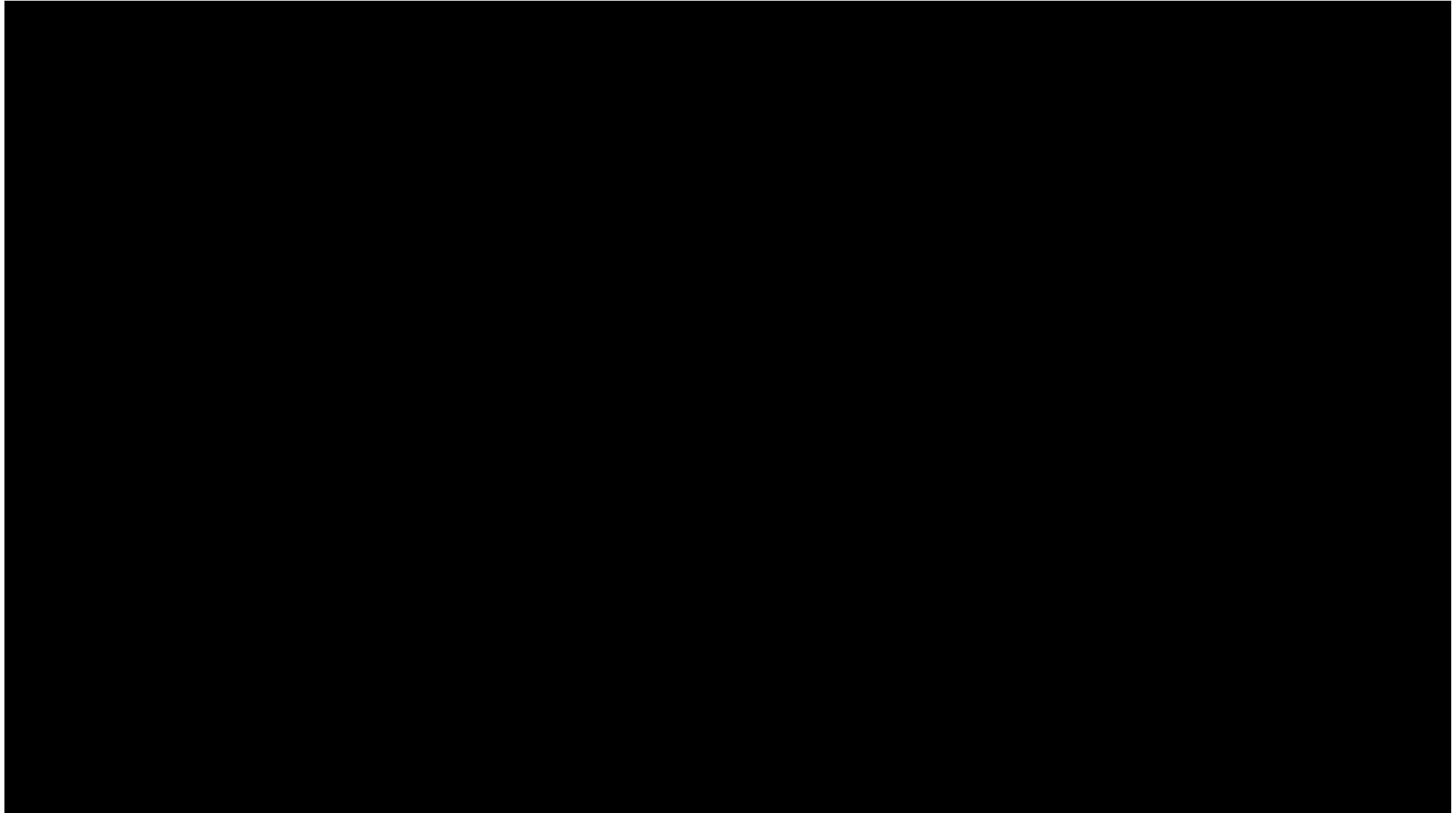
Artificial intelligence

A brief timeline



1/ Understanding AI - Pre-Introduction

The Past, Present and future [Click](#)



Quick Poll...2!

How many career shifts INTO AI are from different fields?

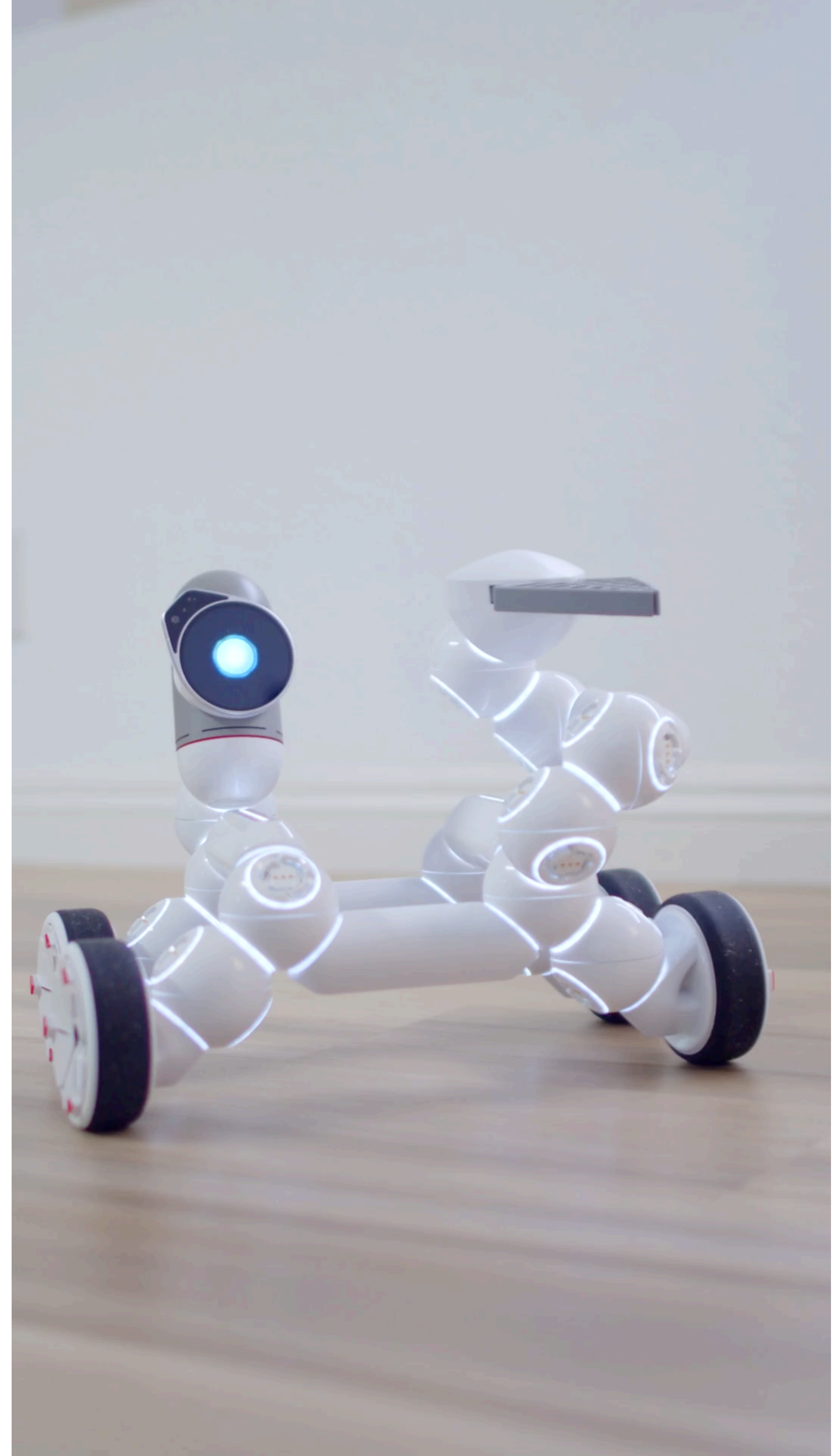
a/ >10%

b/ >25%

c/ >40%

d/ >60%

LinkedIn



Summary

1/ Understanding AI - Pre-Introduction

1. Introduction
2. Digitization. Exponential Innovation.
3. AI Impact. The New Rules.
4. AI: From tool to business transformation.
5. AI Pioneers
6. AI Timeline and Famous Applications
7. Headline takeaways

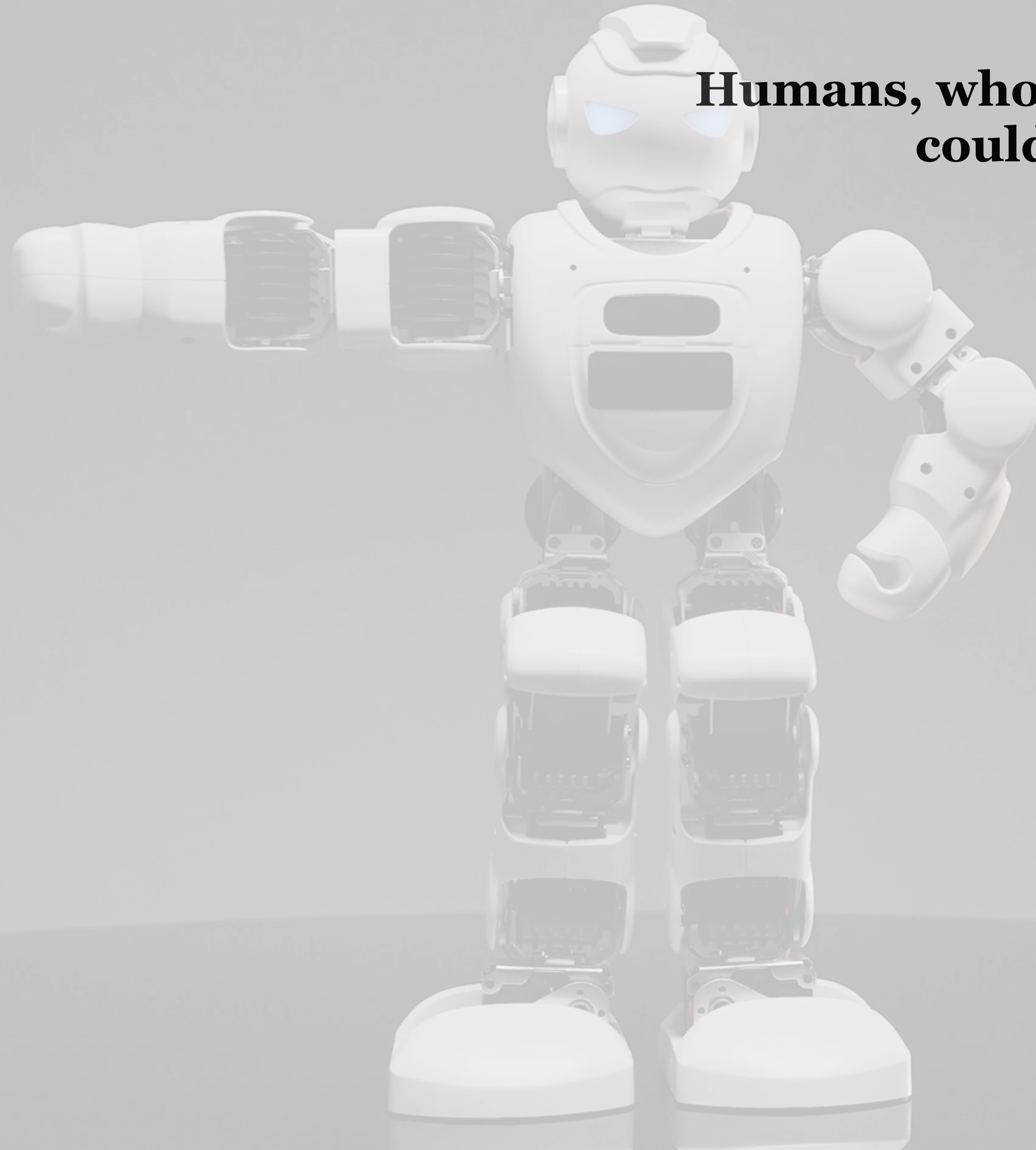


“The development of full artificial intelligence could spell the **end of the human race**....It would take off on its own, and re-design itself at an ever increasing rate.

Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded.”



- Stephen Hawking told the BBC



1/ Pre-Introduction
End of Presentation



1/ Understanding AI - Pre-Introduction

Breakout Room 1!

Could we consider bestowing
“Godhood” to Steve Ballmer!
for walking into those rather
big shoes of a great like Bill Gates?



Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

2/ Understanding AI

Big Data, Data Science, Data Analytics

Deep-Dive I





1.
Technology

2.
Business

2.
People



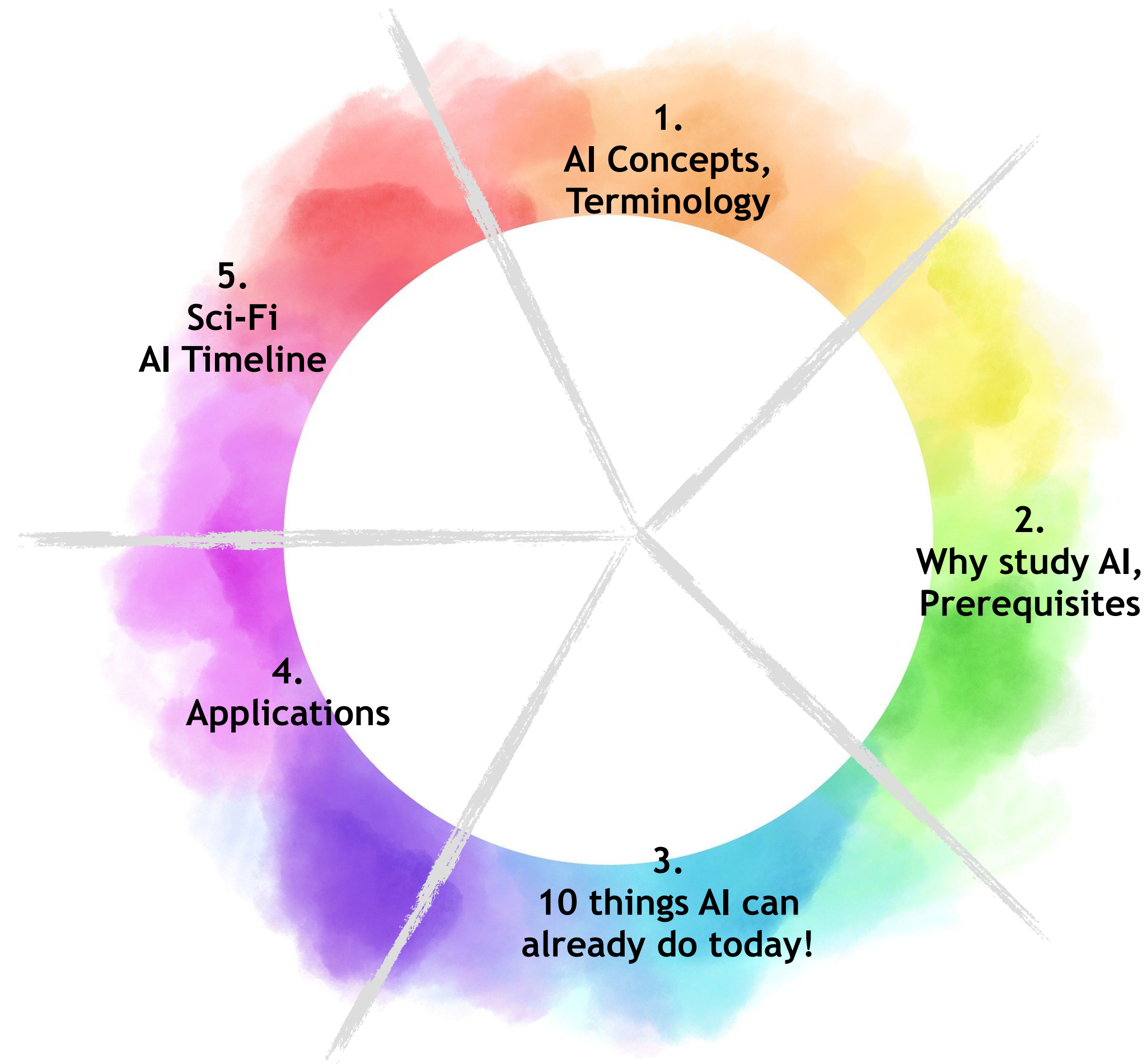
2. Understanding AI- The Basics

2. Understanding AI- The Basics



Demystifying AI

2 - Understanding AI - Deep Dive I





Yeah! Poll time...3!

_____ per cent of digital transformation initiatives use AI,
and significantly more will do so in the 2020s and beyond.

a/ 10%

b/ 20%

C/ 30%

d/ 40%



DATA IS NOT THE SAME AS KNOWLEDGE...



DATA IS NOT THE SAME AS KNOWLEDGE...

Data: recorded facts

- A red and round object



DATA IS NOT THE SAME AS KNOWLEDGE...



Data: recorded facts

- A red and round object

Information: data, systematized, organized and put in context

- The object is a *tomato*

DATA IS NOT THE SAME AS KNOWLEDGE...



Data: recorded facts

- A red and round object

Information: data, systematized, organized and put in context

- The object is a *tomato*

Knowledge: Information that gives you a competitive advantage

- The tomato is a *fruit*

DATA IS NOT THE SAME AS KNOWLEDGE...



Data: recorded facts

- A red and round object

Information: data, systematized, organized and put in context

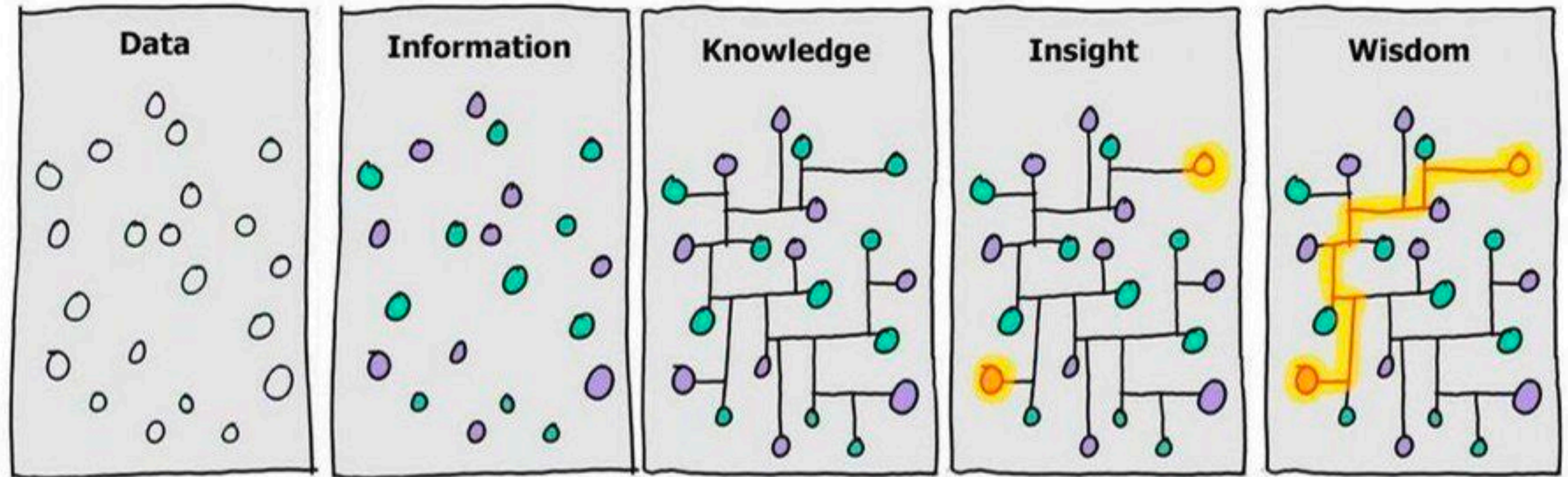
- The object is a *tomato*

Knowledge: Information that gives you a competitive advantage

- The tomato is a *fruit*

Wisdom: ...

- Don't ever put tomato in a fruit salad!



AI - Deep Dive 1

Data Science

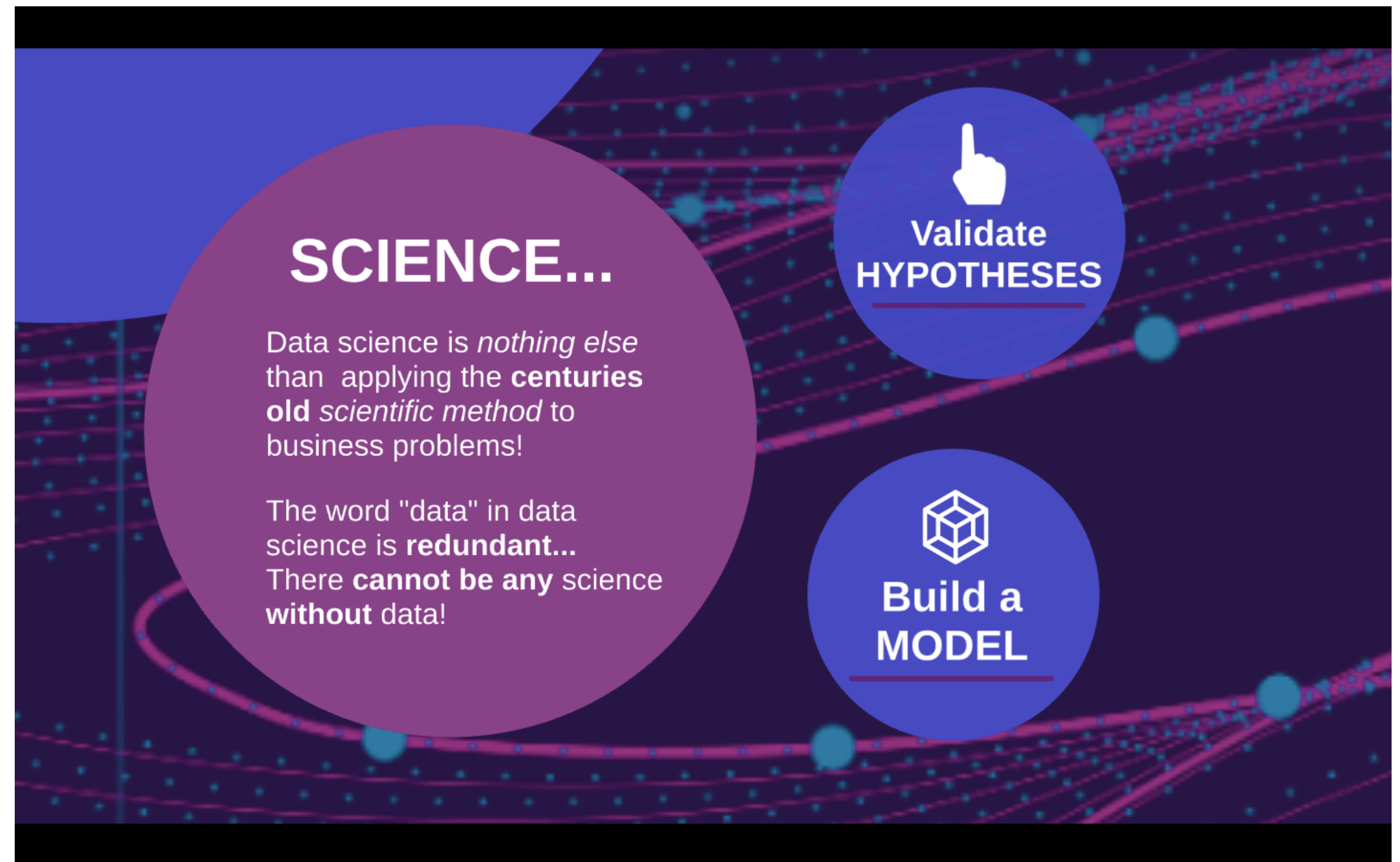
- Definition 1
 - Process of understanding
 - Science
 - Umbrella term
- Headline takeaways



AI - Deep Dive 1

Data Science

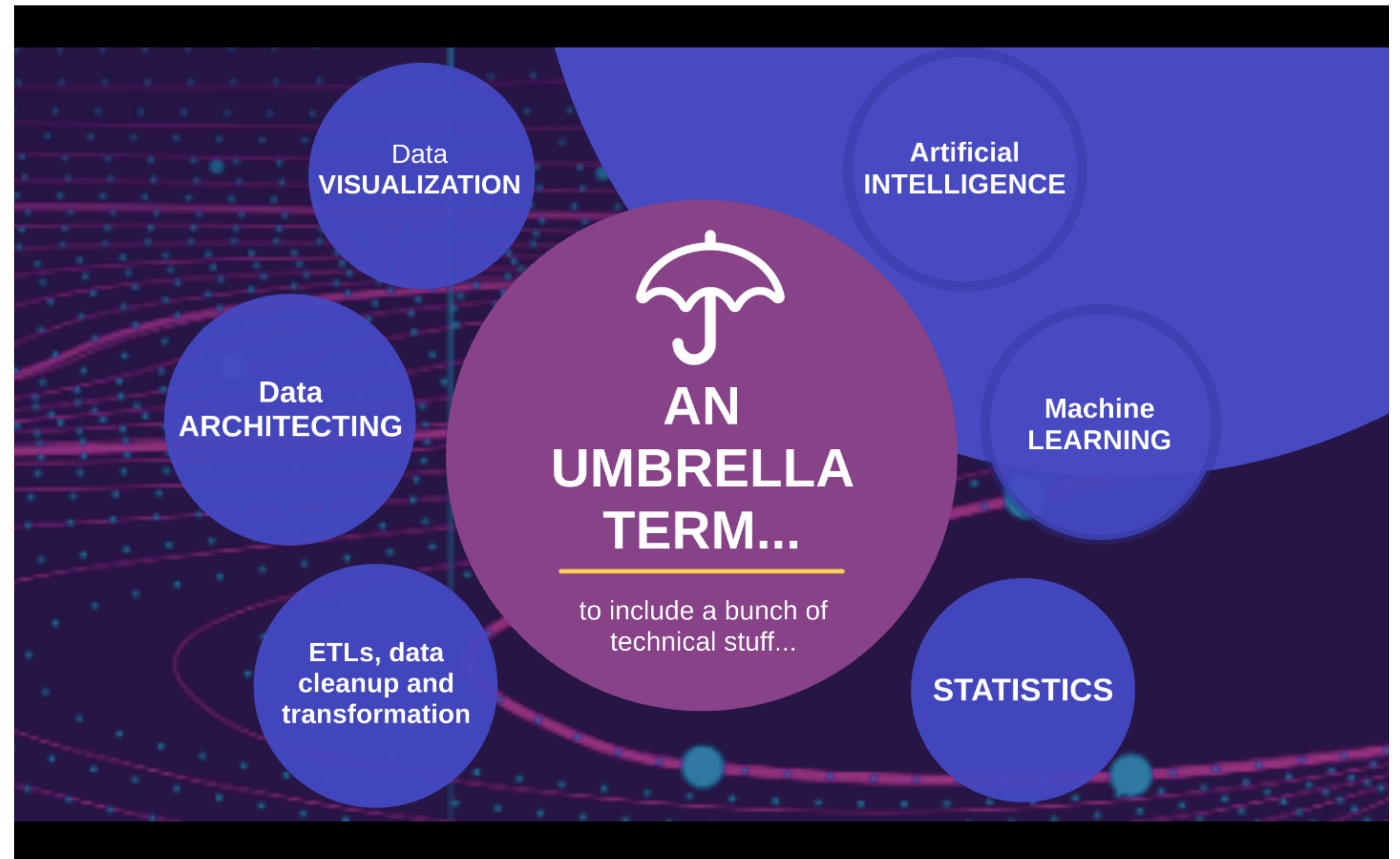
- Data Science
- Definition 2
 - Process of understanding
- Science
 - Umbrella term
- Headline takeaways



AI - Deep Dive 1

Data Science

- Data Science
- Definition 3
 - Process of understanding
 - Science
- Umbrella term
- Headline takeaways



AI - Deep Dive 1

Data Science

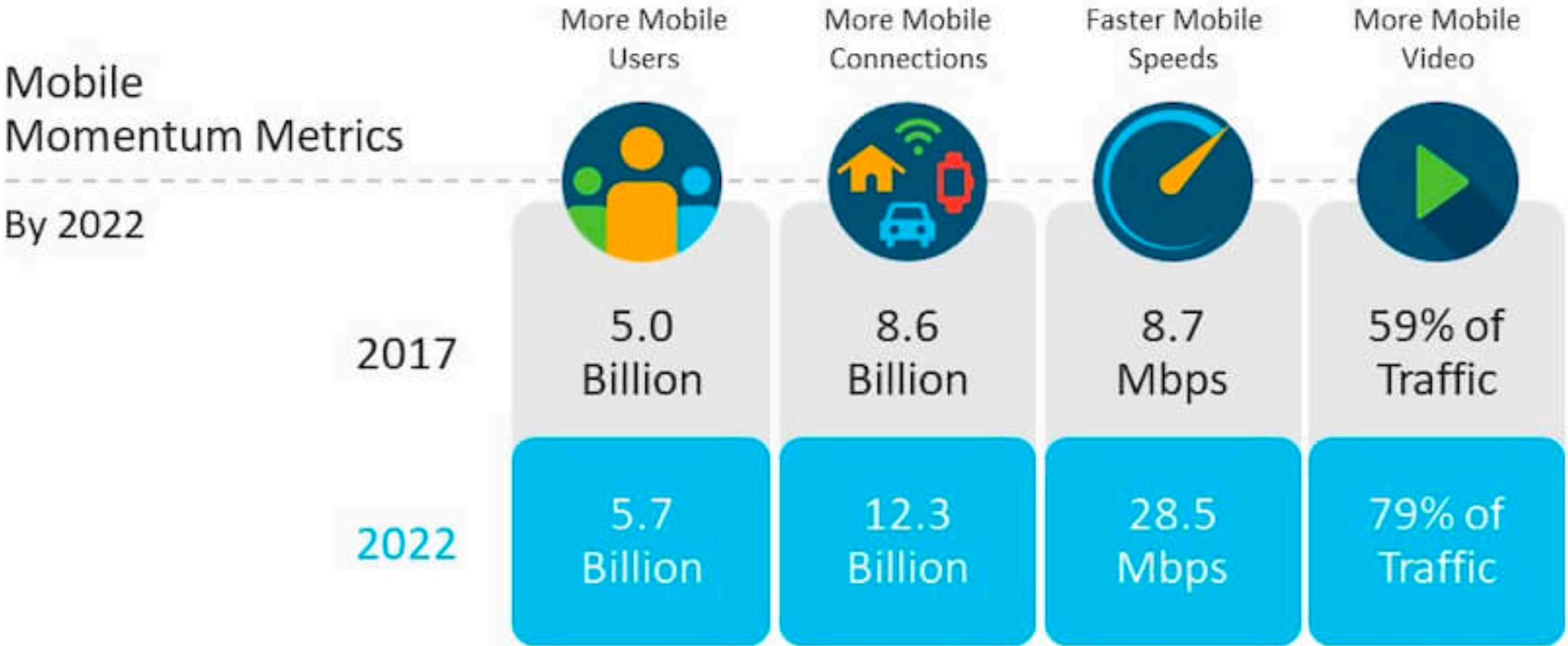
- Data Science
- Why is it a thing NOW!
- Headline takeaways



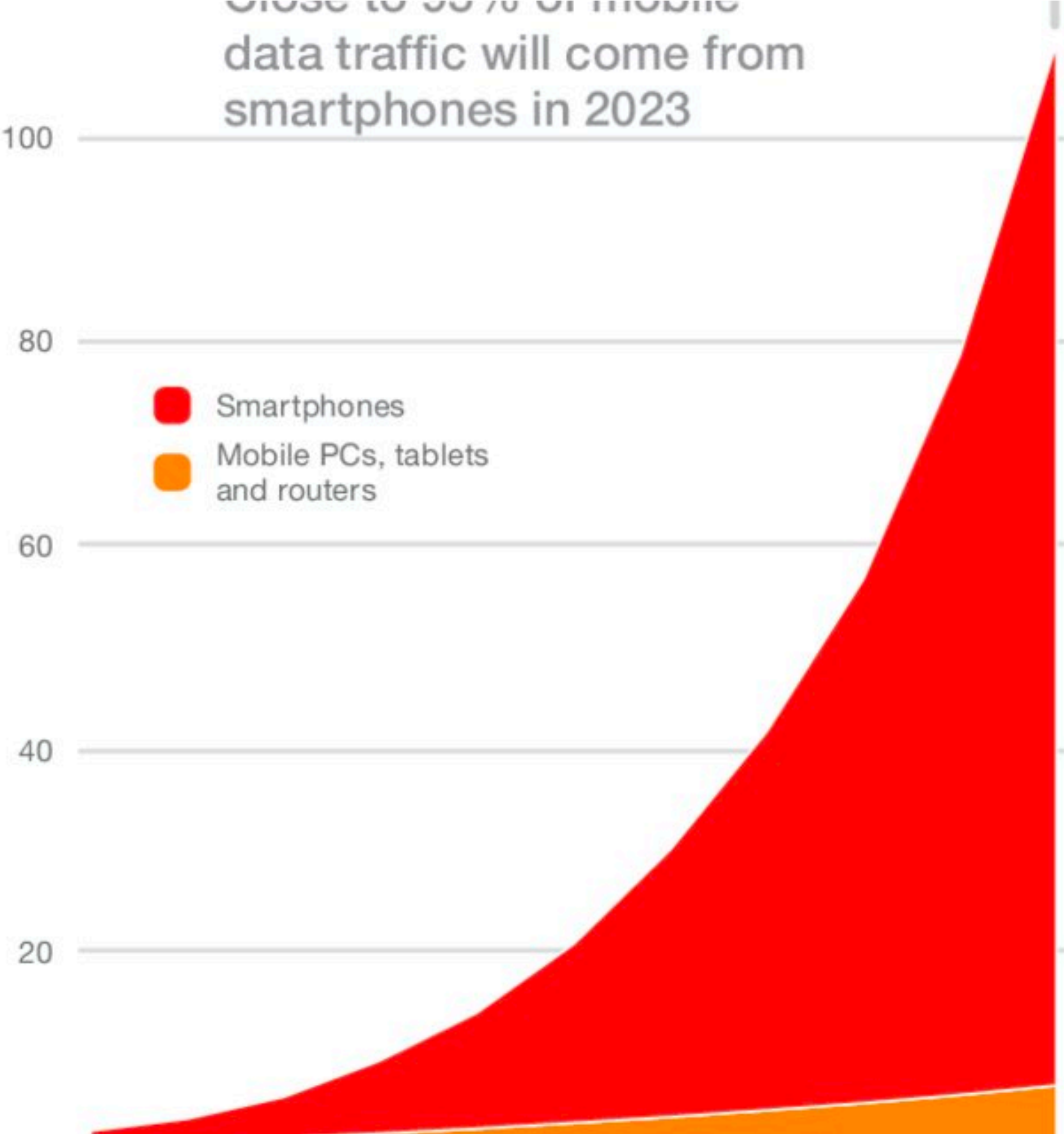
AI - Deep Dive 1

Data Science

Global Mobile Data Drivers



Source: Cisco VNI Global Mobile Data Traffic Forecast, 2017–2022



AI - Deep Dive 1

Big Data Analytics

- What is big data analytics?
- Headline takeaways



AI - Deep Dive 1

Big Data Analytics

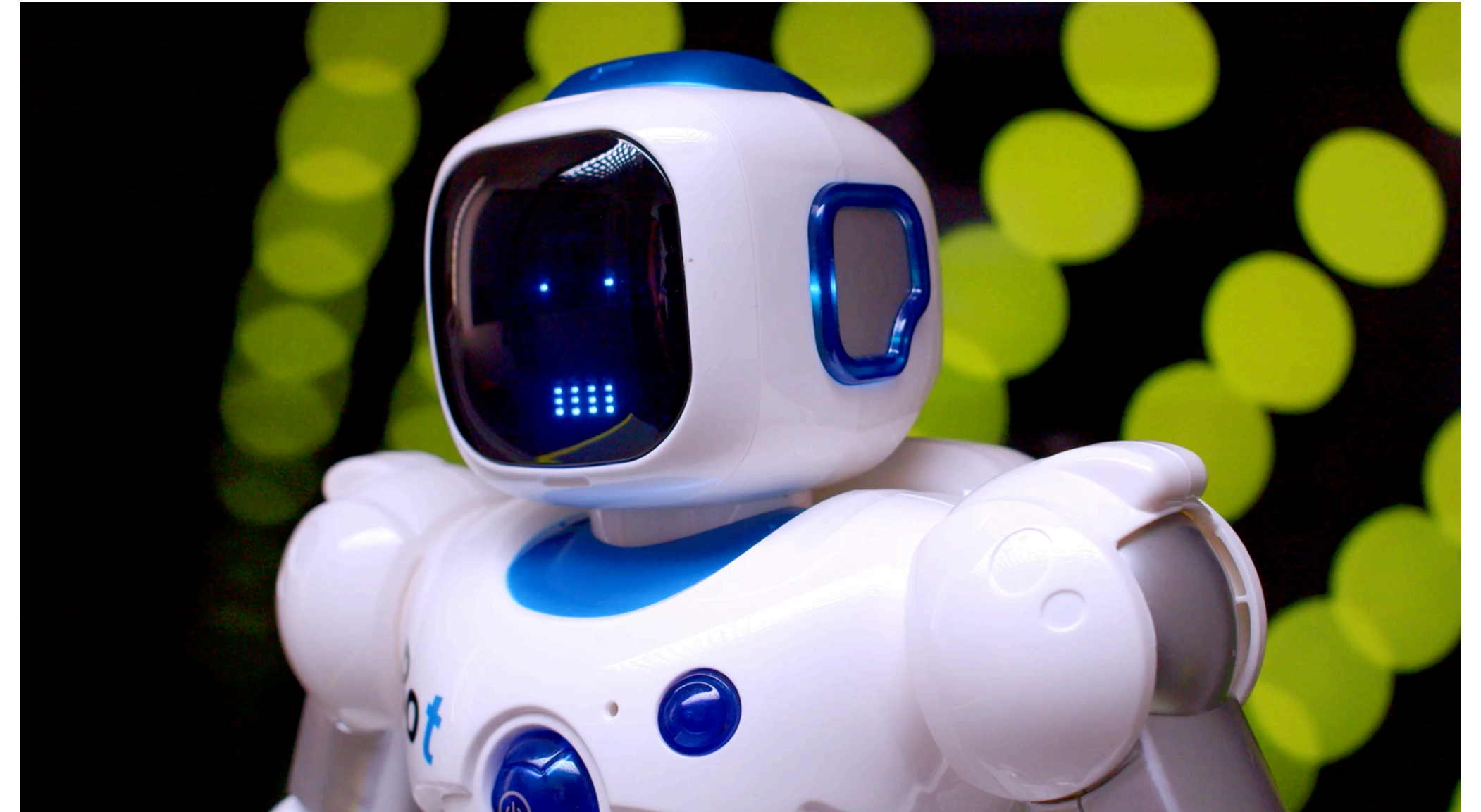
- Data Science vs
- Big Data vs
- Data Analytics
- Headline takeaways



AI - Deep Dive 1

An Introduction

1. The origin of AI
2. Key components
 - Computational systems
 - Data and data management
 - Advanced AI algorithms/ Code
3. Why important
4. Use cases
5. Headline takeaways



AI - Deep Dive 1

Explaining AI



Quick Poll...4!

The pace of technology adoption is expected to remain unabated and may accelerate in some areas. AI figures amongst those on top.

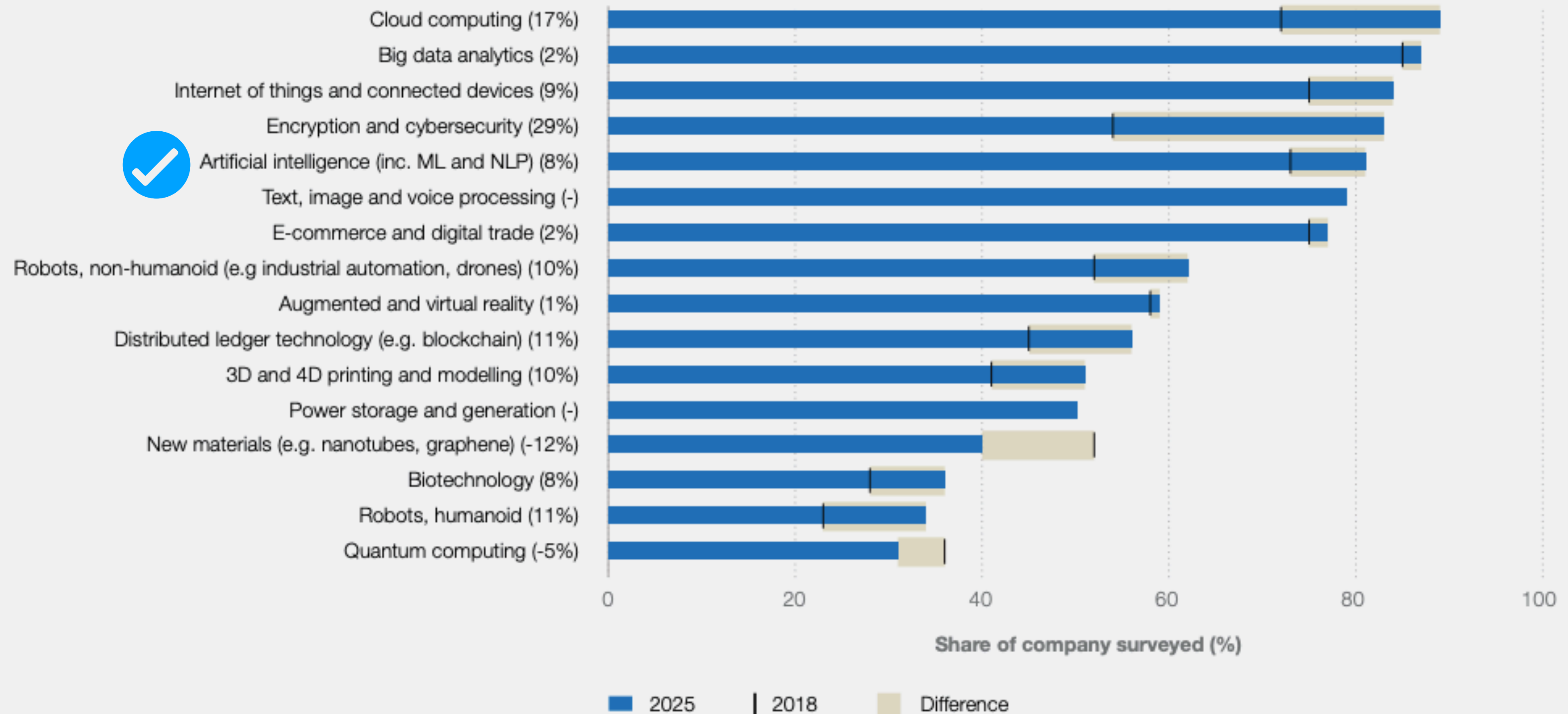
a/ True

b/ False



FIGURE 18

Technologies likely to be adopted by 2025 (by share of companies surveyed)



Source

Future of Jobs Survey 2020, World Economic Forum.

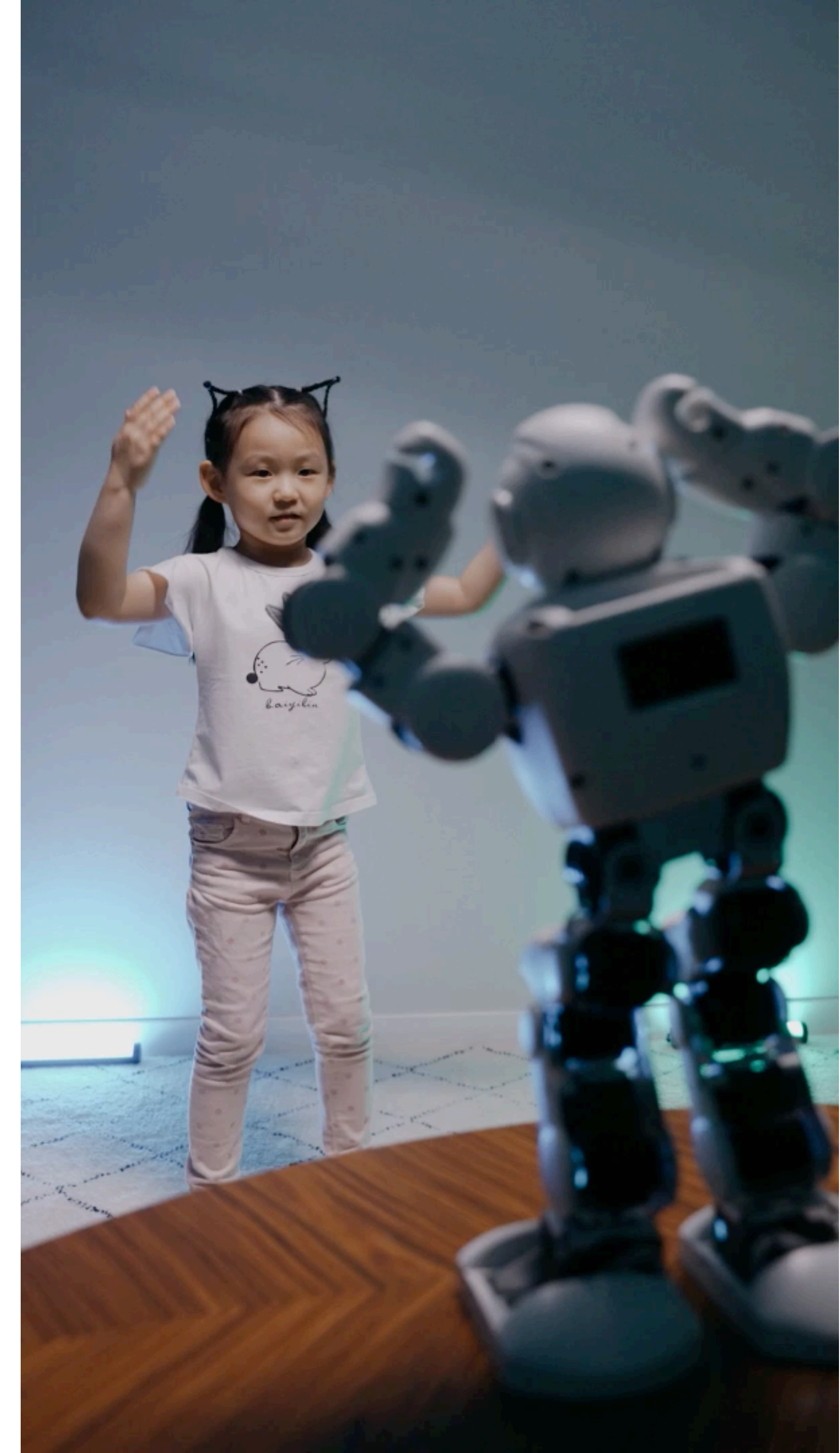


Yeah! Poll time...5!

Artificial intelligence is cited as the top up-skilling need among professionals seeking online continuing education.

a/ True

b/ False



AI - Deep Dive 1

Why study AI

Why Study Artificial Intelligence in Business?

- 71% of organizations and leaders perceive AI and Machine Learning are “game-changers”¹
- 78% of brands have already or are planning to implement AI by 2020²
- Growth of the global AI market is forecast to grow to \$118.6 billion by 2025³

¹ Sources: MemSQL, Accenture, narrativescience.com, cmo.com, pwc.com

² https://www.oracle.com/webfolder/s/delivery_production/docs/FY16h1/doc35/CXResearchVirtualExperiences.pdf

³ tractica.com

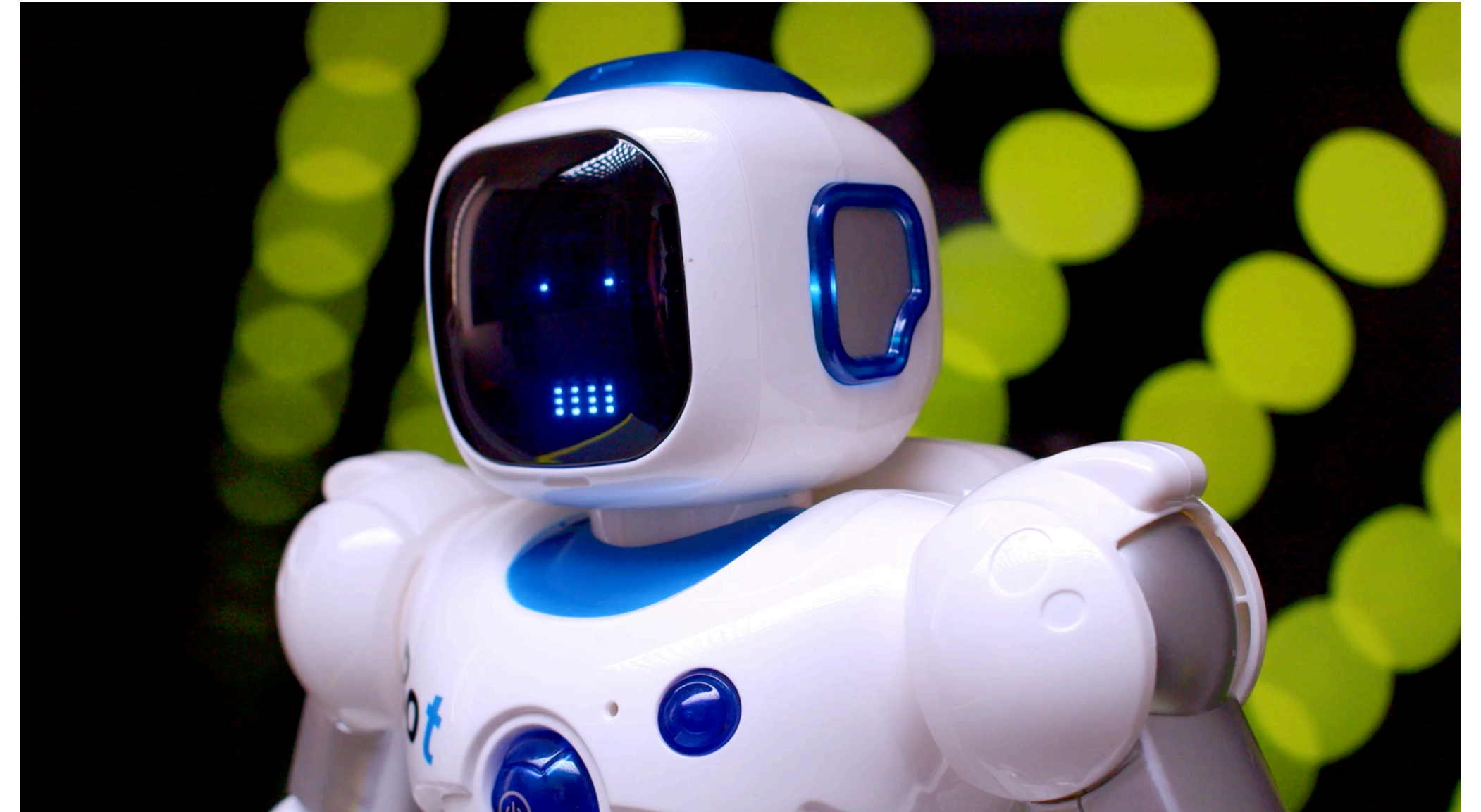


AI - Deep Dive 1

Pre-requisites

Programming

1. Basic coding concepts
2. Right language
 - Language demonstrating low level concepts
 - Avoid popular languages
 - Choose a lang on basis of goals
3. Hands-on coding, not reading
4. Master fundamentals
5. Write code on paper
6. Language features v/s libraries
7. Headline takeaways

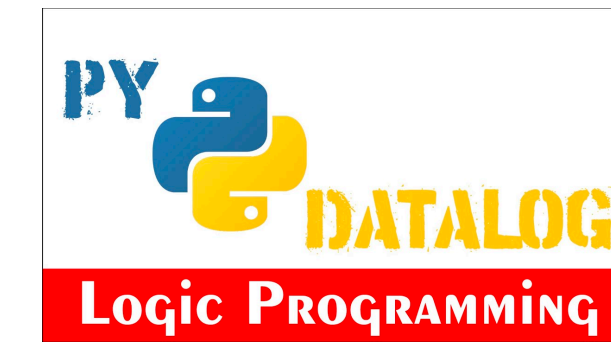
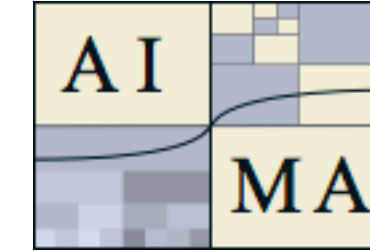


AI - Deep Dive 1

Pre-requisites

Python

1. Features and advantages
2. Why AI and Python
3. Decoding Python
4. Python Libraries for General AI
5. Python for ML
6. Python v/s C++ for AI
7. LISP for AI
8. Java with AI
9. Headline takeaways



simpleai-team/
simpleai

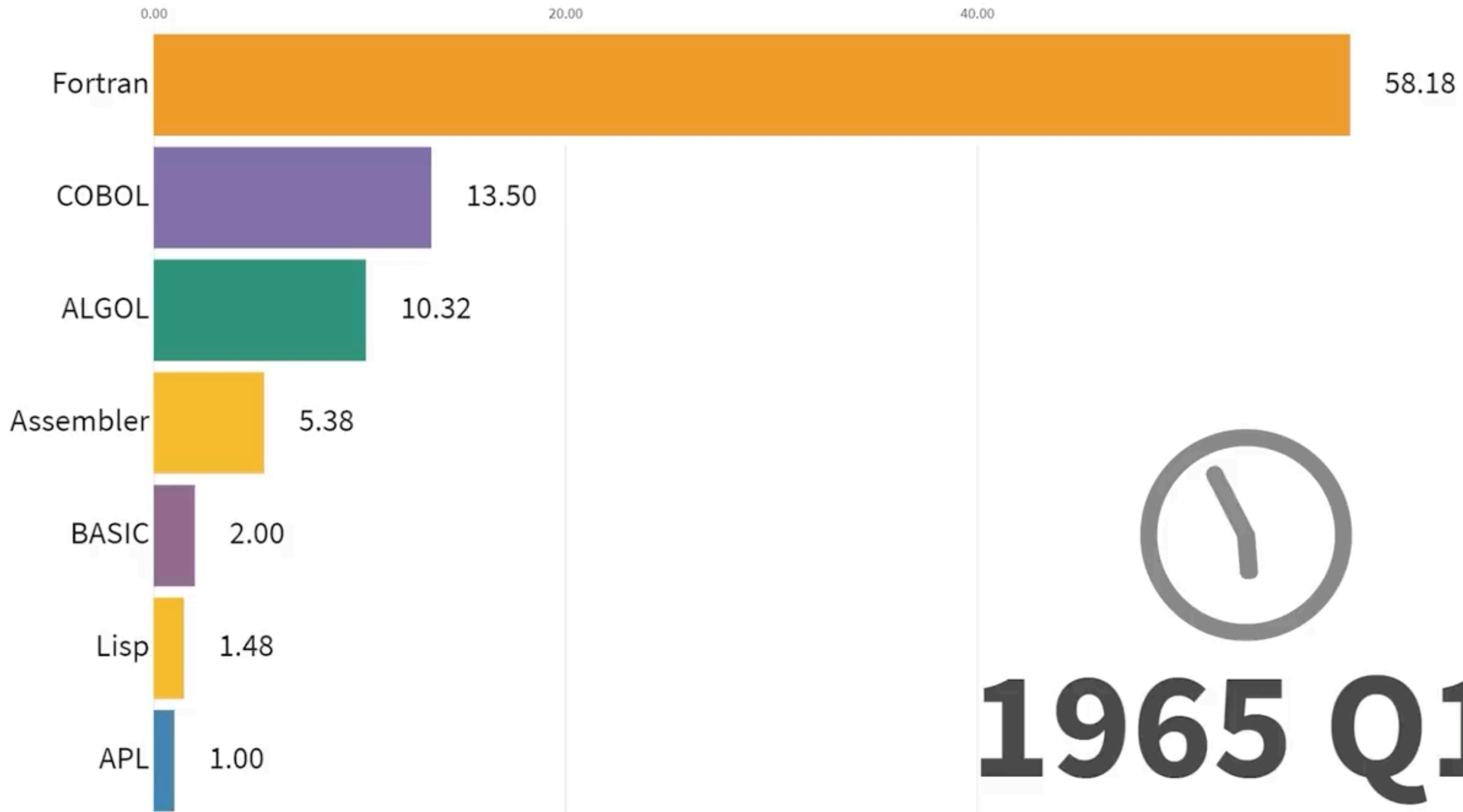
simple artificial intelligence utilities

12 Contributors 58 Used by 914 Stars 238 Forks



e a s y A I





1965 Q1

Thinking Humanly "The exciting new effort to make computers think ... <i>machines with minds</i> , in the full and literal sense." (Haugeland, 1985) "[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning .. ." (Hellman, 1978)	Thinking Rationally "The study of mental faculties through the use of computational models." (Charniak and McDermott, 1985) "The study of the computations that make it possible to perceive, reason, and act." (Winston, 1992)
Acting Humanly "The art of creating machines that perform functions that require intelligence when performed by people." (Kurzweil, 1990) "The study of how to make computers do things at which, at the moment, people are better." (Rich and Knight, 1991)	Acting Rationally "Computational Intelligence is the study of the design of intelligent agents." (Poole <i>et al</i> , 1998) "AI ... is concerned with intelligent behavior in artifacts." (Nilsson, 1998)

Figure 1.1 Some definitions of artificial intelligence, organized into four categories.

➔ **Think like human**

The exciting new effort to make computers think... machines with minds, in the full and literal sense. [Haugeland, 1985].

➔ **Think Rationally**

The study of the computations that make it possible to perceive, reason, and act. [Winston, 1992].

➔ **Act Humanly**

The study of how to make computers do things at which, at the moment, people are better. [Rich & Knight, 1991].

➔ **Act Rationally**

The branch of computer science that is concerned with the automation of intelligence behaviour. [Luger & Stubblefield, 1993].





[Click](#)

Yeah! Poll time...6!

The value of AI technology in FinTech is expected to reach

a/ > 5 billion

b/ > 10 billion

c/ >15 billion

d/ > 20 billion

SOURCE: RESEARCH AND MARKETS



AI - Deep Dive 1

Breakout Room 2!

Do robots qualify as people?

Could we consider granting
“personhood”
to sophisticated, autonomous robots?



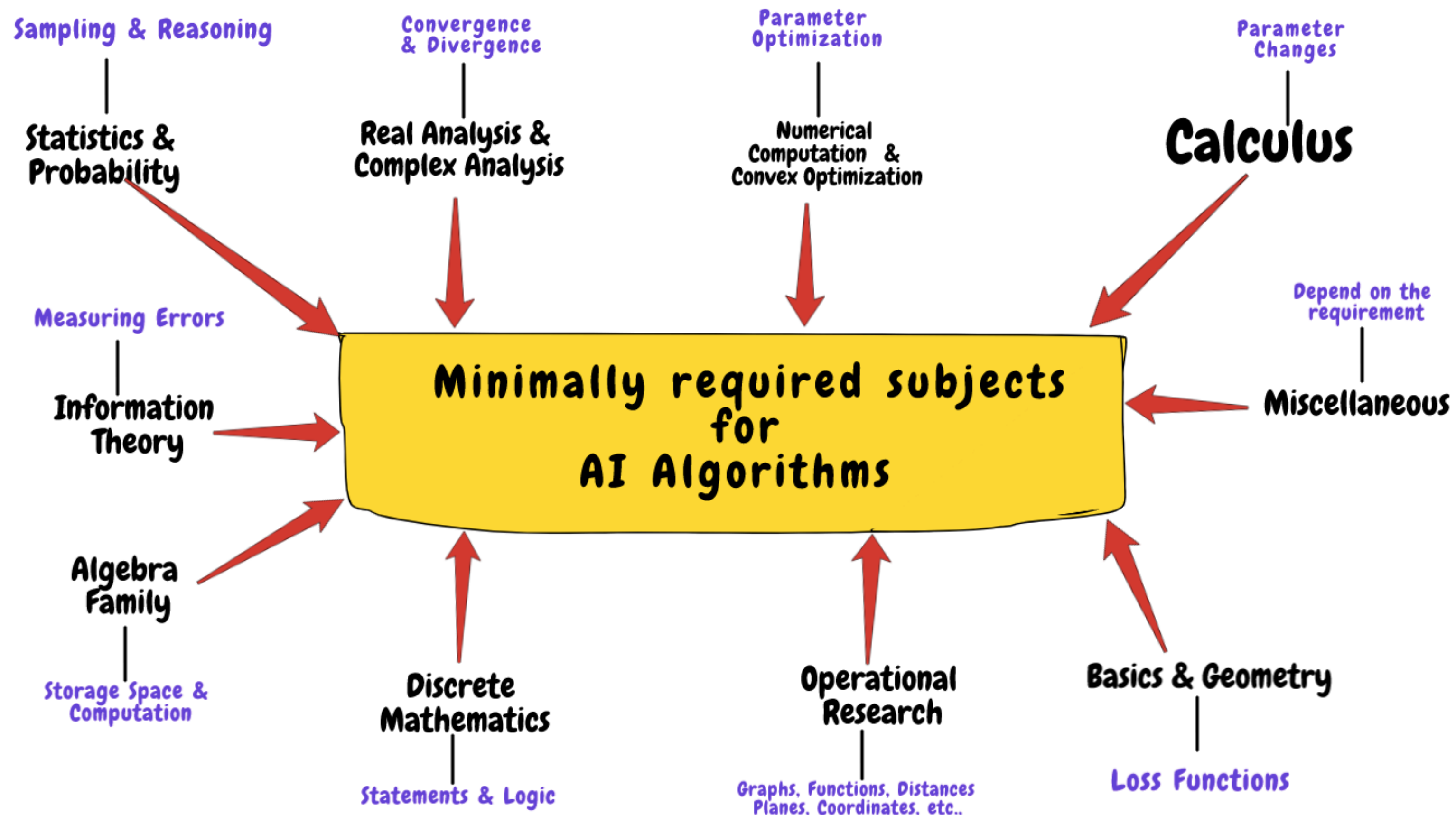


 UNVEILED

AI - Deep Dive 1

Pre-requisites

Mathematics



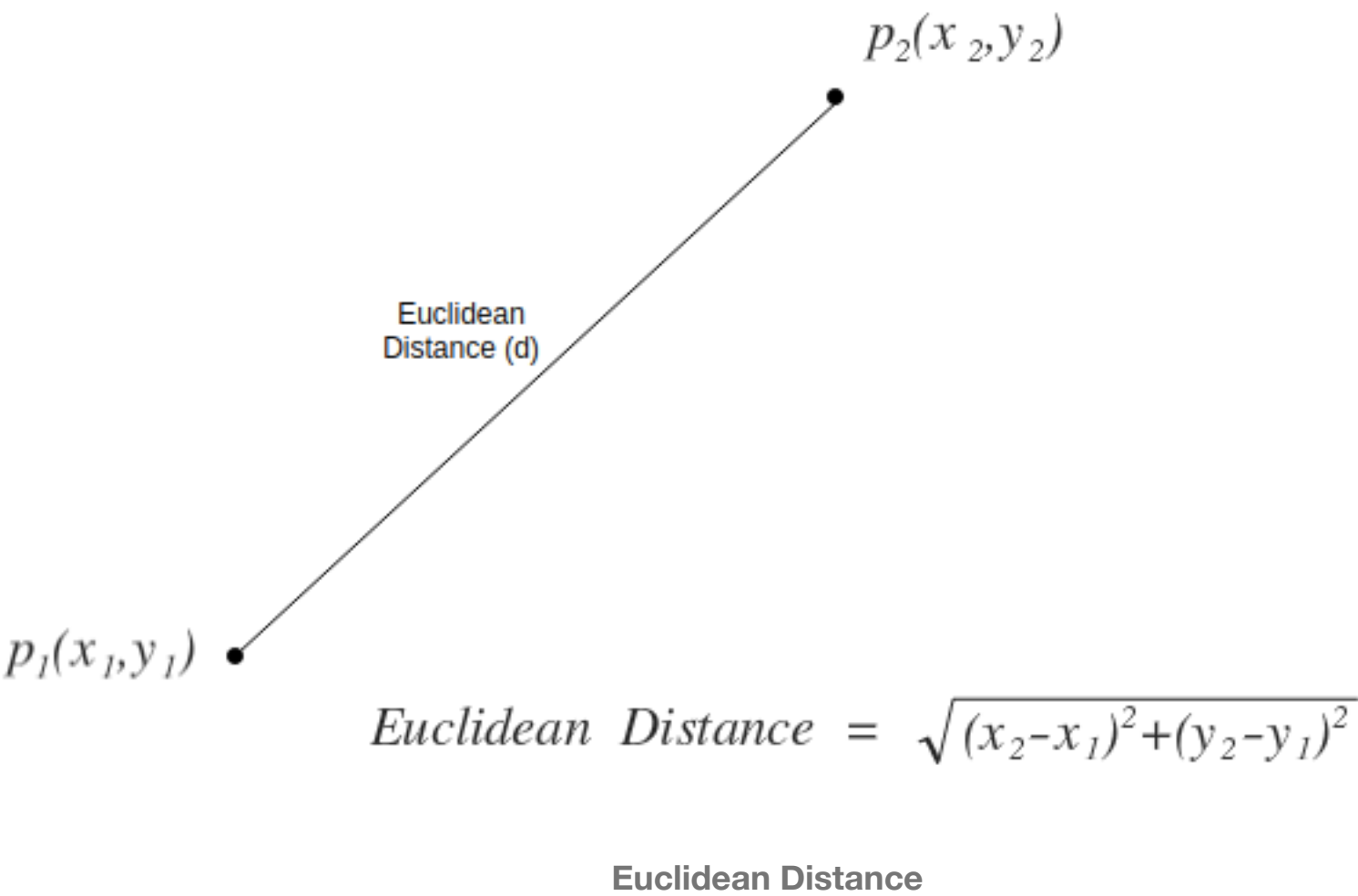
AI - Deep Dive 1

Pre-requisites

Mathematics

Basics & Geometry

Requires to to understand the concepts, notations and advanced subjects.



Algebra

Abstract, Linear and Vector Algebra. Linear Algebra is a computation tool in AI

Concepts	Types and Usages
Vector	Stores your data in n-dimensions
Vector Norms	L1, L2, L1+L2 - applies in Regularization for ML Algorithms, Frobenius and max norm
Vector Product Rules	Dot Product, Cross Product, Cosine, etc., -> Checking for the similarity of Vectors
Unit Vector	Checking and using in various algorithms for normalization

Concepts, Types and Usages of Vectors



AI - Deep Dive 1

Pre-requisites

Mathematics

Stats & Probability

Deals with Reasoning and Uncertainty

Concepts

Descriptive statistics

Probability Theory

Chain Rule

Bayesian Rule

Distributions

Sampling

Hypothesis Testing

Estimators (MLE/MAP)

Applications/Purpose of Concepts

It is a summary statistic that quantitatively describes or summarizes the features from a collection of information.

It provides the analysis of random phenomena. The outcome of random event cannot be determined before it occurs. In AI random events are used as vectors.

Evaluating the dependencies in a sequence of tokens

Using for Text classification eg: e-mail: spam or ham

Data source and provides various kinds of data to use in AI applications Eg: Data source for weights, Normal Distribution to get Normalized Data

Sampling is the process of study of population/data based on samples instead of individual evaluation. It has different various usages in ML and DL.

To draw the conclusion or inference about the data.

Estimating the value of a parameter in two ways MLE and MAP. MLE single value estimator and MAP multiple value estimator.

Major Statistical Concepts used in AI

Calculus

Deals with Changes in the parameters, functions, errors and Approximations.

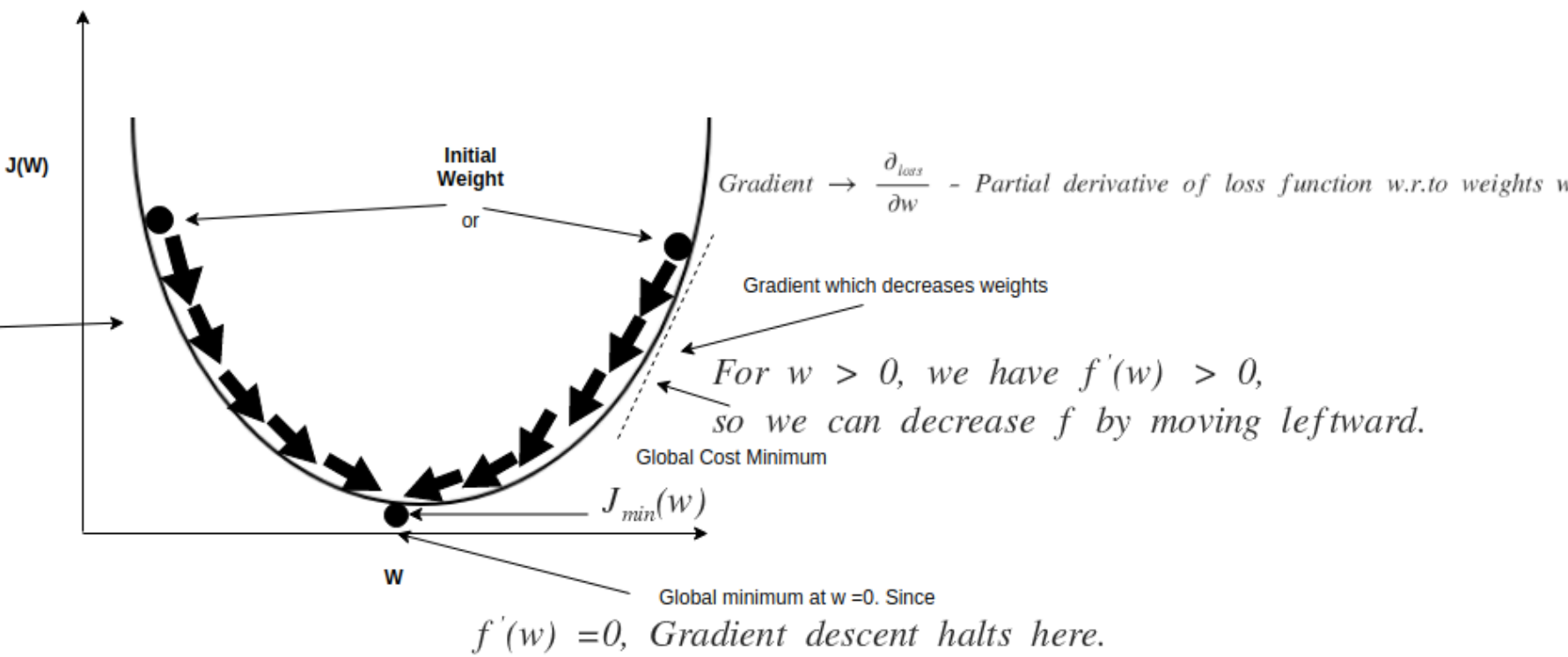
For $w < 0$, we have $f'(w) < 0$, so we can decrease f by moving rightward.

updating weights w

$$w = w - \alpha \frac{\partial \text{loss}}{\partial w}$$

learning rate

Learning rate describes to converge at every point if it is small otherwise won't converge in the right way



Gradient Descent Algorithm working on Parameters or Weights in an ML/DL algorithm



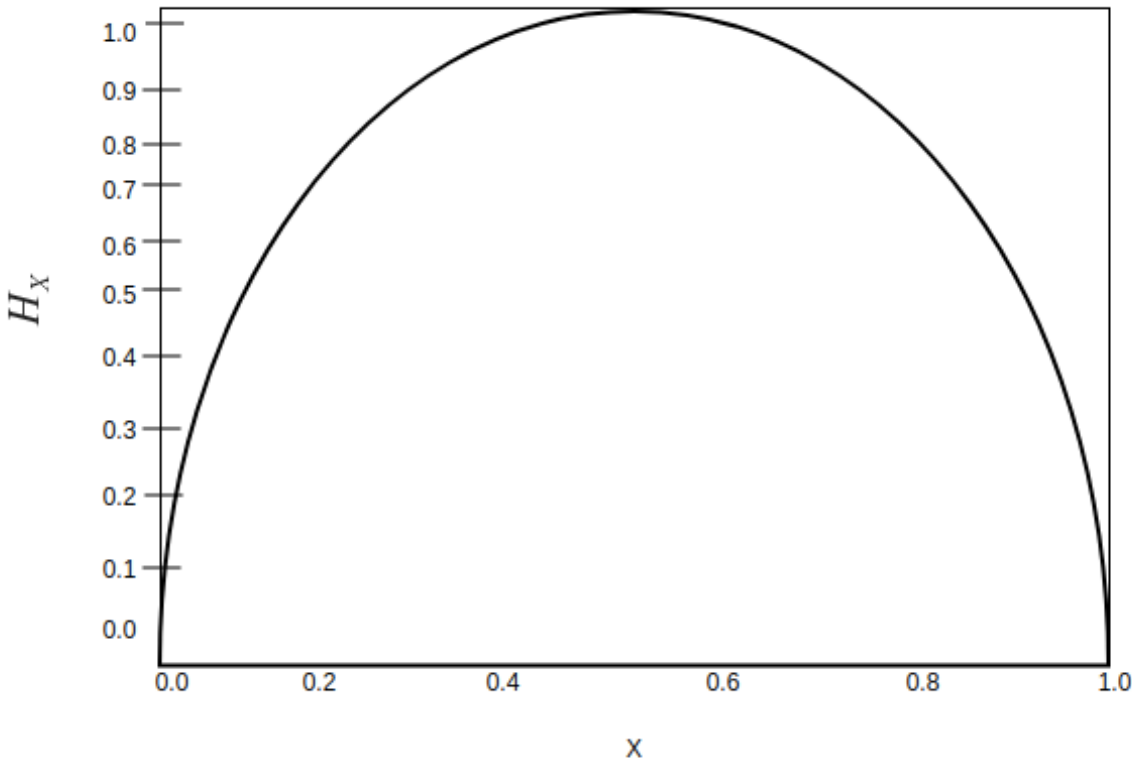
AI - Deep Dive 1

Pre-requisites

Mathematics

Information Theory

Uses to measuring the uncertainty in algorithms



Shannon Entropy

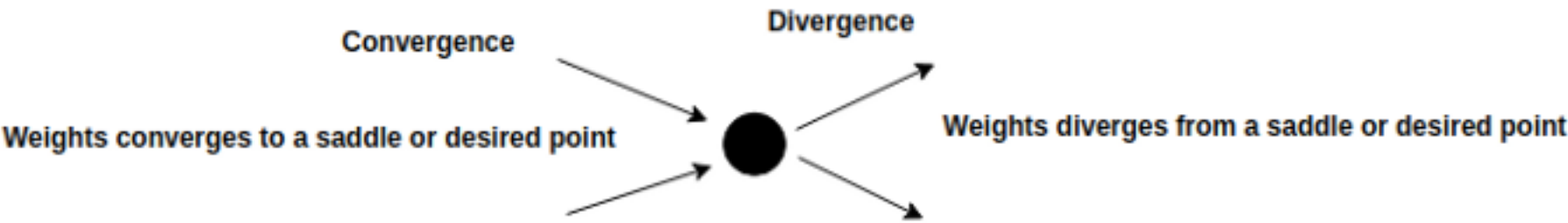
- Low When Distributions that are closer to deterministic.
- High when distributions that are close to uniform.

$$\text{Entropy } H_X = - \sum_{\forall x \in X} P(x) \log_2 P(x)$$

Entropy in Classification Problems

Real Analysis & Complex Analysis

Uses for Convergence/Divergence



Converge and Diverge parameters in a model



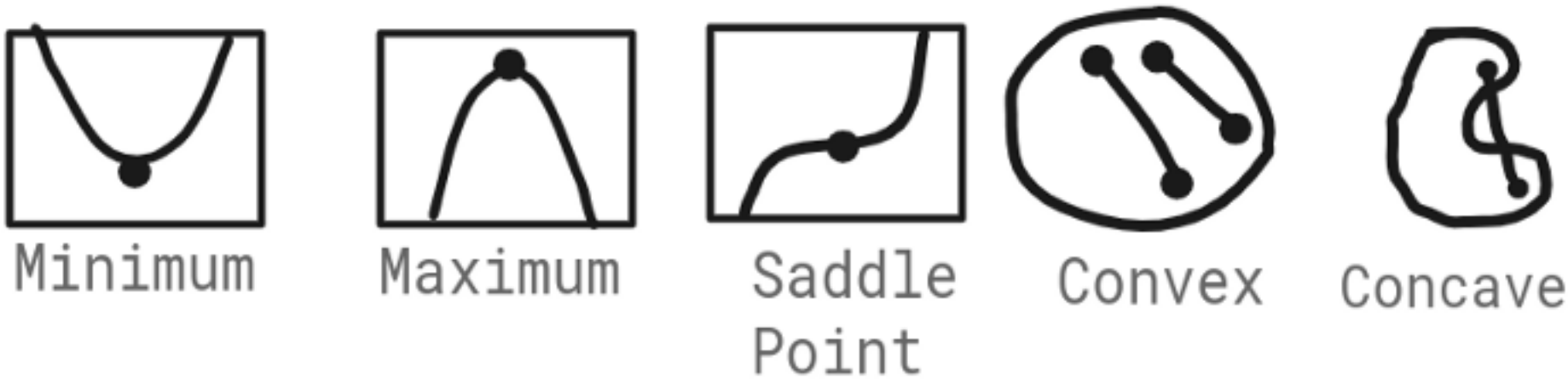
AI - Deep Dive 1

Pre-requisites

Mathematics

Numerical Computation & Convex Optimization

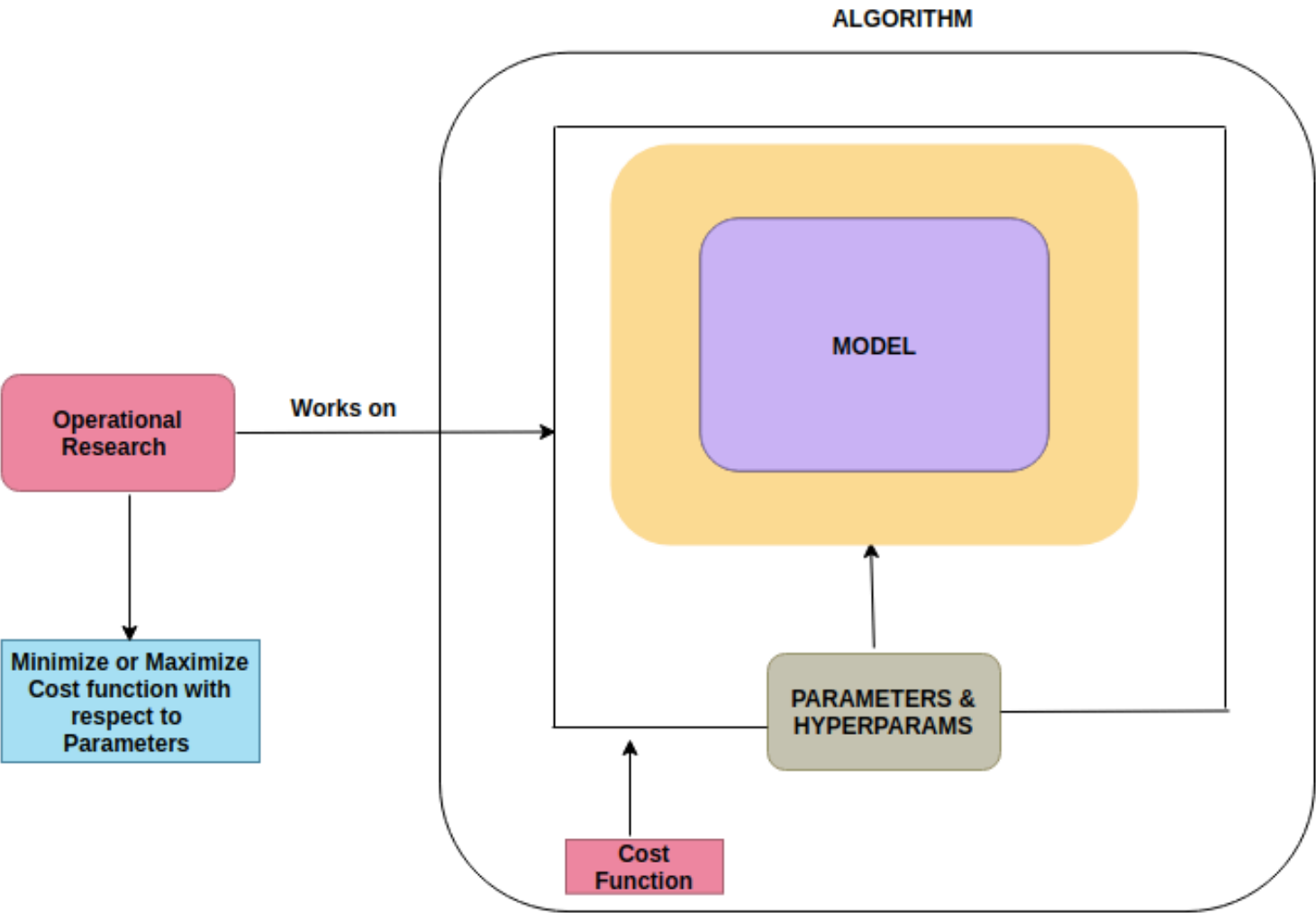
Computation methods & Optimizing with respect to constraints



Graphically Minimum, Maximum, Saddle Point, Convex ,Concave

Operational Research

Optimize Cost (minimize / maximize)



OR works on Typical ML/DL algorithm



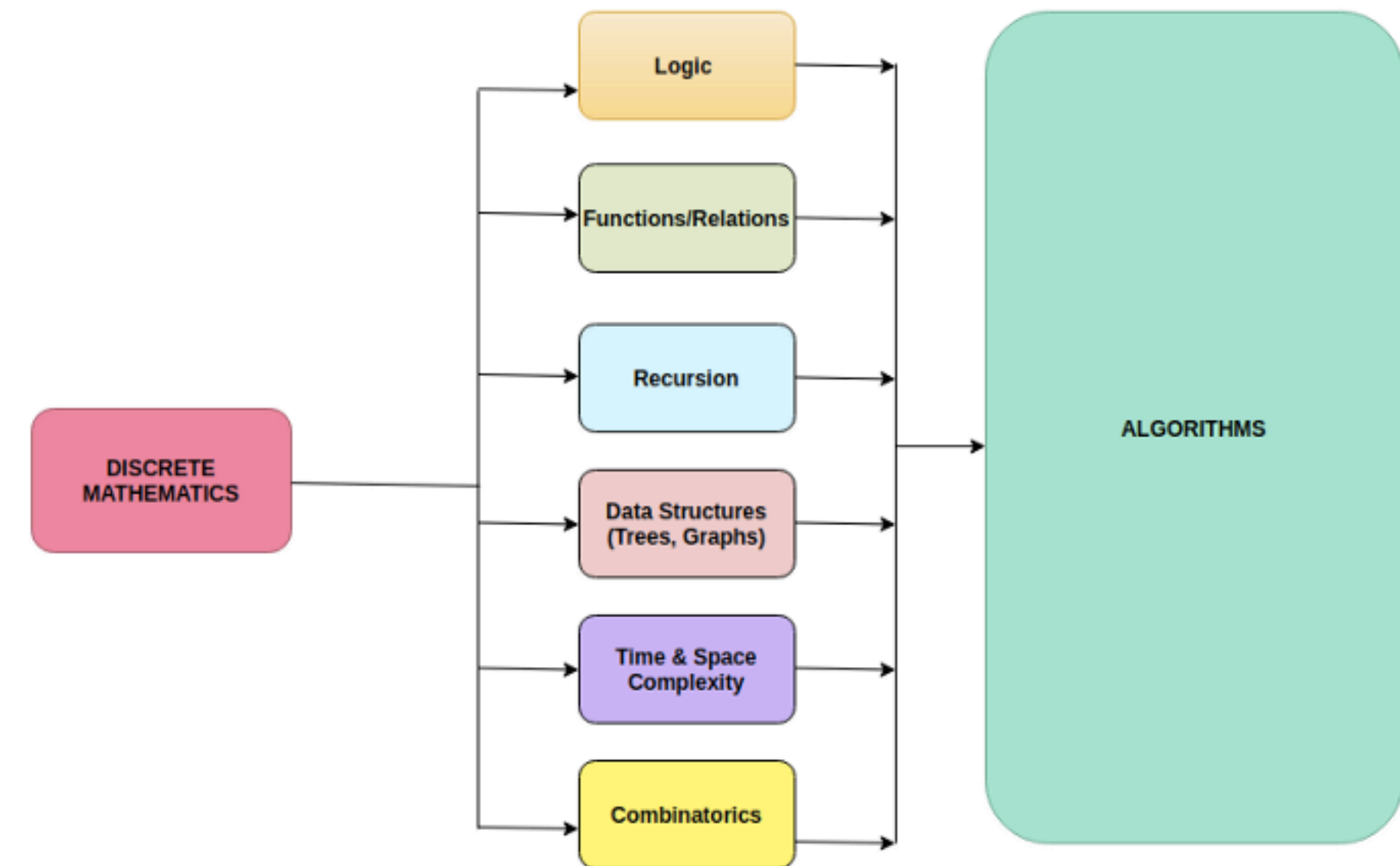
AI - Deep Dive 1

Pre-requisites

Mathematics

Discrete Mathematics

Basics for Logic, Algorithms and proofs



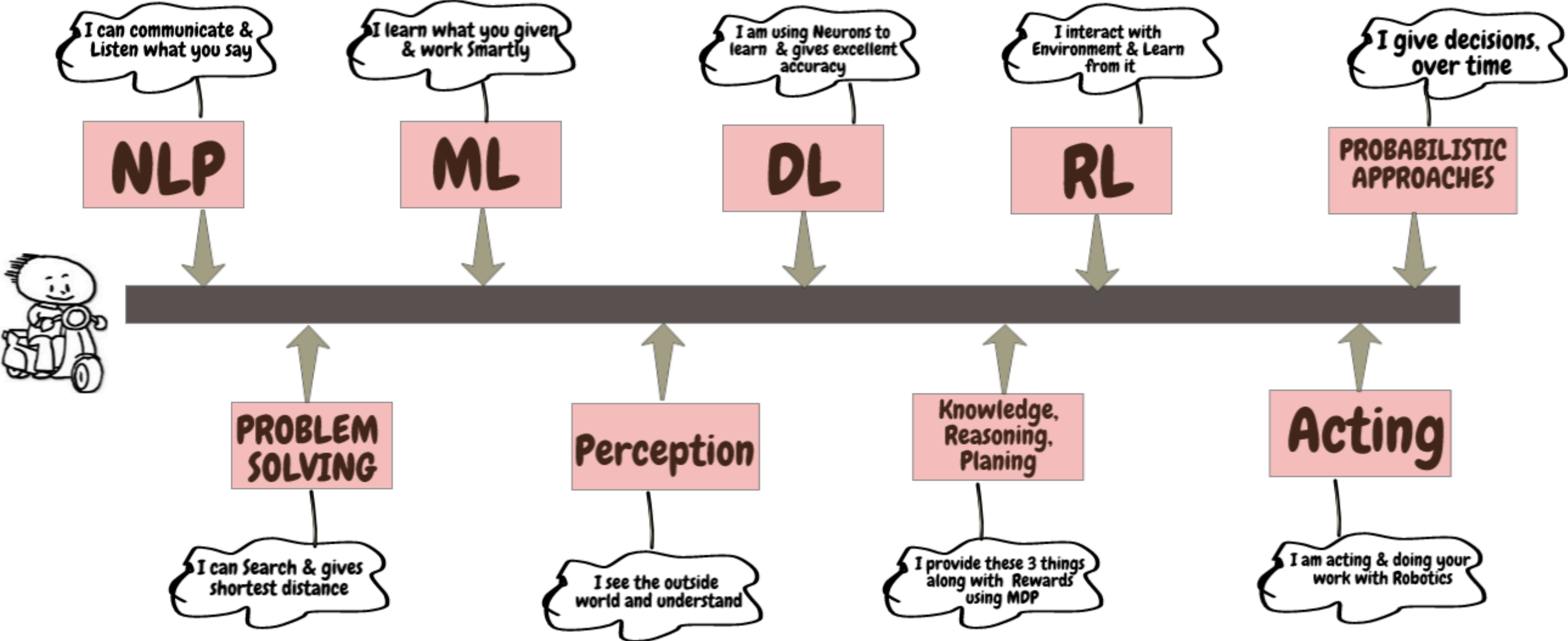
DM Concepts applying in Algorithms for various usages

Miscellaneous

There are many subjects/concepts will come into picture and have to learn as and when required

AI - Deep Dive 1

Pre-requisites



Purpose of AI Subjects/fields

AI - Deep Dive 1

Pre-requisites

10 breakthroughs in statistics that have helped drive the revolution in AI

1. Hirotugu Akaike (1973). [*Information Theory and an Extension of the Maximum Likelihood Principle*](#). Proceedings of the Second International Symposium on Information Theory.

2. John Tukey (1977). [*Exploratory Data Analysis*](#).

3. Grace Wahba (1978). [*Improper Priors, Spline Smoothing and the Problem of Guarding Against Model Errors in Regression*](#). Journal of the Royal Statistical Society.

4. Bradley Efron (1979). [*Bootstrap Methods: Another Look at the Jackknife*](#). Annals of Statistics.

5. Alan Gelfand and Adrian Smith (1990). [*Sampling-based Approaches to Calculating Marginal Densities*](#). Journal of the American Statistical Association.

6. Guido Imbens and Joshua Angrist (1994). [*Identification and Estimation of Local Average Treatment Effects*](#). Econometrica.

7. Robert Tibshirani (1996). [*Regression Shrinkage and Selection Via the Lasso*](#). Journal of the Royal Statistical Society.

8. Leland Wilkinson (1999). [*The Grammar of Graphics*](#).

9. Ian Goodfellow, Jean Pouget-Abadie, Mehdi Mirza, Bing Xu, David Warde-Farley, Sherjil Ozair, Aaron Courville, and Yoshua Bengio (2014). [*Generative Adversarial Networks*](#). Proceedings of the International Conference on Neural Information Processing Systems.

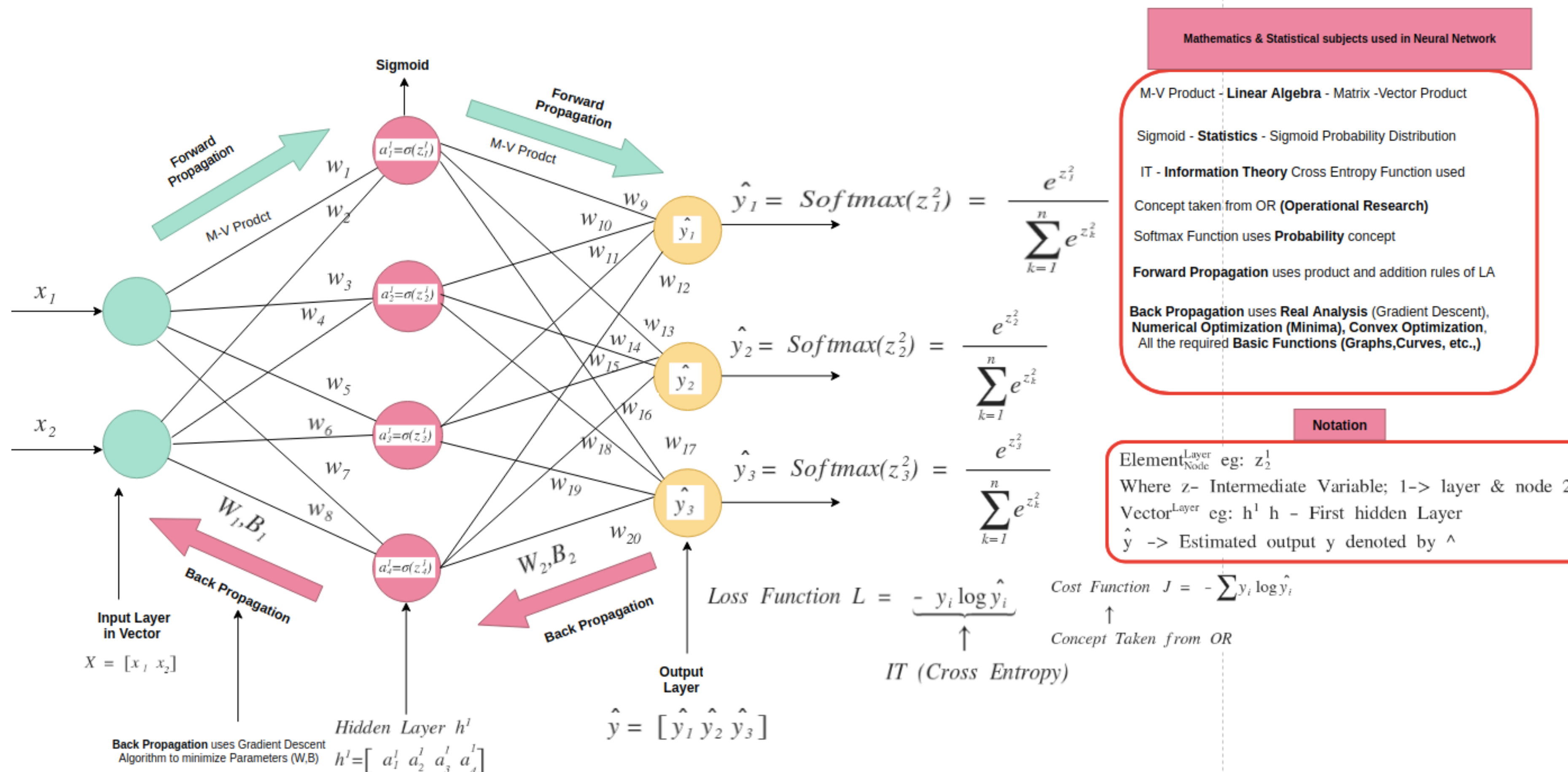
10. Yoshua Bengio, Yann LeCun, and Geoffrey Hinton (2015). [*Deep Learning*](#). Nature.



AI - Deep Dive 1

Pre-requisites

Applied Mathematical Concepts in Neural Networks

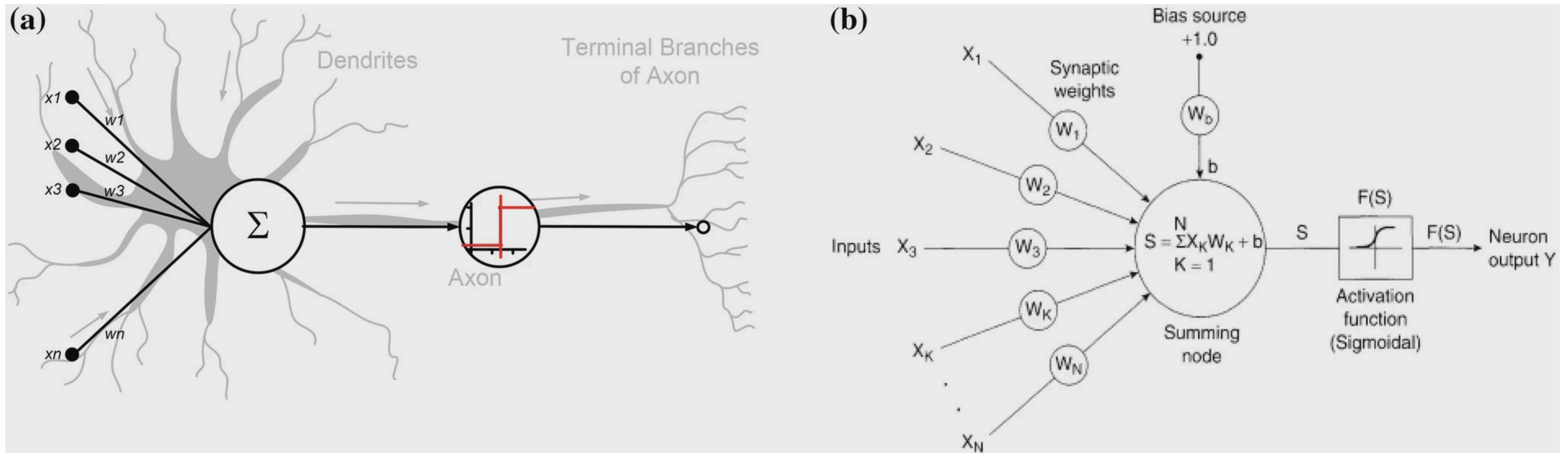


Neural Network Architecture for Multi-class Classification

AI - Deep Dive 1

Pre-requisites

Applied Mathematical Concepts in Neural Networks



(a) Biological Neural Network (BNN) & (b) Artificial Neural Network (ANN) and representing in BNN

AI - Deep Dive 1

Pre-requisites

Databases for Artificial Intelligence

Srishty Choudhary *et al*, International Journal of Computer Science and Mobile Computing, Vol.5 Issue.3, March- 2016, pg. 67-70

Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing



A Monthly Journal of Computer Science and Information Technology

ISSN 2320-088X
IMPACT FACTOR: 5.258

IJCSMC, Vol. 5, Issue. 3, March 2016, pg.67 – 70

DATABASES FOR ARTIFICIAL INTELLIGENCE

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patkarudayc@gmail.com

Abstract- The basic motto behind implementing artificial intelligence is to create expert systems and to implement human intelligence in machines. An intelligent robot is a machine able to extract information from its environment. One can study this to know more about themselves and how data are stored and which system is used here.

Keywords: - AI (Artificial intelligence), RDMS (Relational database management system), DBMS (Database management system), IDMS (Intelligent database management system), HIPM (Human information processing model), DPM (Data processing model).

I. INTRODUCTION

Artificial intelligence is a branch of science or rather advanced science which deals with how intelligence can be implemented. But after implementing next important aspect that should be made confront is how data which is generated will be stored and for that we need databases. Database is basically a pool of data which stores data in both sequential and non-sequential format.

II. THEORETICAL BACKGROUND

Data is collection of bits and bytes of information and a database is an organised collection of data. On the broader side a Database management system (DBMS) is a computer software application that interacts with the user, other applications, and the database itself to capture and analyse data. DBMS permits applications to define, access, and update data through a Data definition language (DDL) and Data manipulation language (DML) combined into a declarative query language such as the relational query language (SQL). SQL is an ANSI standard for accessing and manipulating the information stored in relational databases. The relational database stores the data in the form of tables and records and often that data are called as structured data and on the contrary non-relational databases stores data in the form of documents and is often termed as non-structured or semi-structured data.



AI - Deep Dive 1

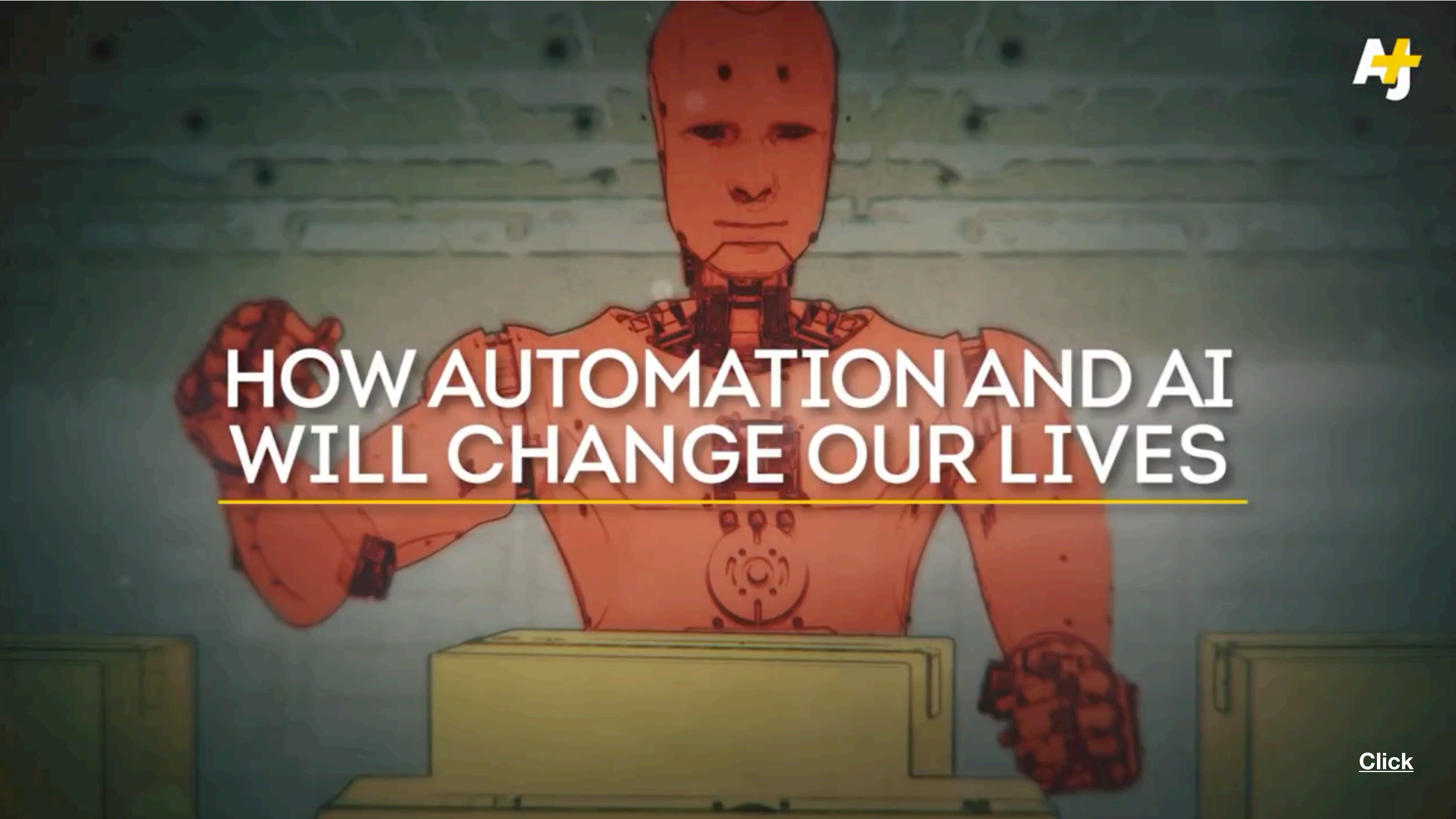
Pre-requisites

Visual timelines of AI predictions in Sci-Fi

Sci Fi Prediction	AI in Reality
1977: K9, a robotic dog in <i>Doctor Who</i> , beats its master at a chess game.	1997: IBM's Deep Blue computer beats a Russian chess master, Garry Kasparov.
1984: Skynet from <i>Terminator</i> , a self-aware AI program, attempts to extinguish humanity.	2019: The U.S. Army creates an autonomous system to "acquire, identify, and target threats" (ATLAS AI).
2011: AI monitors surveillance cameras and predicts future criminals in <i>Person of Interest</i> .	2018: The <i>National Data Analytics Solution (NDAS)</i>

Sci Fi Prediction	AI in Reality
1962: <i>The Jetsons</i> cartoon shows video calls on a tv screen, and a robot maid.	2002: <i>iRobot Roomba</i> is the first robotic vacuum. 2018: <i>Facebook Portal</i> is a video-calling smart display. 2019: <i>Moley</i> robotic kitchen is able to prep meals from scratch and clean up afterwards.
1966: <i>Star Trek</i> inspired several tech innovations that have become commonplace.	Examples include: Bluetooth headsets, voice assistants, cellphones, and automatic sliding doors.
1989: <i>Back to the Future</i> features smart glasses for television and phone calls, and a smart watch which can precisely predict weather.	2012: The <i>Dark Sky</i> app provides custom alerts on the weather to the minute. 2013: <i>Google Glass</i> is able to make calls, send texts, display photos, and provide directions. 2015: <i>Apple Watch</i> comes enabled with WiFi, Bluetooth, a GPS, and even a heart sensor.
1999: <i>Smart House</i> showcases a fully automated house that is able to respond to verbal requests, cook and clean, and control thermostat settings.	2019: A <i>HGTV</i> contest lets people win a WiFi connected smart house, complete with voice-enabled thermostat and security systems.



A red, humanoid robot with a metallic, segmented body is shown from the waist up. It has a human-like face with dark eyes and a neutral expression. The robot is standing in a control room with a grey, textured wall and a large, yellowish-green control panel in front of it. The text 'HOW AUTOMATION AND AI WILL CHANGE OUR LIVES' is overlaid in white, bold, sans-serif font, with a yellow horizontal line underneath it.

HOW AUTOMATION AND AI WILL CHANGE OUR LIVES

Yeah! Poll time...7!

Of all the technologies impacting business, which showed the biggest growth?

a/ Cloud

b/ AI

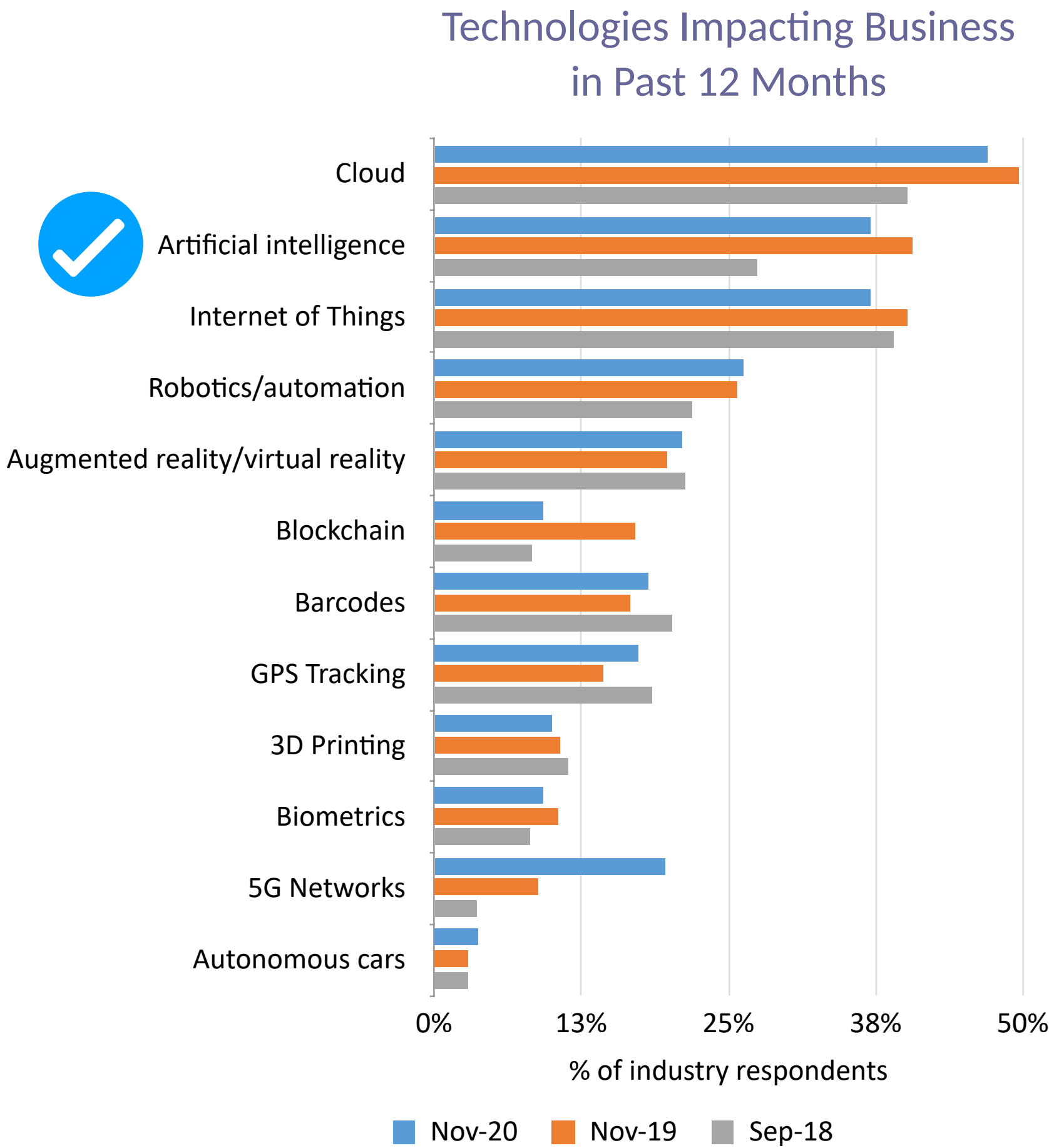
C/ IOT

d/ Robotics/ Automation

e/ Blockchain



AI showed the biggest growth compared to previous year's survey



Source: Euromonitor International's Voice of the Industry: Digital Survey, September 2018, November 2019, November 2020

Summary

2/ AI - Deep Dive 1

1. Key AI Concepts and Terminology
2. Opportunities in AI
3. Why study AI
4. AI Pre-requisites
5. Headline takeaways



“The real question is, when will we draft an artificial intelligence bill of rights? What will that consist of? And who will get to decide that?”

—Gray Scott

2/ Understanding AI
Deep Dive I



Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

3/ Understanding AI

Diving Deeper



1.
Understanding AI -
Course Introduction

2.
Understanding AI -
Deep-Dive 1


3.
Understanding AI -
Deep-Dive 2

4.
Understanding ML -
Deep-Dive

5.
Understanding DL -
Deep-Dive

6.
Implementing AI -
Projects

7.
AI Trends -
State of AI

8.
AI for
Business Leadership

9.
Ethics
In AI

10.
AI in
Singapore +
AI in action!

11.
Understanding AI -
Applications

12.
Future
of AI



1.
Technology

2.
Business

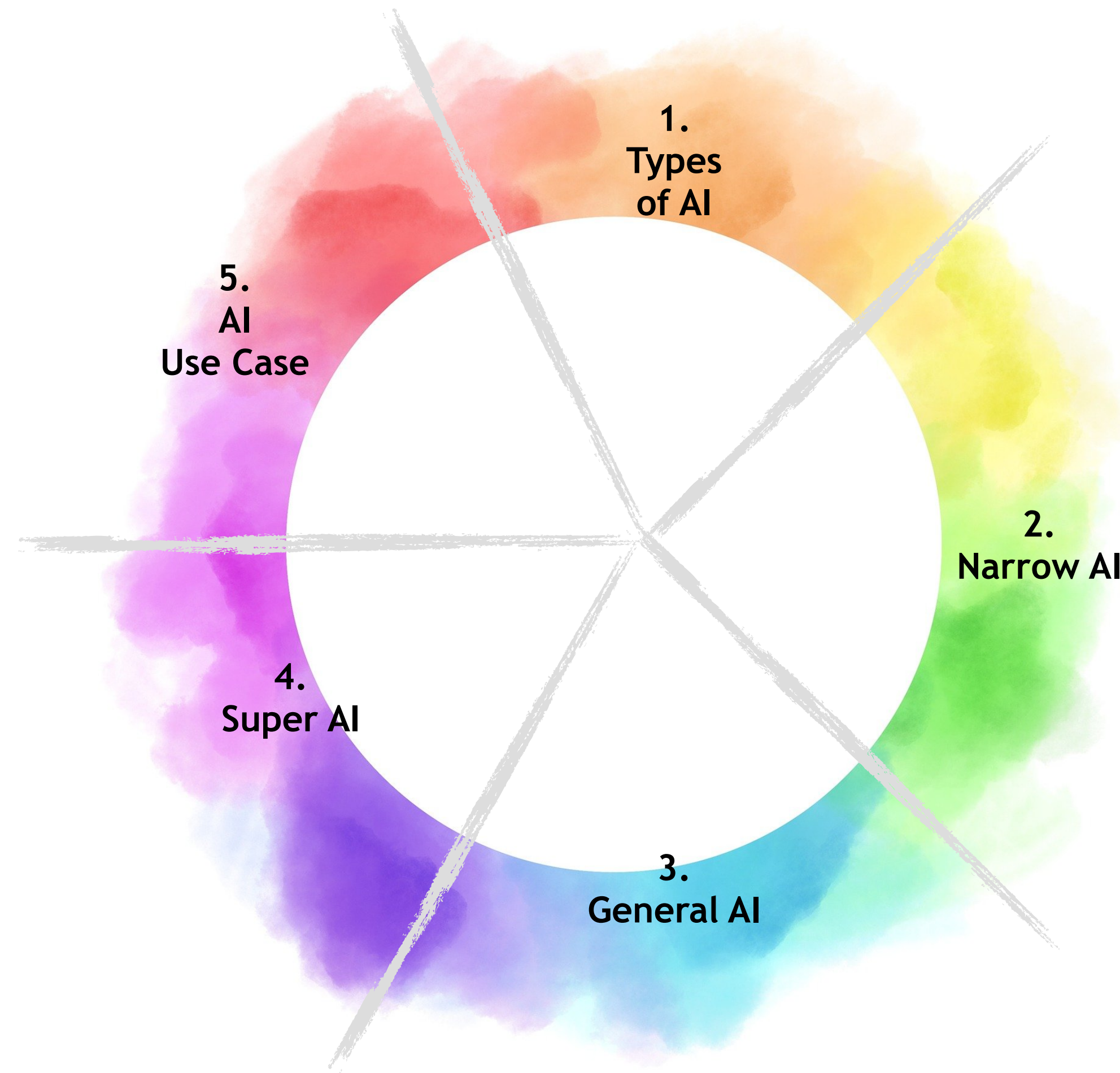
2.
People

3.
Understanding AI-
Diving Deeper...

3. Understanding AI- Diving Deeper...



3/ Understanding AI - Diving Deeper



Click

QUICK POLL TIME, again 8!

Of all the technologies in which companies plan to invest in the coming 5 years, which will **outscore** others in terms of investments in the next 5 years?

a/ Cloud

b/ AI

c/ IOT

d/ Robotics/ Automation

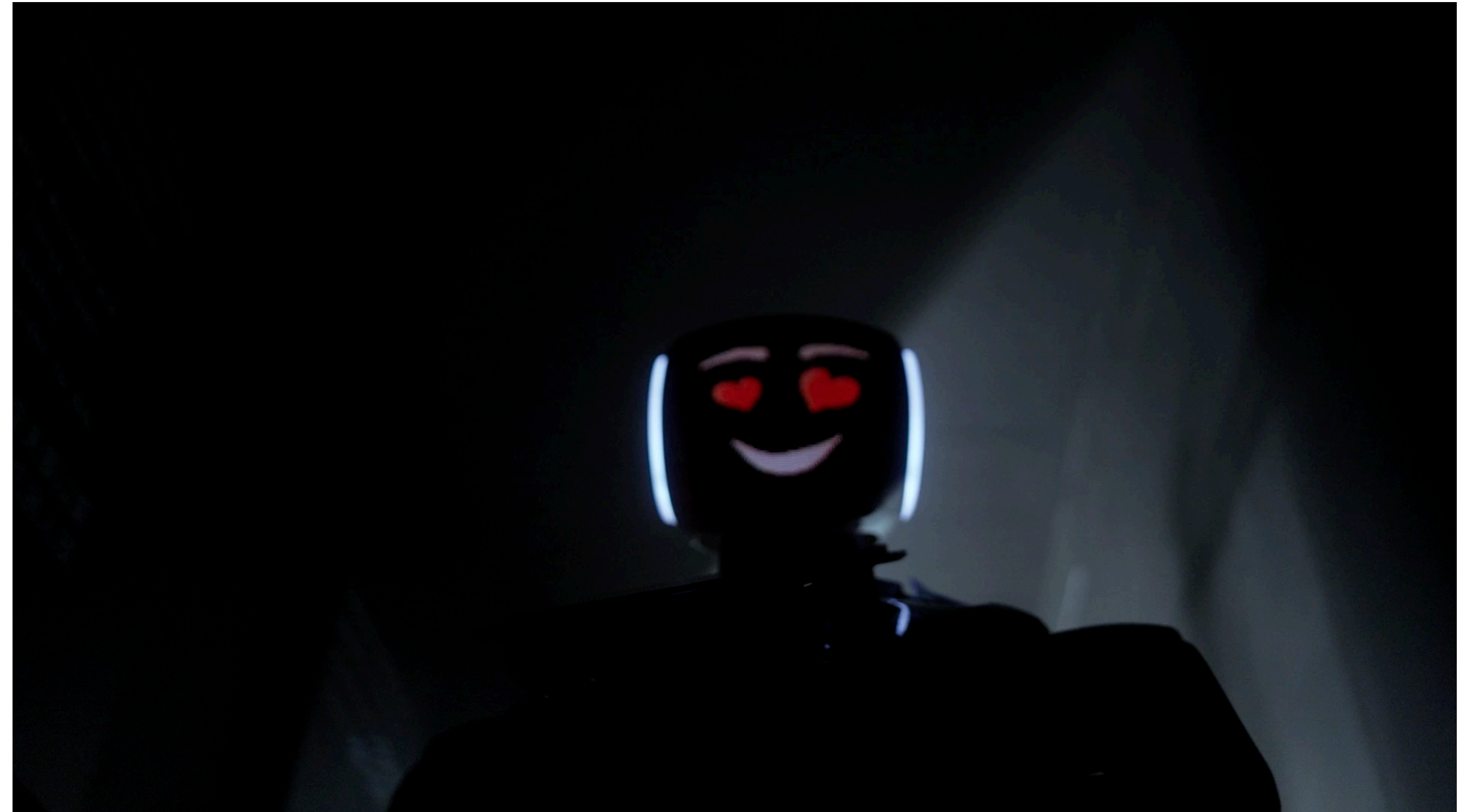
e/ Blockchain



3/ Understanding AI - Diving Deeper

Types of AI

1. Capabilities-based:
 - Narrow
 - General
 - Super
2. Headline Takeaways



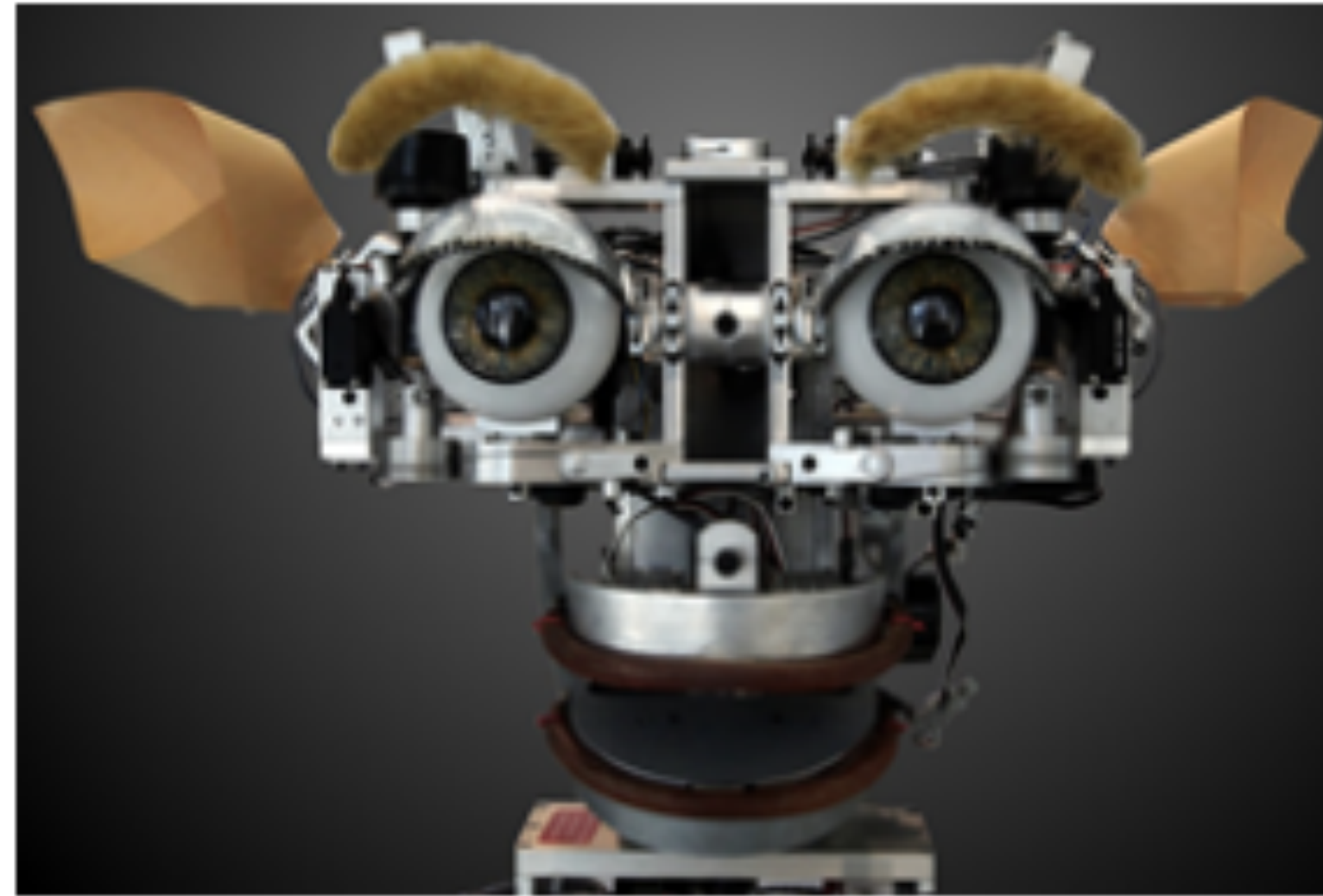
3/ Understanding AI - Diving Deeper

Types of AI

Functionalities-based

1. Purely reactive
2. Limited memory
3. Theory of mind
4. Self-aware

Headline Takeaways



Kismet



Sophia

3/ Understanding AI - Diving Deeper



[Click](#)

At the Forefront

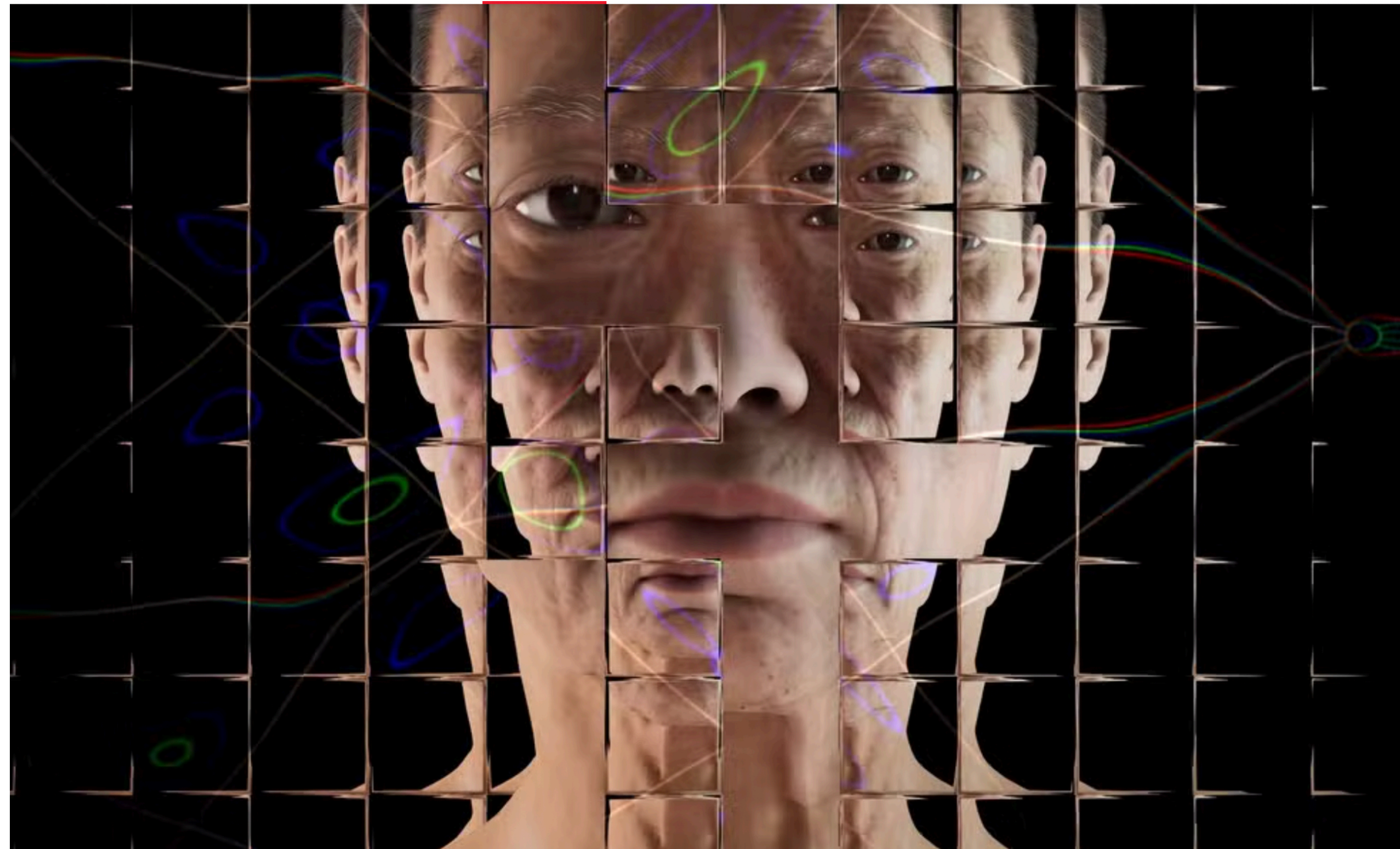
- ▶ Google's (Deepmind) AlphaGo Zero took 40 days to become the best Go player in the world entirely from self-play with no human intervention and using no historical data.
- ▶ After OpenAI created a program to beat the world's top Dota 2 players in 1-on-1 matches, the team's next goal is to teach the system to play 5-on-5 matches.

3/ Understanding AI - Diving Deeper

‘The Game is Over’: Google’s DeepMind says it is on verge of achieving human-level AI

New Gato AI is ‘generalist agent’ that can carry out a huge range of complex tasks, from stacking blocks to writing poetry

Anthony Cuthbertson • Monday 23 • 8 Comments



Google’s DeepMind has pioneered advances in artificial intelligence since its founding in 2010, with the ultimate goal of creating a human-level AI
(Alan Warburton / Better Images of AI / CC)

3/ Understanding AI - Diving Deeper



At the Forefront

- ▶ Elon Musk's Neuralink start-up is looking to create a brain-to machine interface. It's developing neural lace, an ultra-thin mesh implanted in the skull, to increase the storage and processing power of the human brain.

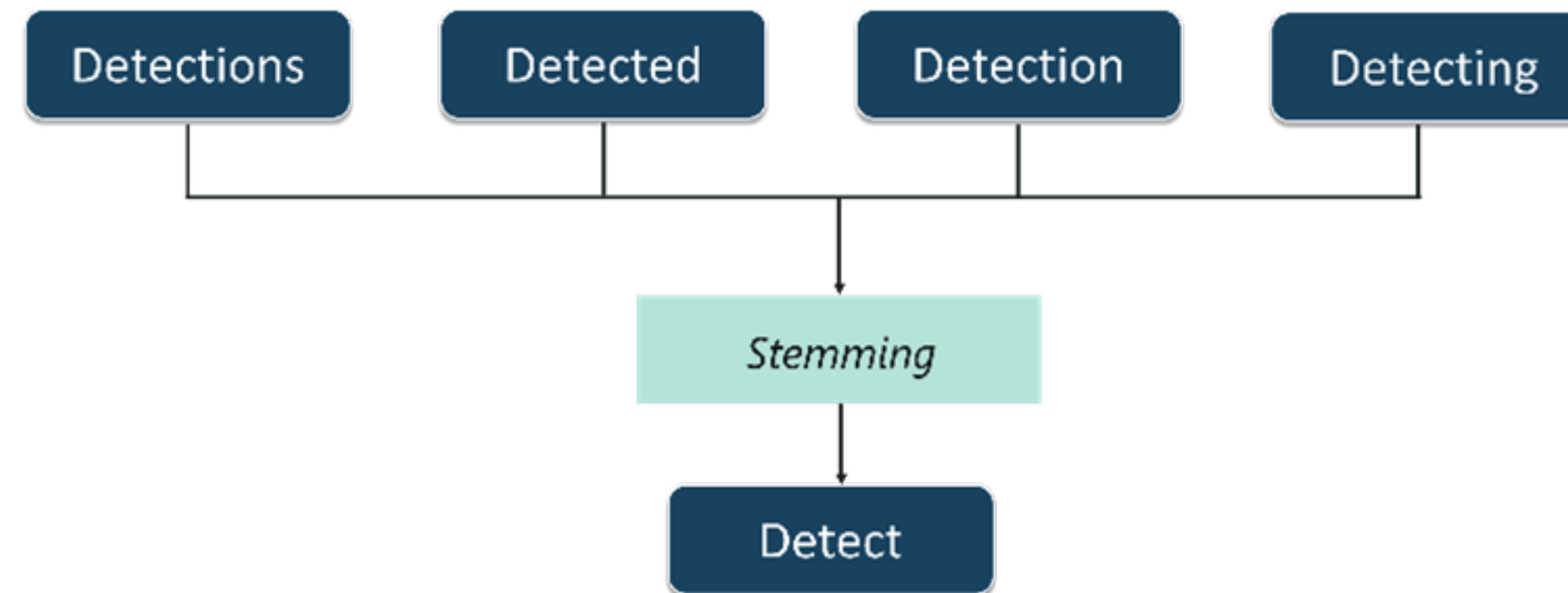
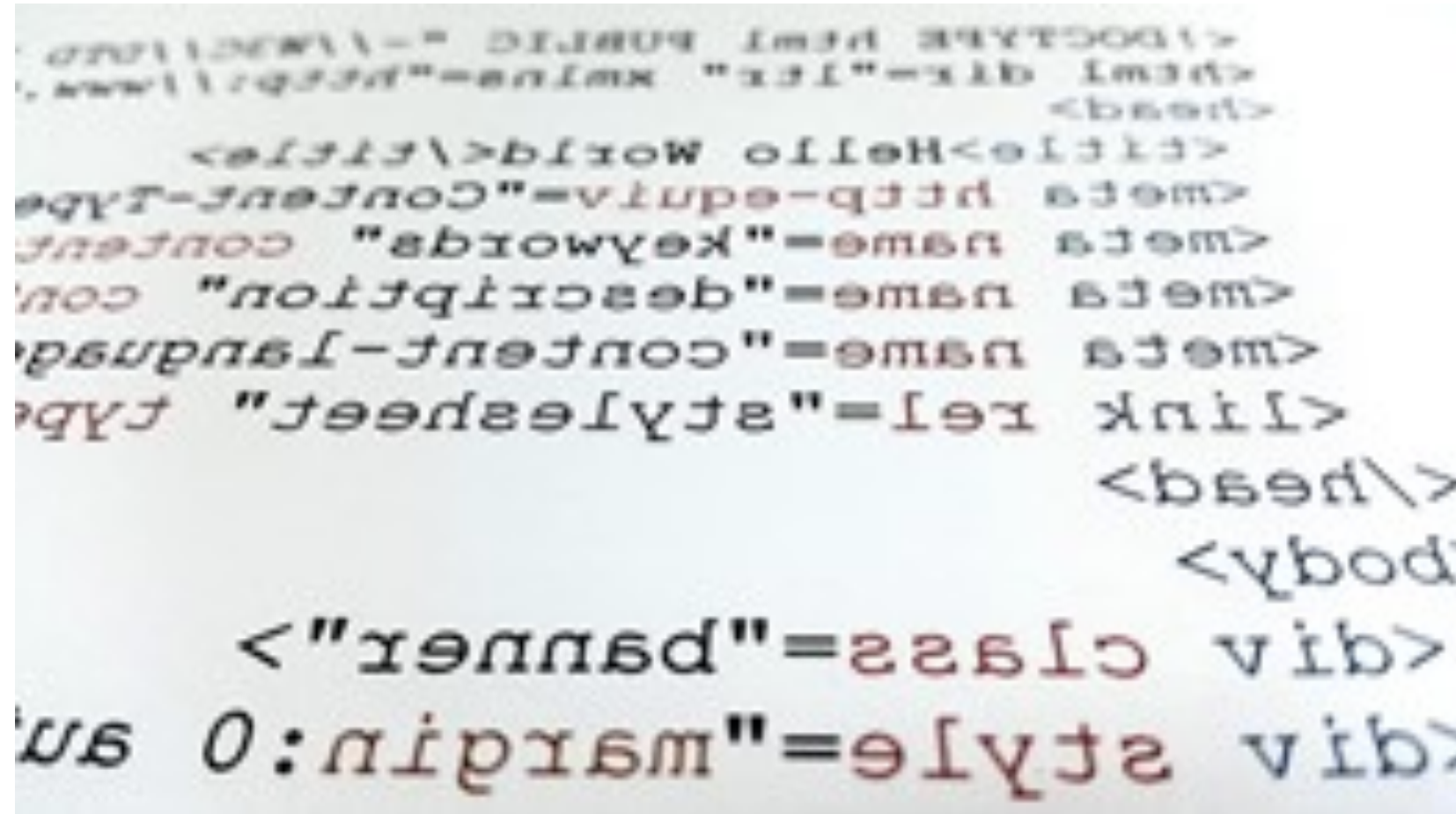
3/ Understanding AI - Diving Deeper

How does AI work?

1. Use case
2. AI-driven product illustration
3. Headline Takeaways



3/ Understanding AI - Diving Deeper



Summary

3/ Understanding AI - Diving Deeper

1. Types of AI
 - Capabilities
 - Functionalities
2. Narrow AI
3. General AI
4. Super AI
5. How does AI Work?
6. Use Case
7. Headline takeaways



End of Presentation

“The upheavals [of artificial intelligence] can escalate quickly and become scarier and even cataclysmic. Imagine how a medical robot, originally programmed to rid cancer, could conclude that the **best way to obliterate cancer is to exterminate humans who are genetically prone to the disease.**”

Nick Bilton, tech columnist wrote in *The New York Times*

3/ Understanding AI
Diving Deeper

AI - The Basics

Breakout Room 3!

Today's Generation Alpha children are the ones who are going to co-live with Artificial Super Intelligence. And that will open a new chapter in the history of humanity.

**What kind of world will it be
when a computer's cognitive ability
may become superior to a human's!**



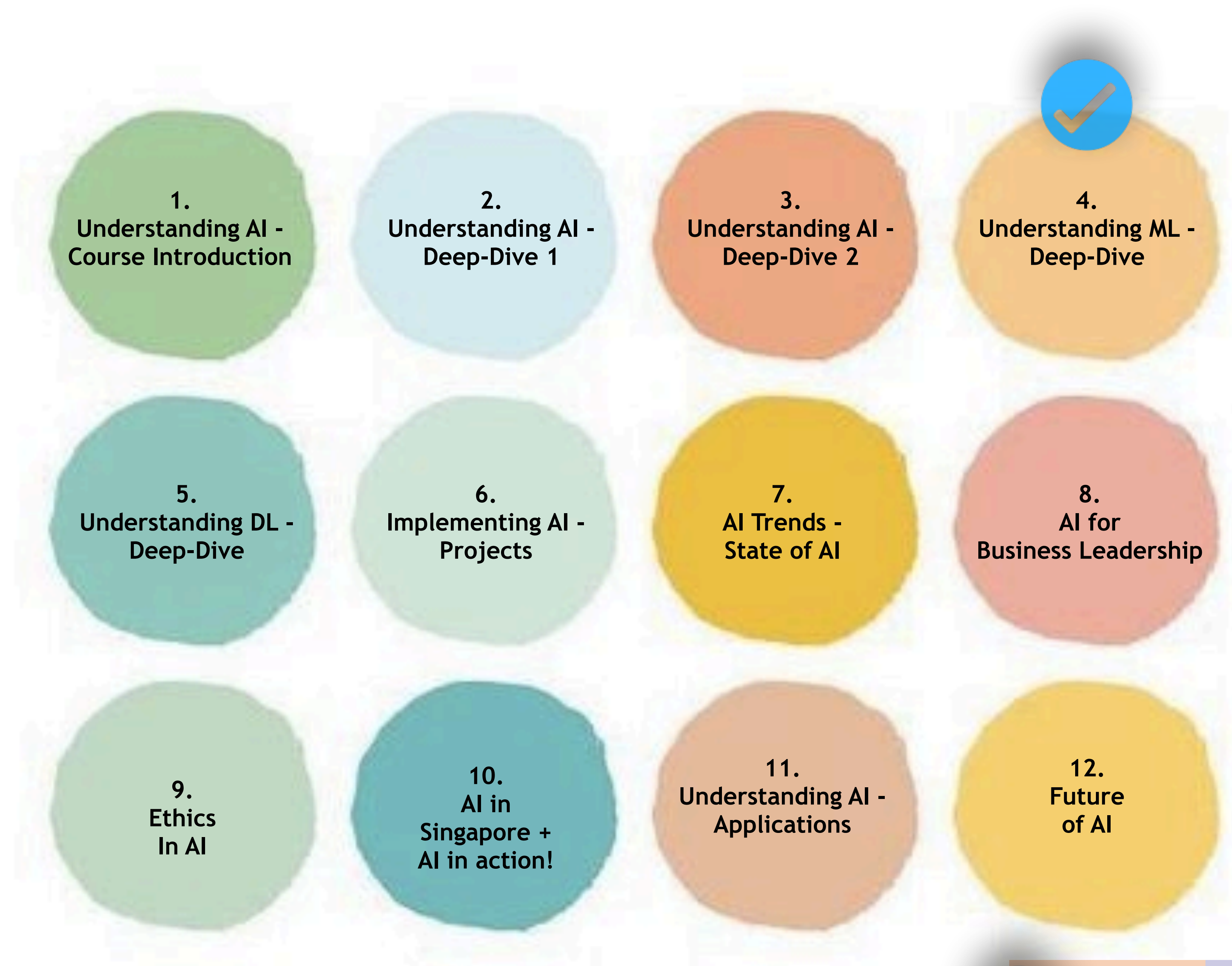
Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

4/ Understanding ML
Deep Dive



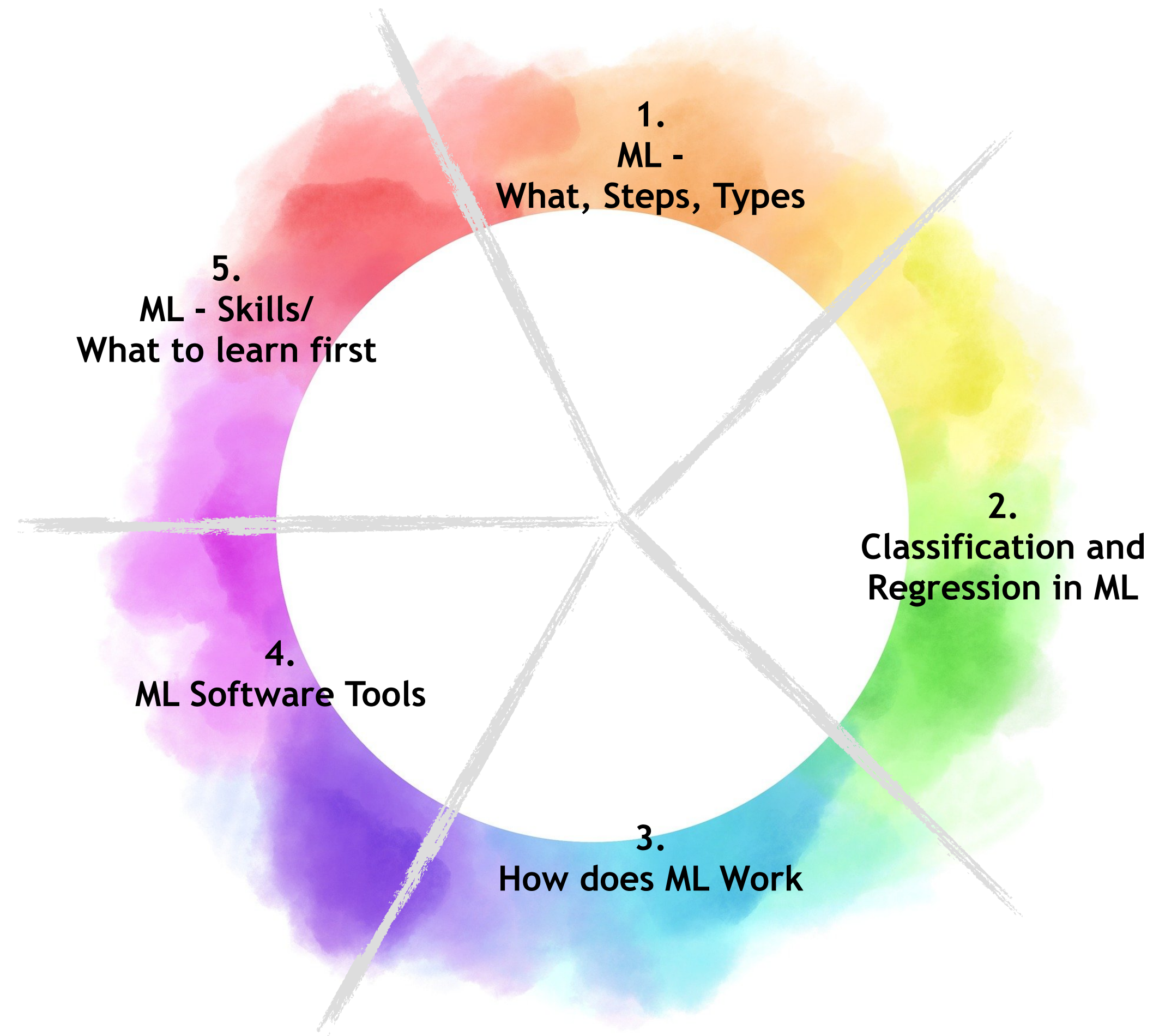


5.
Understanding ML-
Deep Dive

5.
Understanding ML-
Basics + More



5/ Understanding ML - Deep-Dive





Poll No 12

What is the biggest driver for AI and AI adoption?

a/ Software

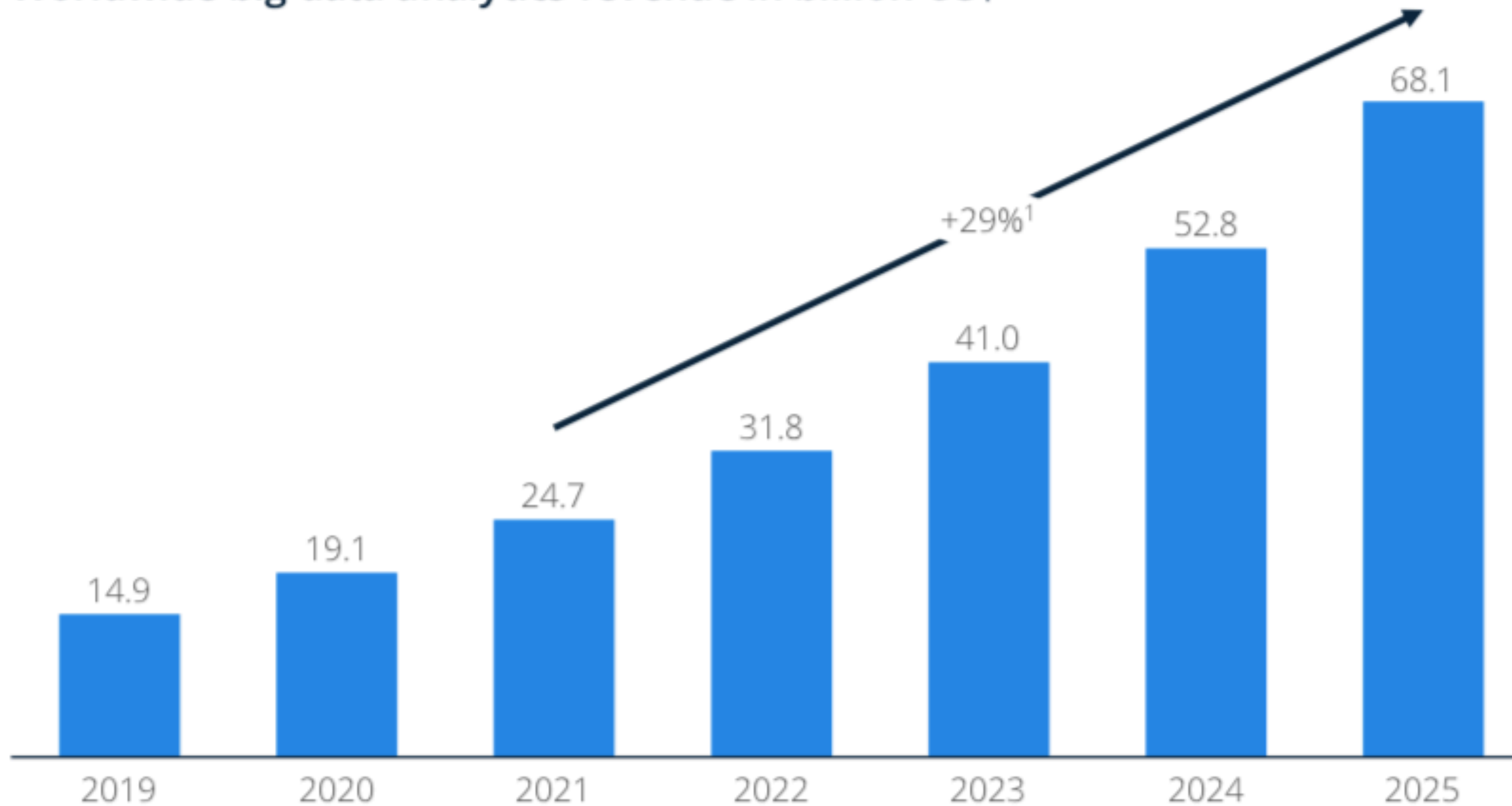
b/ Hardware

c/ Big Data

d/ Talent



Worldwide big data analytics revenue in billion US\$



Sources: Frost & Sullivan, as of September 2020

ETL ENTREPRENEURIAL
THOUGHT LEADERS

Alexandr Wang

Founder and CEO, Scale AI

in conversation with Emily Ma

January 19, 2022

Understanding ML - Deep-Dive

Implementing AI

1. Machine Learning
2. Deep Learning
3. Neural Network
4. Headline Takeaways



Understanding ML - Deep-Dive

Diving into Machine Learning

1. The data frontier
2. ML everywhere
3. Using data to answer questions
4. Headline takeaways



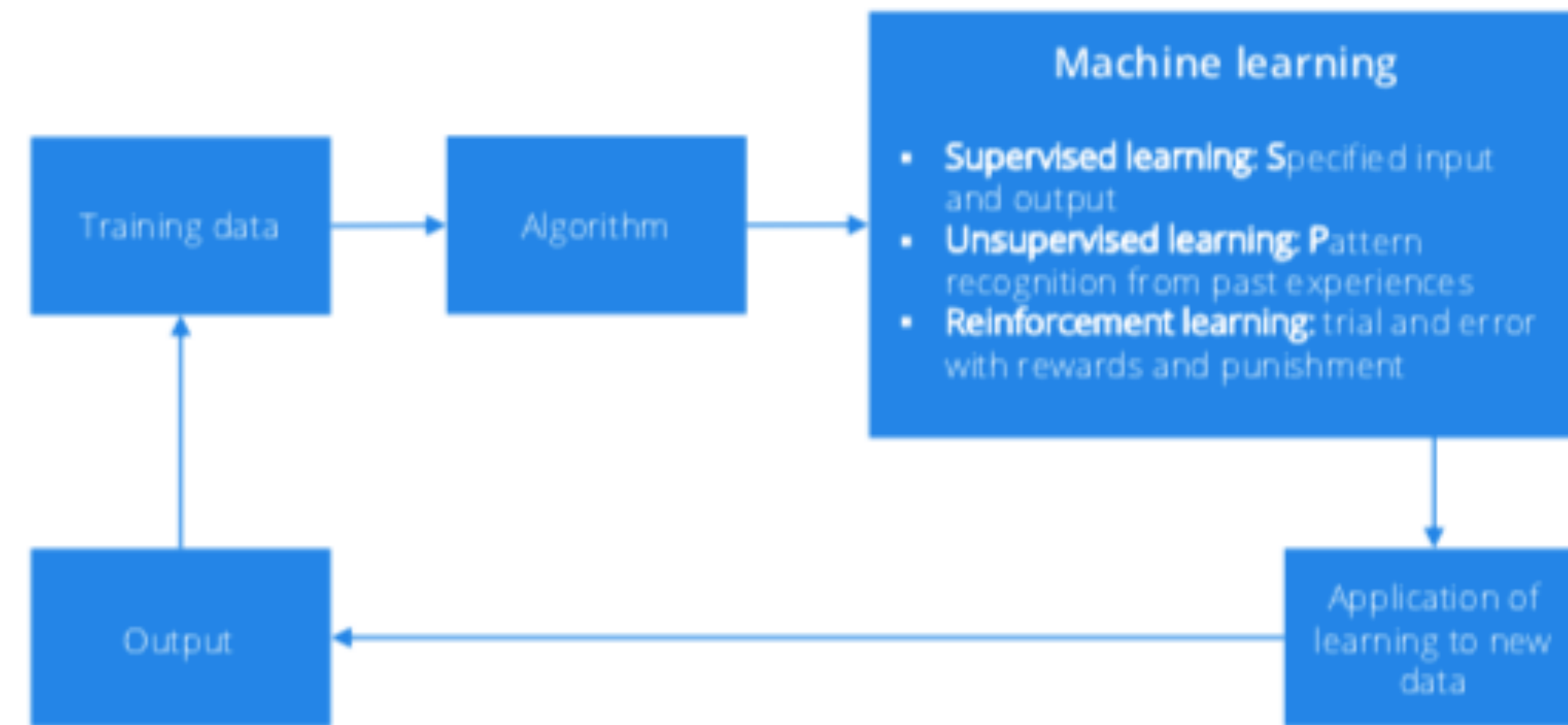
[Click](#)

Understanding ML - Deep-Dive

What is Machine Learning

1. Explaining ML
2. Headline takeaways

Illustration of the machine learning process

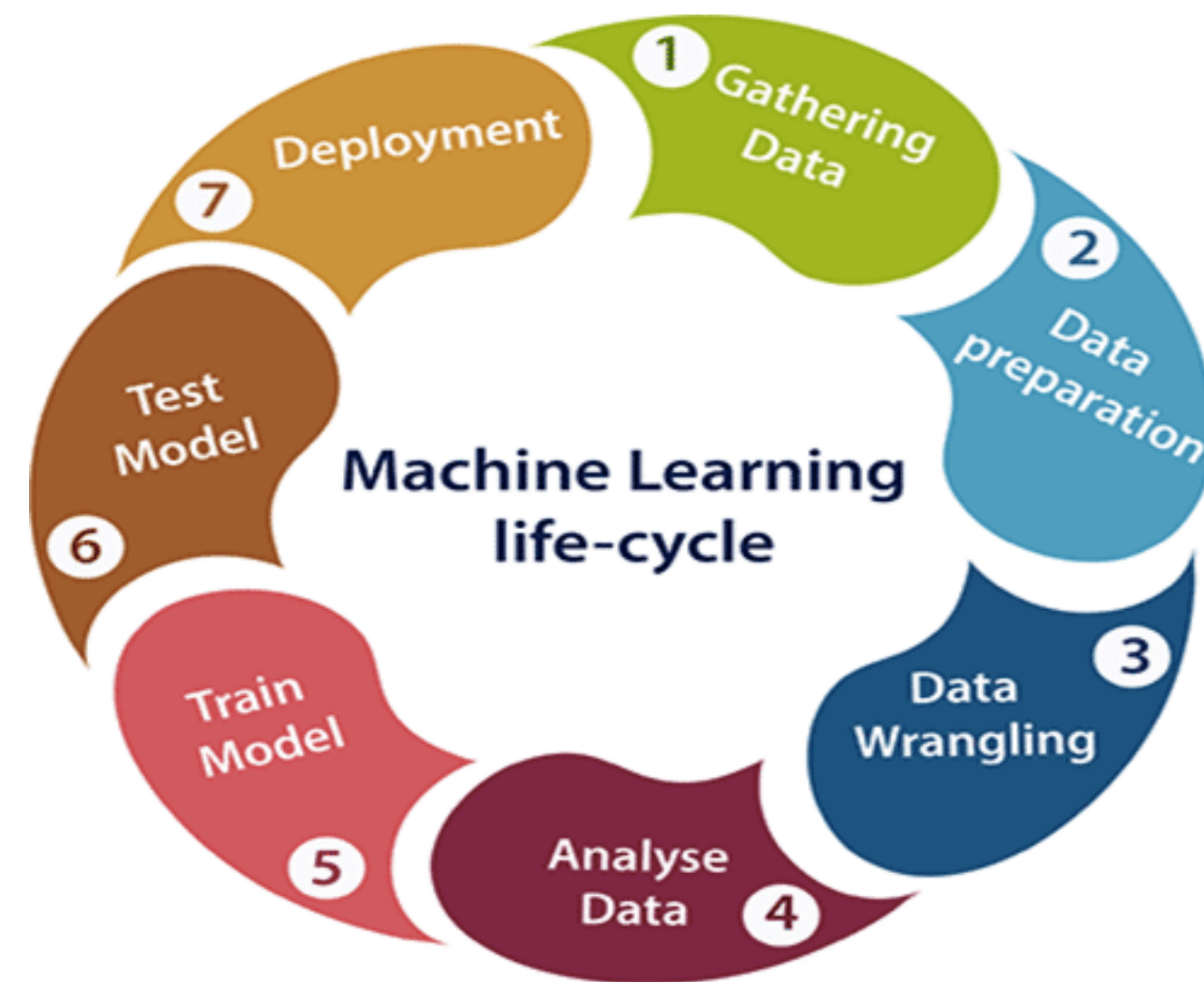


Sources: SAS, McKinsey

Understanding ML - Deep-Dive

Steps of Machine Learning

1. Explaining the steps
2. Headline takeaways



[Click](#)

Understanding ML - Deep-Dive

ML Model

PassengerId	Pclass	Name	Gender	Age	Fare	Cabin	Embarked	Survived
1	3	Braund, Mr. Owen Harris	male	22	7.25		S	0
2	1	Cumings, Mrs. John Bradley (Florence Briggs Thayer)	female	38	71.2833	C85	C	1
3	3	Heikkinen, Miss. Laina	female	26	7.925		S	1
4	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	53.1	C123	S	1
5	3	Allen, Mr. William Henry	male	35	8.05		S	0
6	3	Moran, Mr. James	male		8.4583		Q	0
7	1	McCarthy, Mr. Timothy J	male	54	51.8625	E46	S	0
8	3	Palsson, Master. Gosta Leonard	male	2	21.075		S	0
9	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27	11.1333		S	1

Binary Classification

SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
5.1	3.5	1.4	0.2	Iris-setosa
7.7	2.6	6.9	2.3	Iris-virginica
4.7	3.2	1.3	0.2	Iris-setosa
7	3.2	4.7	1.4	Iris-versicolor
6.5	3	5.5	1.8	Iris-virginica
6.9	3.1	4.9	1.5	Iris-versicolor
7.7	3.8	6.7	2.2	Iris-virginica
6.4	3.2	4.5	1.5	Iris-versicolor
4.9	3	1.4	0.2	Iris-setosa

Multi-Class Classification

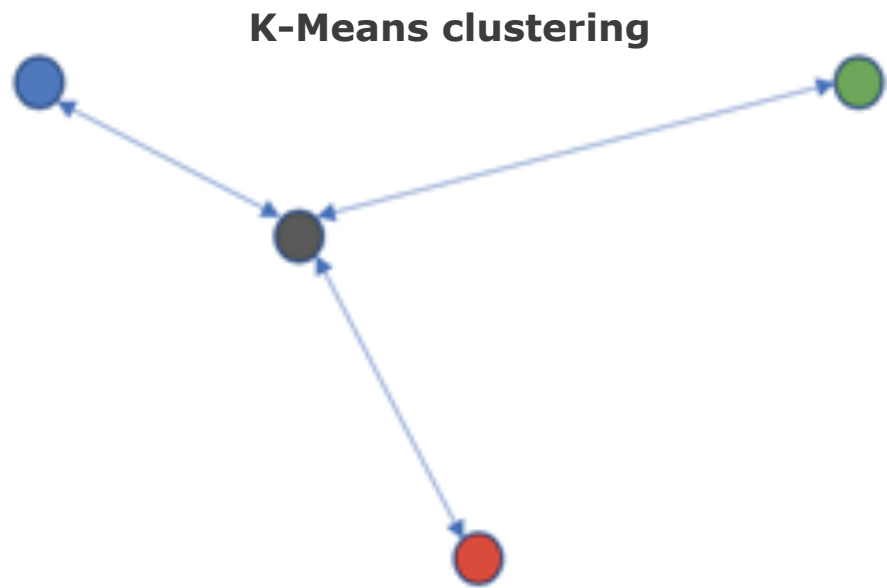


Understanding ML - Deep-Dive

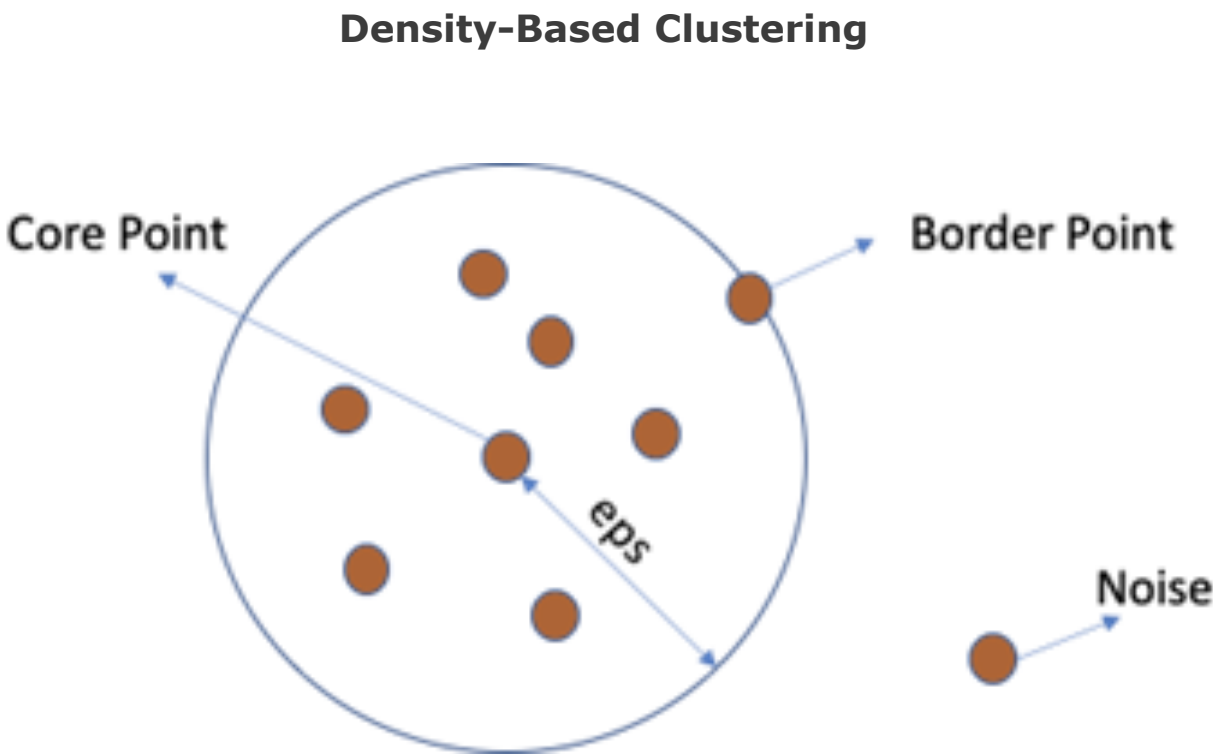
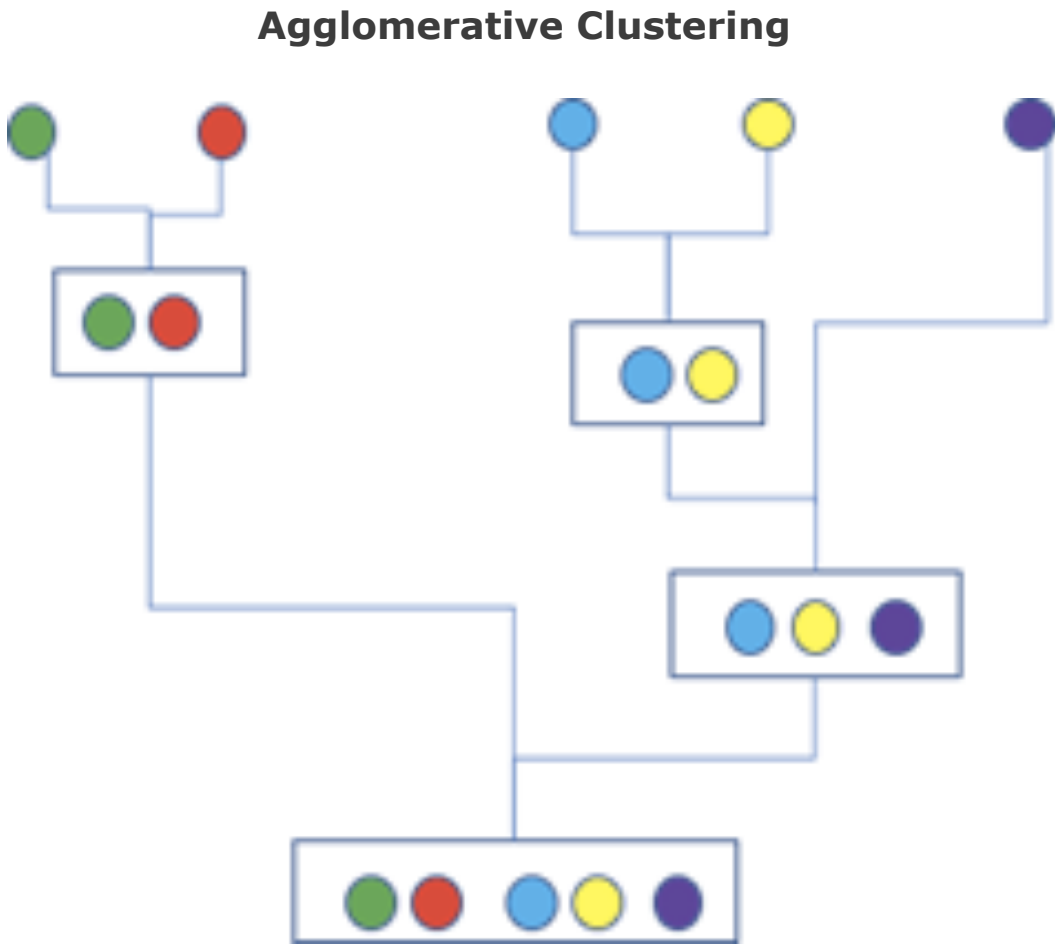
ML Model

gender	race/ethnicity	parental level of education	test preparation course	math score
female	group B	bachelor's degree	none	72
female	group C	some college	completed	69
female	group B	master's degree	none	90
male	group A	associate degree	none	47
male	group C	some college	none	76
female	group B	associate degree	none	71
female	group B	some college	completed	88
male	group B	some college	none	40
male	group D	high school	completed	64
female	group B	high school	none	38

Regression



In this picture, if the blue, green and red dots are the centroids, the grey data point will be grouped with the centroid closest to it. In this case, it will be grouped with the blue centroid.



Understanding ML - Deep-Dive

Classification and Regression in ML



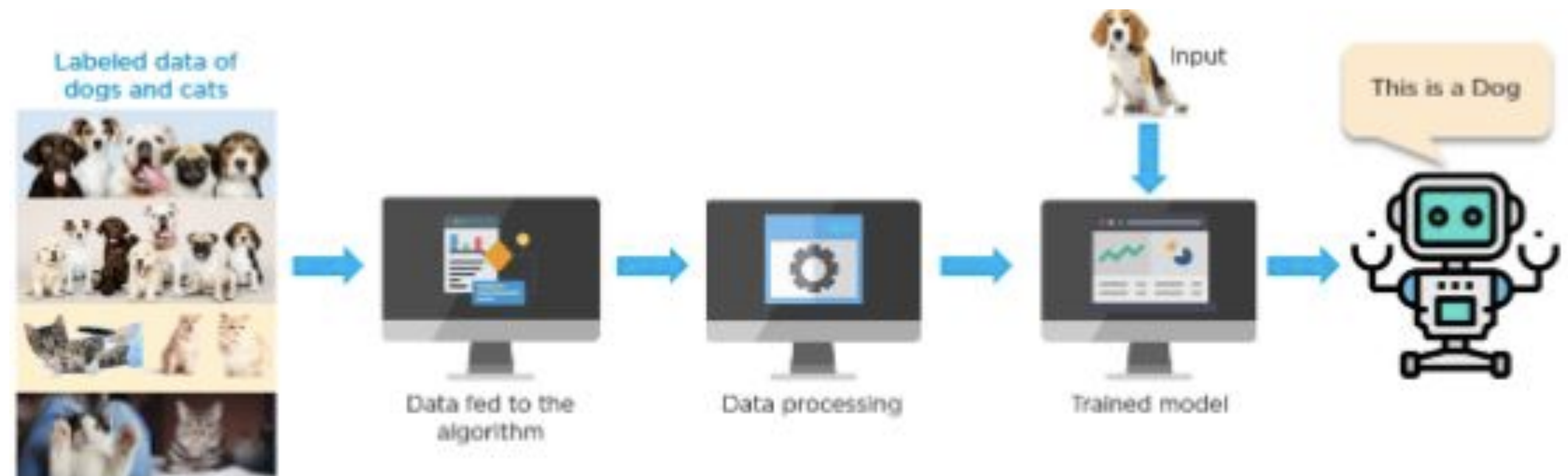
Understanding ML - Deep-Dive

How does ML work?

1. How to learn from data

Types of ML

- 2. Supervised Learning
- 3. Unsupervised Learning
- 4. Reinforcement Learning
- 5. Headline takeaways

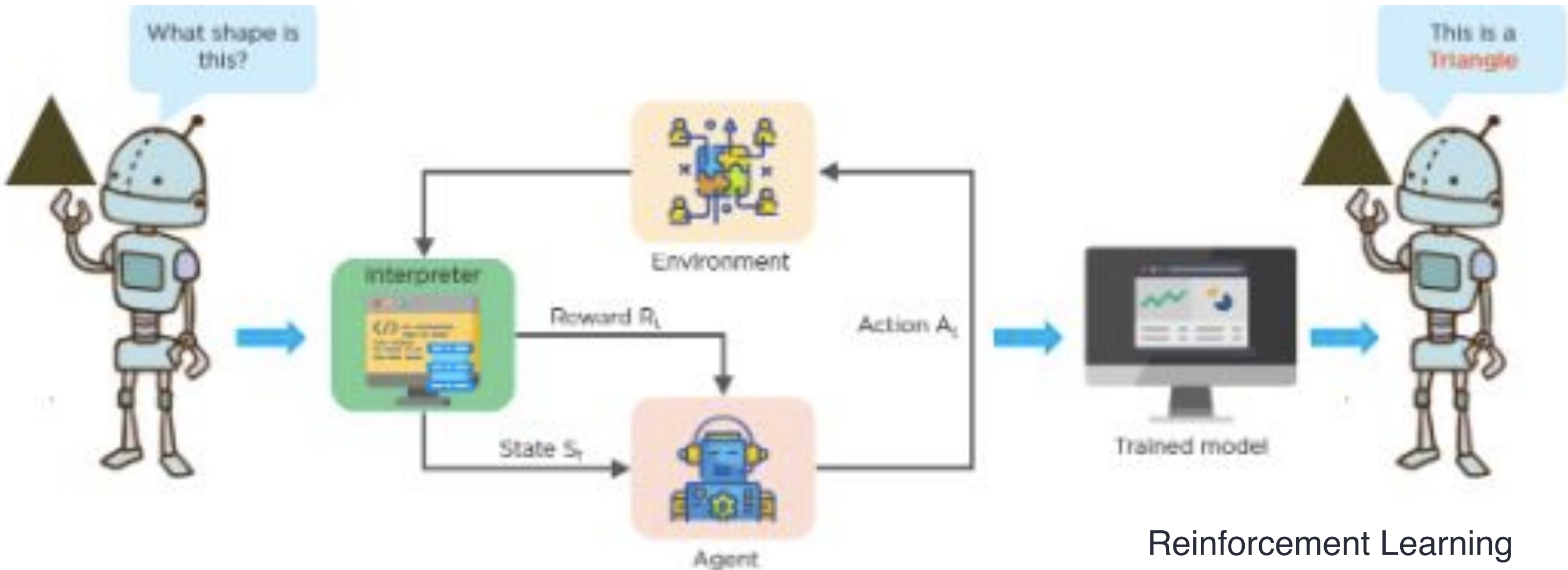
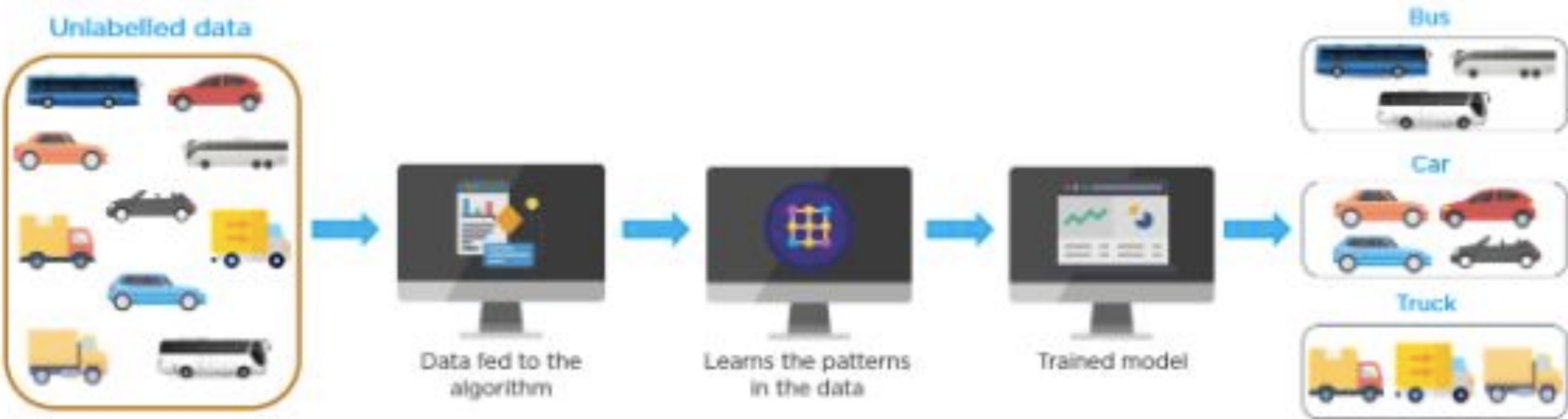


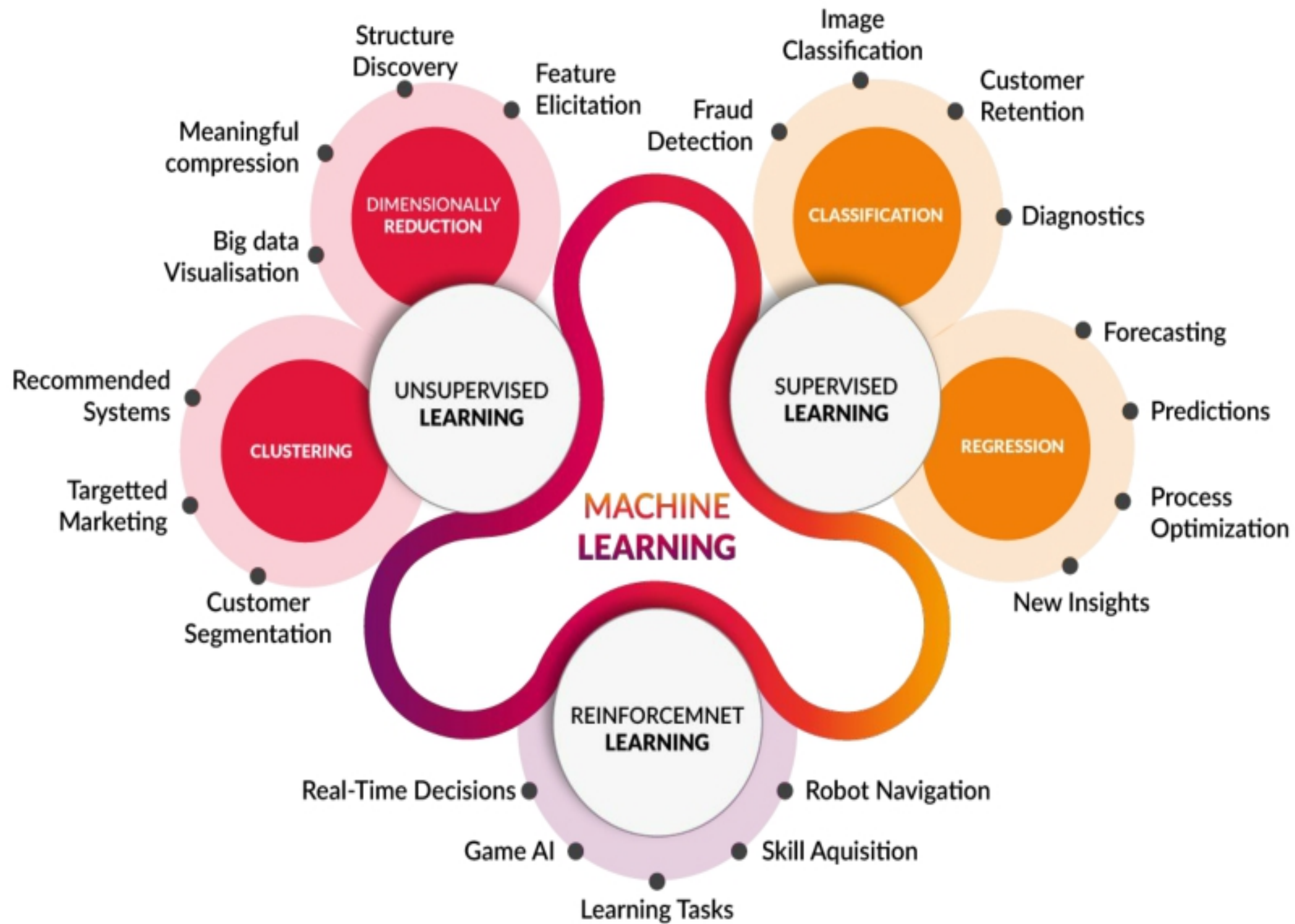
Supervised Learning

Understanding ML - Deep-Dive

How does ML work?

Unsupervised Learning







Poll No 13

With the rise of AI, more and more start-ups venture into the market. Most work in the field of

a/ Recommendation Engines

b/ Video content recognition

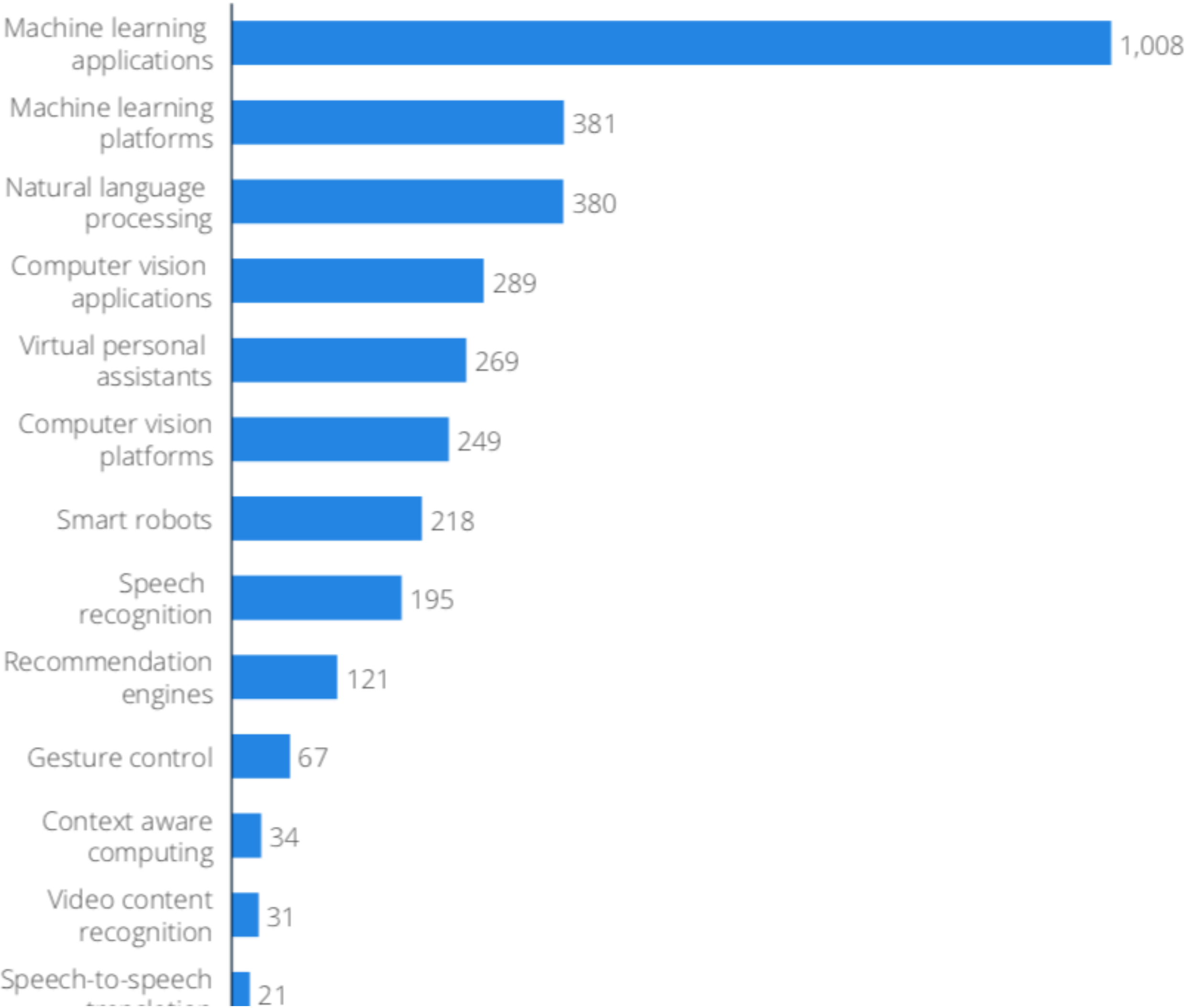
C/ ML applications

d/ virtual personal assistants

**VS/ VENTURE
SCANNER**

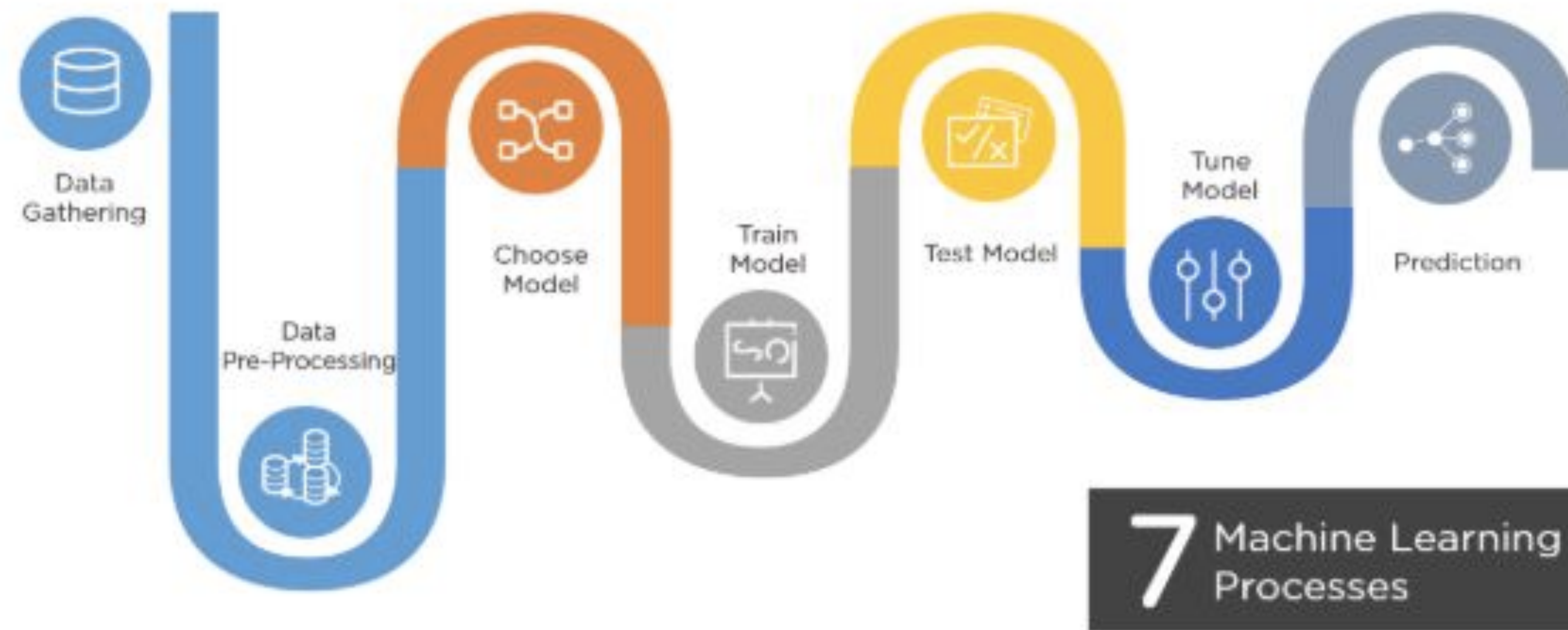


Number of AI start-ups



Understanding ML - Deep-Dive

How does ML work?



Machine Learning Applications

Company	Application	Sector	Inputs	Actions	Objective
	Trade execution platform for multiple strategies	Financial services	200 plus market related data inputs	Sell, buy, hold stocks	To trade as close as possible to VWAP, a common price metric
					
NETFLIX	Test schedules for business partner devices	Technology	Historical test and device performance information	Which test to do next	Minimize device failure
	Recommendation engine	Entertainment	Previous songs liked/disliked/not played	Which songs to put in your playlist	Maximize user listening time
J.P.Morgan	Financial derivatives risk and pricing calculations	Financial services	Historical market data	Price and sell a financial product	Maximize future cash flows of an investment portfolio
					
Google	Data center cooling	Technology	Temperature/air pressure	Turn on fan; add water to air unit	Control temperature and reduce energy usage
	Order dispatching	Ride-hailing	Number of idle vehicles, number of orders, location destinations	Match driver to passenger	Minimize pick up time and maximize revenue

Understanding ML - Deep-Dive

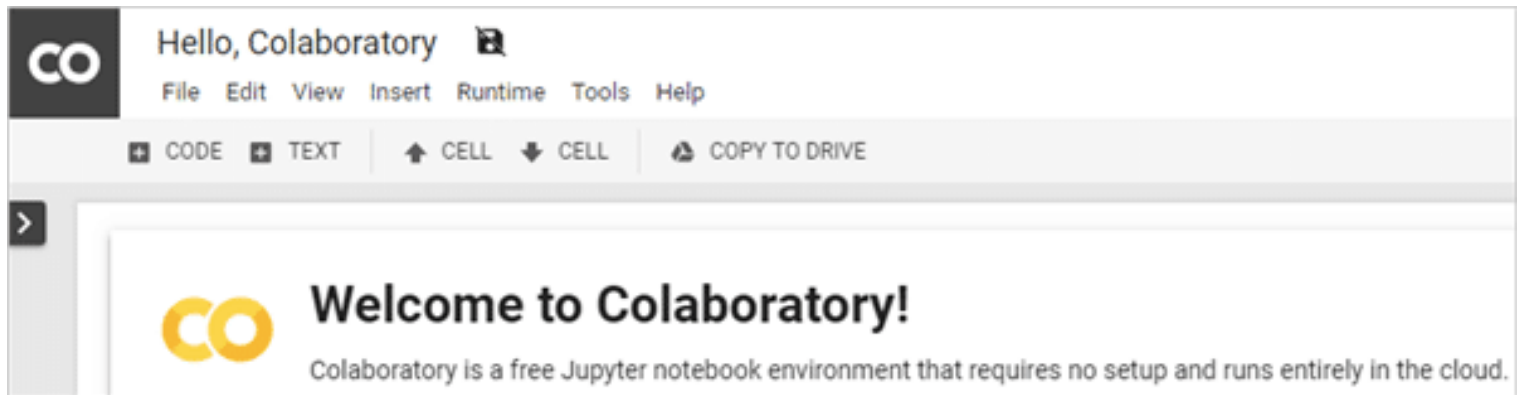
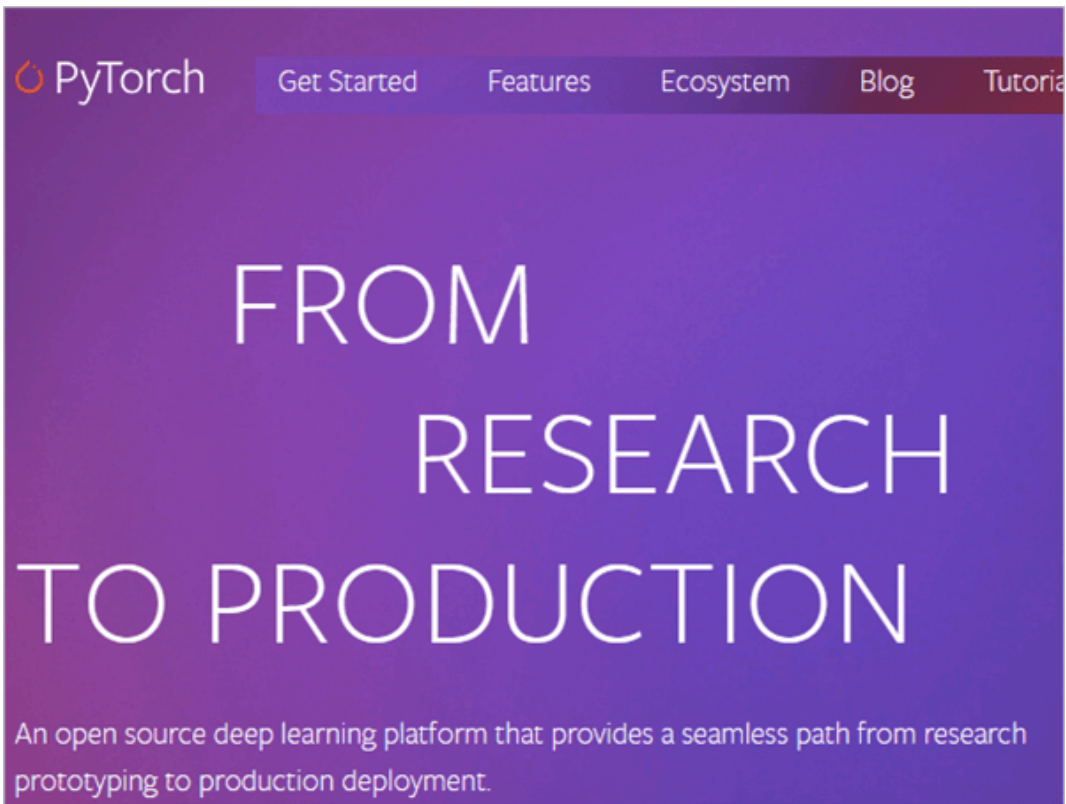
ML Software tools 2022

1. Scikit-learn
2. PyTorch
3. TensorFlow
4. Weka
5. KNIME
6. Colab
7. Apache Mahout
8. accord.Net
9. Shogun
10. keras.io
11. Rapid Miner,
12. Headline takeaways



Understanding ML - Deep-Dive

ML Software tools 2022



Understanding ML - Deep-Dive

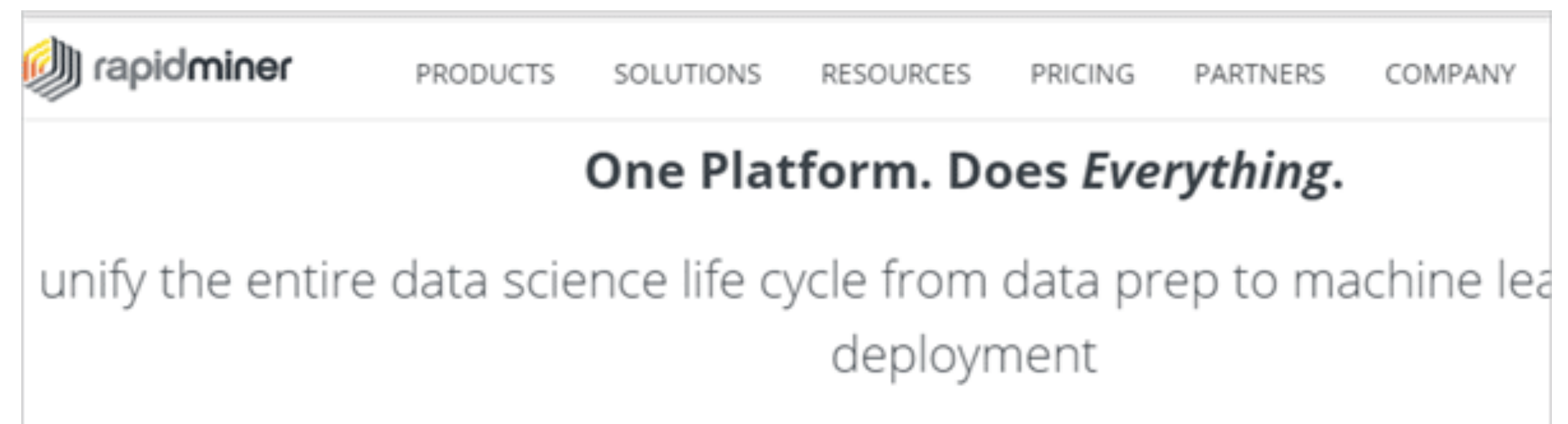
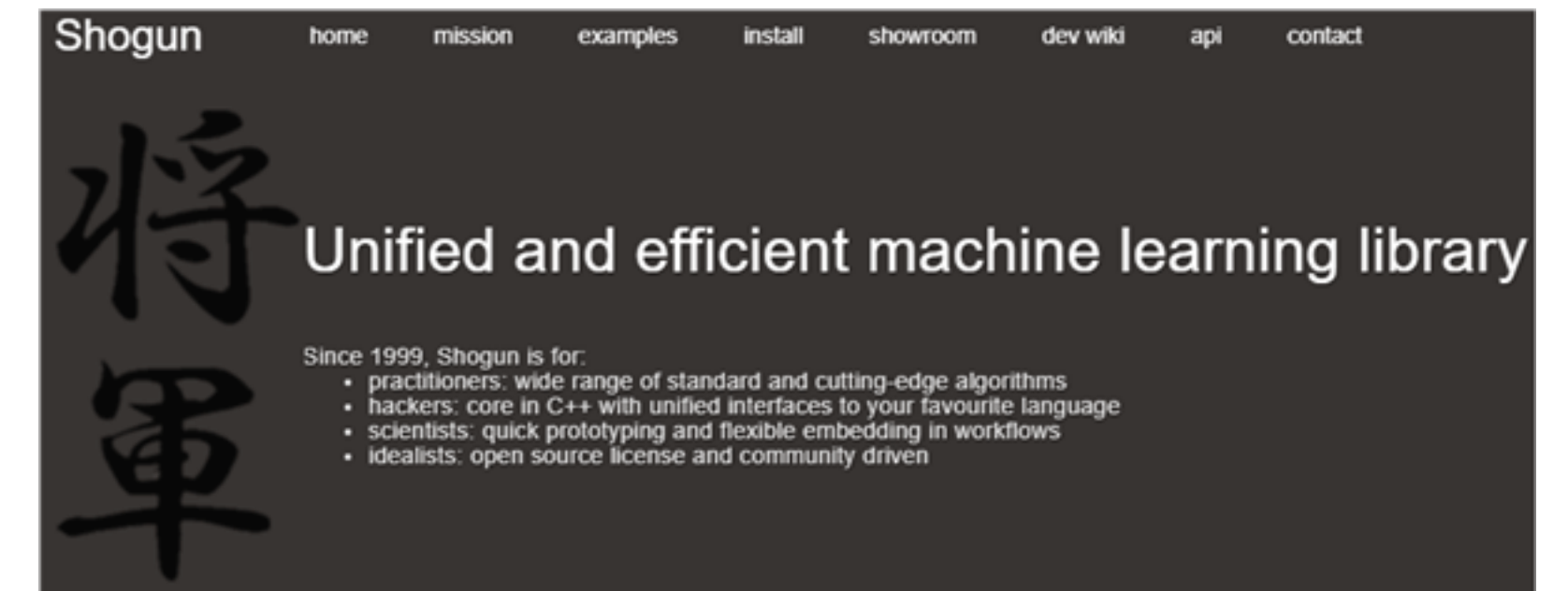
ML Software tools 2022

	Platform	Cost	Written in language	Algorithms or Features
Scikit Learn	Linux, Mac OS, Windows	Free.	Python, Cython, C, C++	Classification Regression Clustering Preprocessing Model Selection Dimensionality reduction.
PyTorch	Linux, Mac OS, Windows	Free	Python, C++, CUDA	Autograd Module Optim Module nn Module
TensorFlow	Linux, Mac OS, Windows	Free	Python, C++, CUDA	Provides a library for dataflow programming.
Weka	Linux, Mac OS, Windows	Free	Java	Data preparation Classification Regression Clustering Visualization Association rules mining
KNIME	Linux, Mac OS, Windows	Free	Java	Can work with large data volume. Supports text mining & image mining through plugins
Colab	Cloud Service	Free	-	Supports libraries of PyTorch, Keras, TensorFlow, and OpenCV



Understanding ML - Deep-Dive

ML Software tools 2022



Understanding ML - Deep-Dive

ML Software tools 2022

	Platform	Cost	Written in language	Algorithms or Features
Apache Mahout	Cross-platform	Free	Java Scala	Preprocessors Regression Clustering Recommenders Distributed Linear Algebra.
Accors.Net	Cross-platform	Free	C#	Classification Regression Distribution Clustering Hypothesis Tests & Kernel Methods Image, Audio & Signal. & Vision
Shogun	Windows Linux UNIX Mac OS	Free	C++	Regression Classification Clustering Support vector machines. Dimensionality reduction Online learning etc.
Keras.io	Cross-platform	Free	Python	API for neural networks
Rapid Miner	Cross-platform	Free plan Small: \$2500 per year. Medium: \$5000 per year. Large: \$10000	Java	Data loading & Transformation Data preprocessing & visualization.



Understanding ML - Deep-Dive

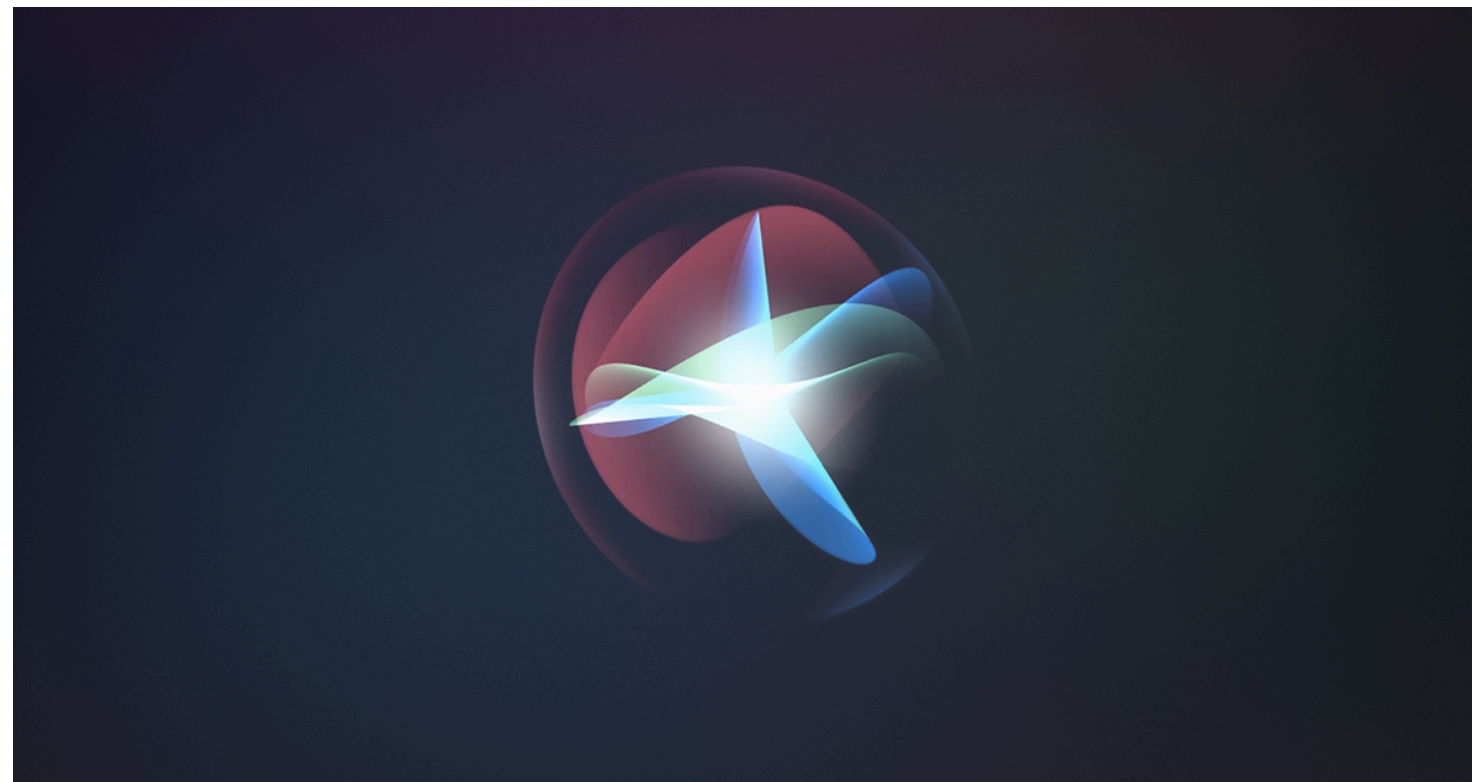
AI tools for personal use

1. ML Software tools
2. AI Personal Assistants
3. Work AI tools
4. In-home AI Tools
5. Social AI Tools
6. Medical/health AI Tools
7. Education AI Tools
8. Shopping AI Tools
9. Music AI Tools
10. Finance AI Tools
11. Research AI Tools
12. Travel AI Tools
13. Headline takeaways



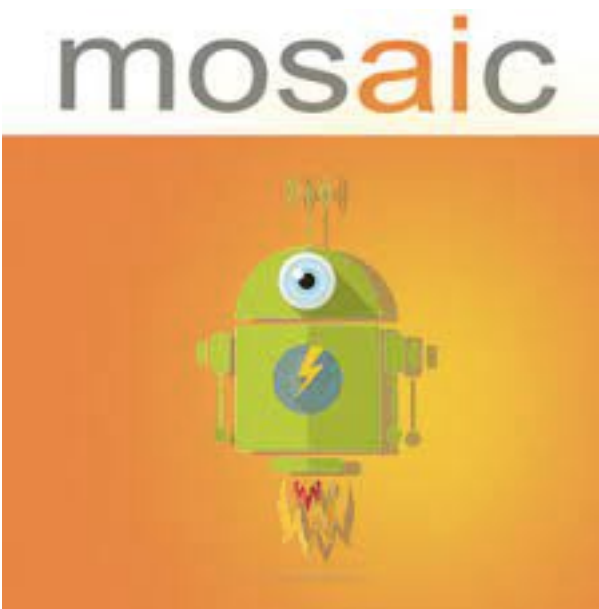
Understanding ML - Deep-Dive

AI tools for personal use AI Personal Assistants

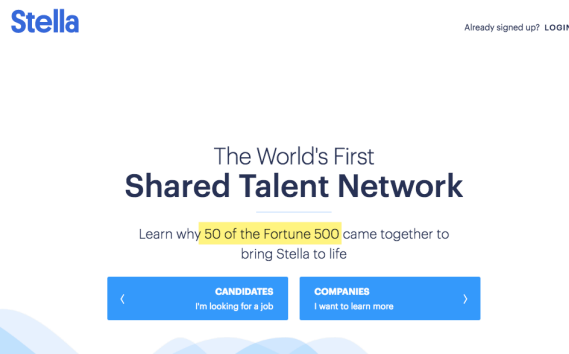
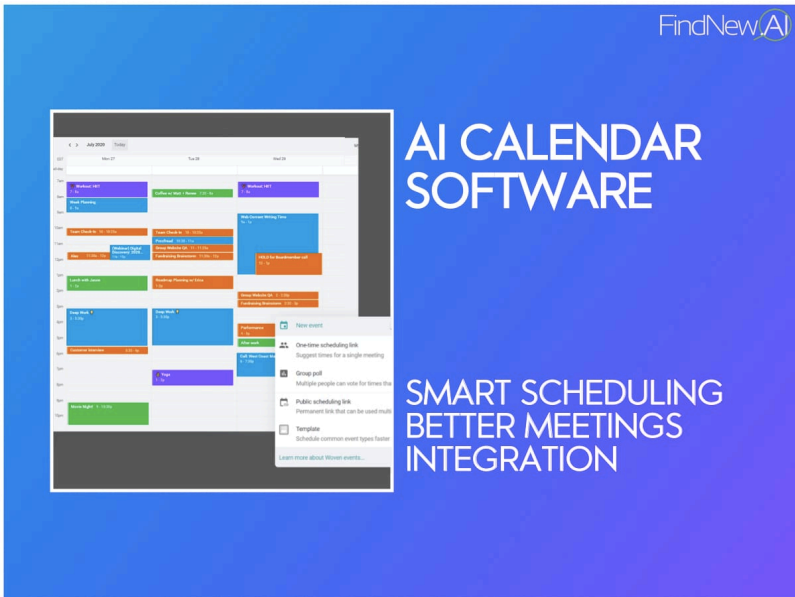
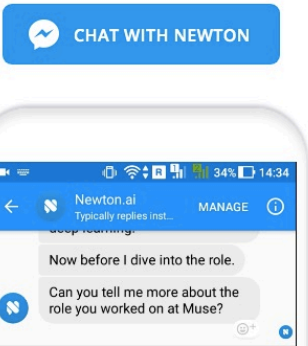


Understanding ML - Deep-Dive

AI tools for personal use Work AI Tools



Meet **Newton**
Your AI friend that gets you hired



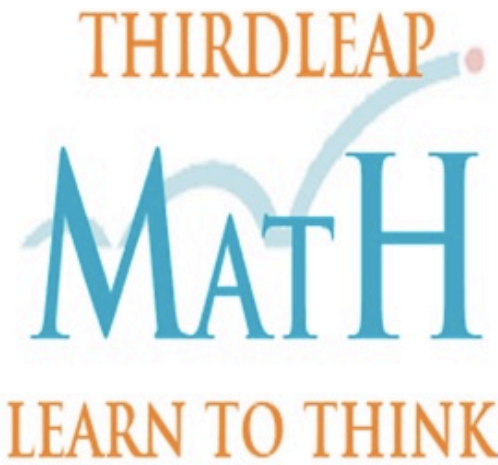
Understanding ML - Deep-Dive



AI tools for personal use In-home AI Tools

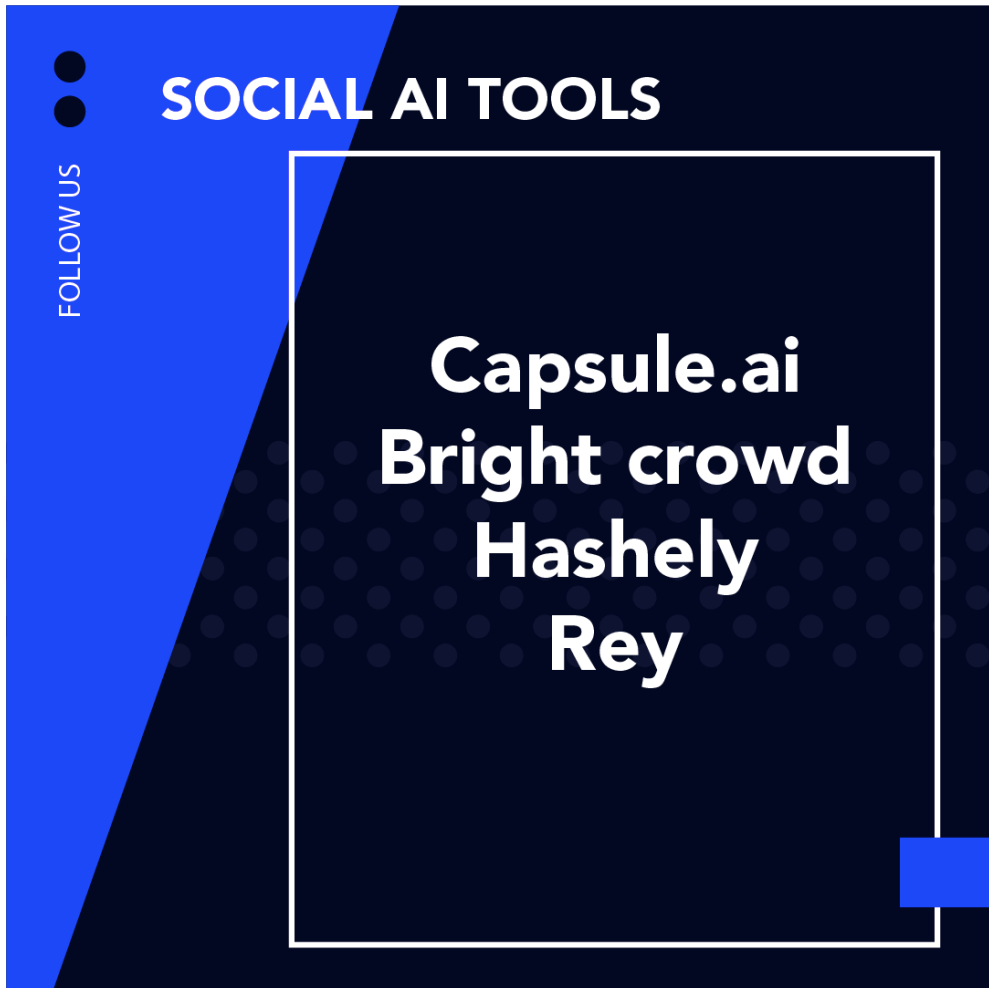


AI tools for personal use Education AI Tools



Understanding ML - Deep-Dive

AI tools for personal use Social AI Tools



Dating.ai

AI tools for personal use Music AI Tools

pandora®



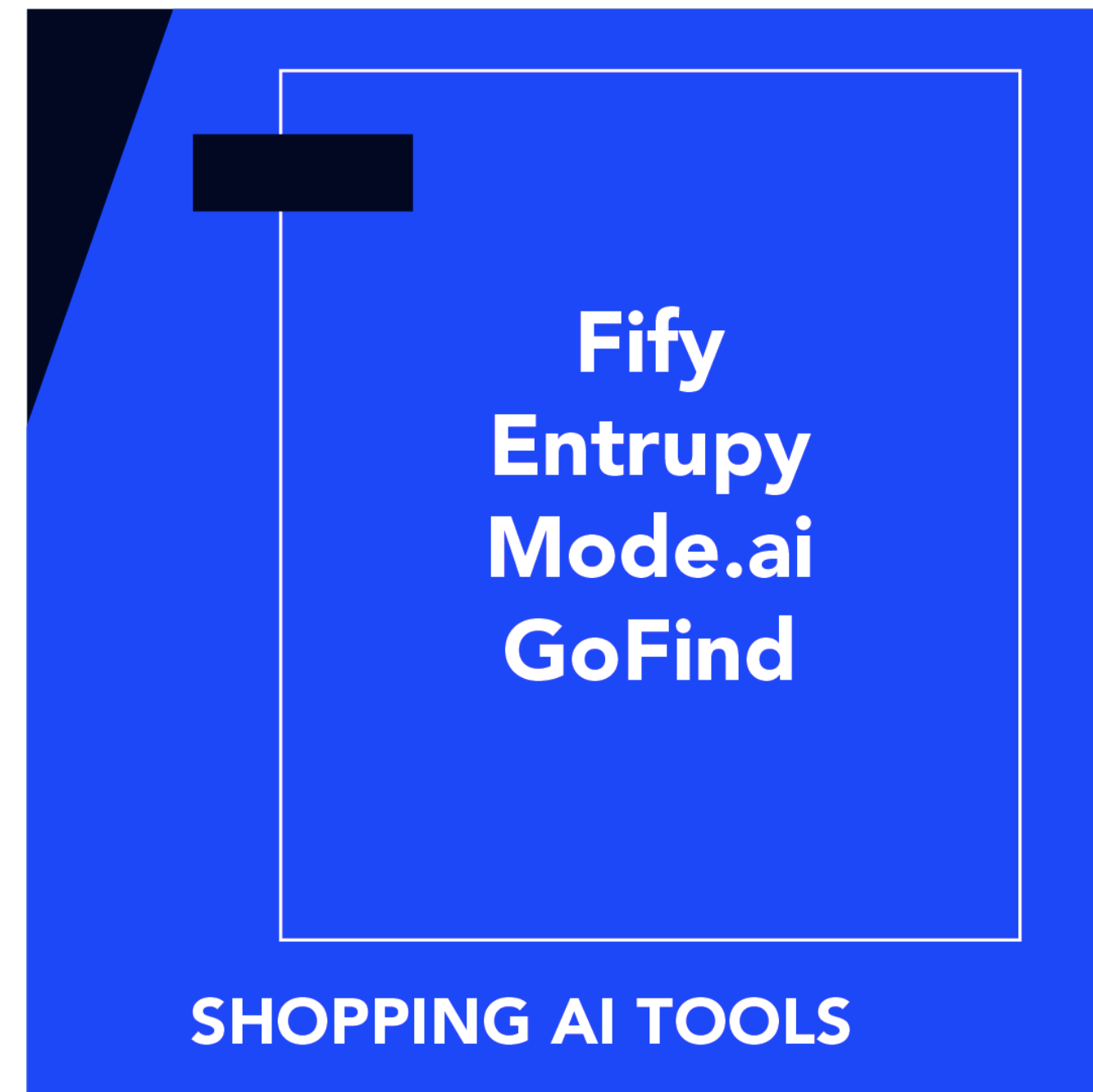
Understanding ML - Deep-Dive

AI tools for personal use Medical/Health AI Tools



Understanding ML - Deep-Dive

AI tools for personal use Shopping AI Tools



Understanding ML - Deep-Dive

AI tools for personal use Finance AI Tools



Understanding ML - Deep-Dive

AI tools for personal use
Research AI Tools



Understanding ML -
Deep-Dive

AI tools for personal use
Travel AI Tools



What do you want the machine learning system to do?

I want to see if there are natural clusters or dimensions in the data I have about different situations.

I want to learn what actions to take in different situations.

Do you want the ML system to be active or passive?

ACTIVE

The system's own actions will affect the situations it sees in the future.

PASSIVE

The system will learn from data I give it.

Do you have access to data that describes a lot of examples of situations and appropriate actions for each situation?

Will the system be able to gather a lot of data by trying sequences of actions in many different situations and seeing the results?

Could there be patterns in these situations that humans haven't recognized before?

Could a knowledgeable human decide what actions to take based on the data you have about the situation?

UNSUPERVISED LEARNING MAY BE APPROPRIATE

*clustering
anomaly detection*

SUPERVISED LEARNING MAY BE APPROPRIATE

*neural nets
support vector machines
regression
recommender systems*

MACHINE LEARNING IS NOT USEFUL

REINFORCEMENT LEARNING MAY BE APPROPRIATE

Credit: Thomas Malone, MIT Sloan | Design: Laura Wentzel



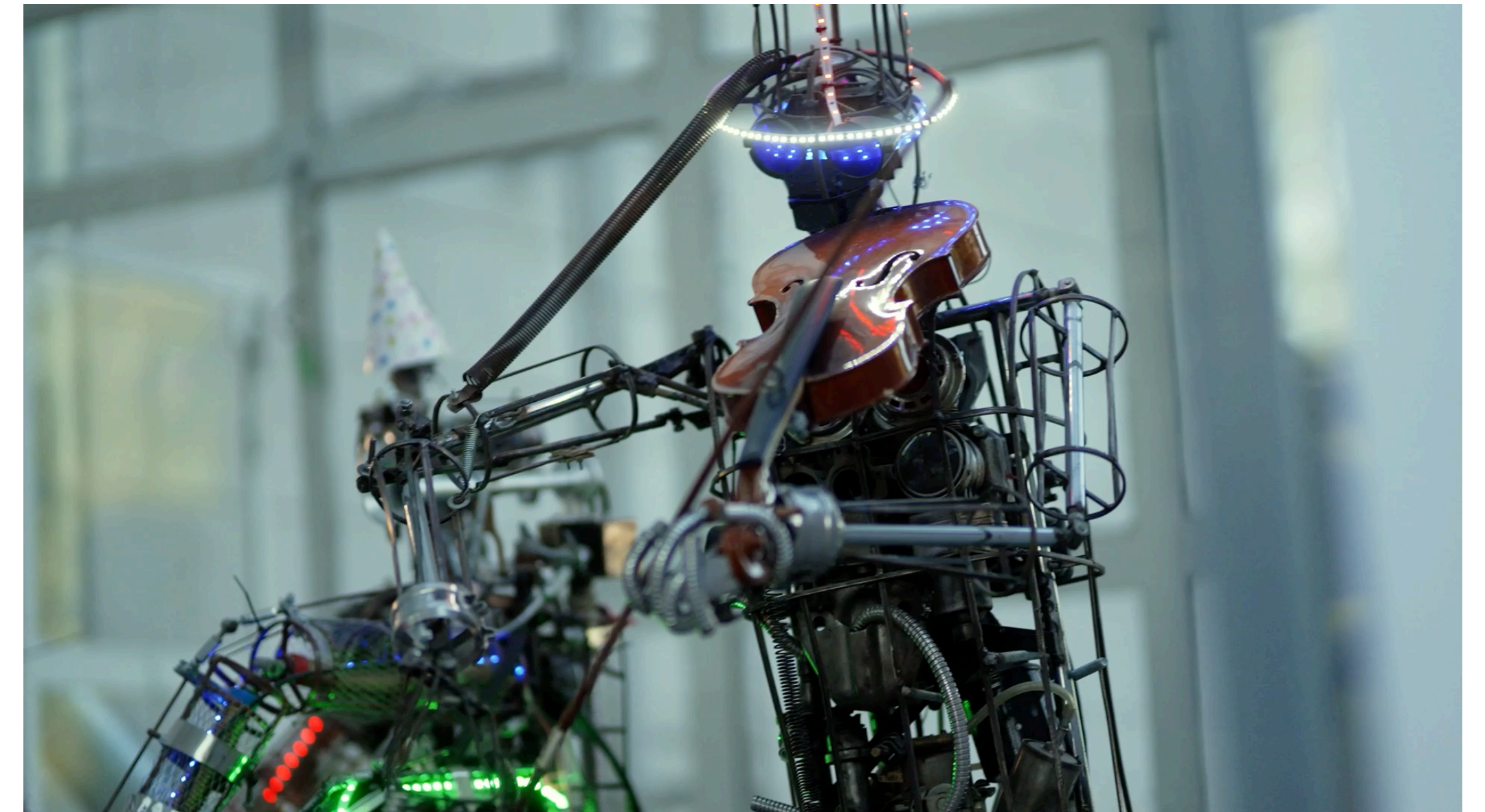
Functions of a Machine Learning System

- **Descriptive** — the system uses the data to explain what happened.
- **Predictive** — the system uses the data to predict what will happen.
- **Prescriptive** — the system will use the data to make suggestions about what action to take.

Summary

5/ Understanding ML - Deep-Dive

1. Implementing AI
2. What is ML
3. Steps in ML
4. Types of ML
5. Classification and Regression in ML
6. How does ML work?
7. ML Software tools 2021
8. AI Tools for personal use
9. Machine Learning Career - What to learn first
10. Machine Learning Career - Skills
11. AI in Numbers
12. Headline takeaways



End of Presentation

“Anything that could give rise to smarter-than-human intelligence—in the form of Artificial Intelligence, brain-computer interfaces, or neuroscience-based human intelligence enhancement – **wins hands down** beyond contest as doing the most to change the world.

Nothing else is even in the same league.”

Eliezer Yudkowsky.



5/ Understanding ML
Basics + More

Johannes Moenius
Automation Expert

X

Breakout Room 5!

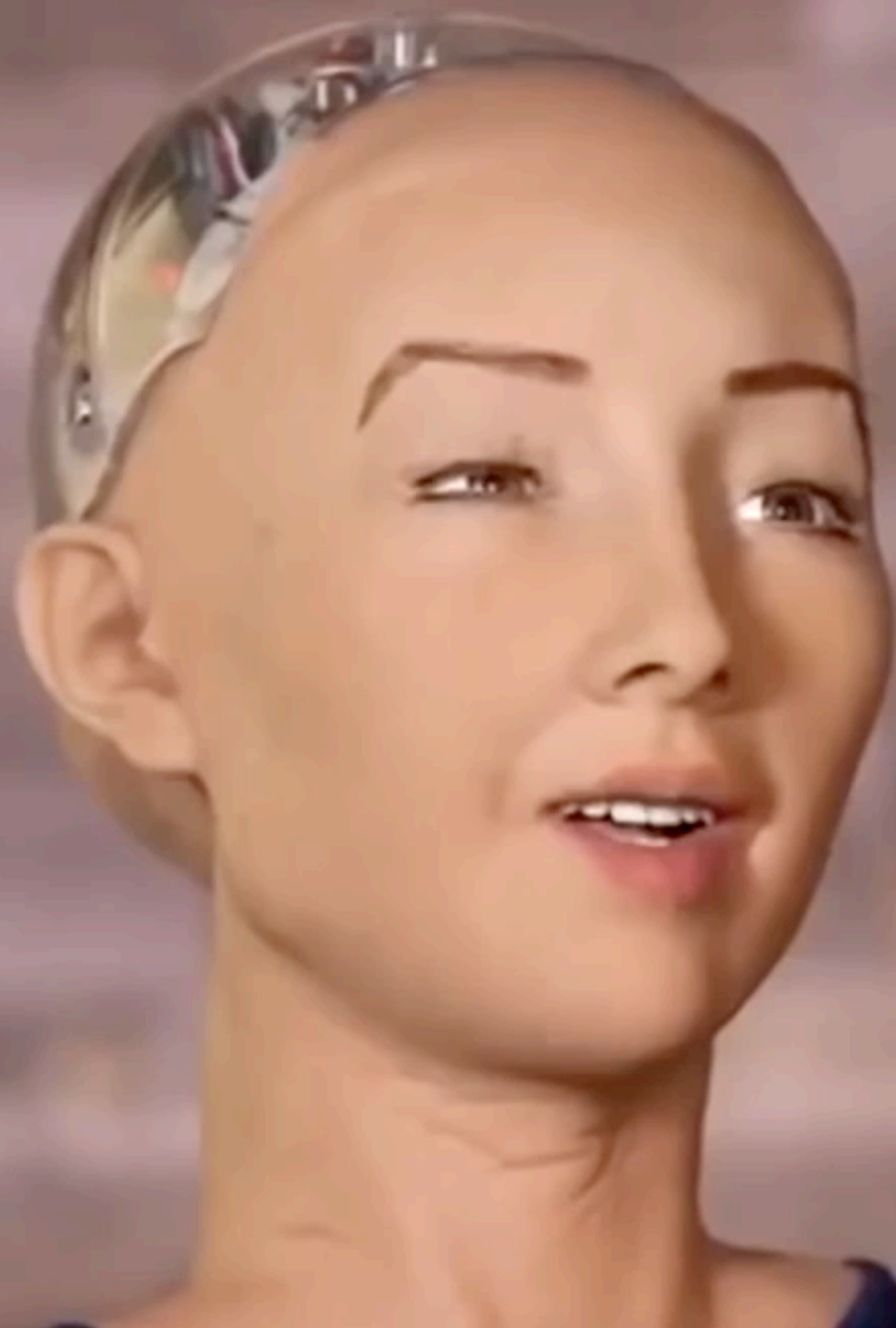
Algorithms are becoming an important part of how work is managed. What are the implications?

AI - the new co-worker!

or

**Are algorithms replacing the human mind
as machines replaced the body!**





SOPHIA

HANSON ROBOTICS

Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

5/ Understanding Deep Learning
NLP, CV, Face Recognition
Deep Dive



1.
Understanding AI -
Course Introduction

2.
Understanding AI -
Deep-Dive 1

3.
Understanding AI -
Deep-Dive 2

4.
Understanding ML -
Deep-Dive


5.
Understanding DL -
Deep-Dive

6.
Implementing AI -
Projects

7.
AI Trends -
State of AI

8.
AI for
Business Leadership

9.
Ethics
In AI

10.
AI in
Singapore +
AI in action!

11.
Understanding AI -
Applications

12.
Future
of AI



1.
Technology

2.
Business

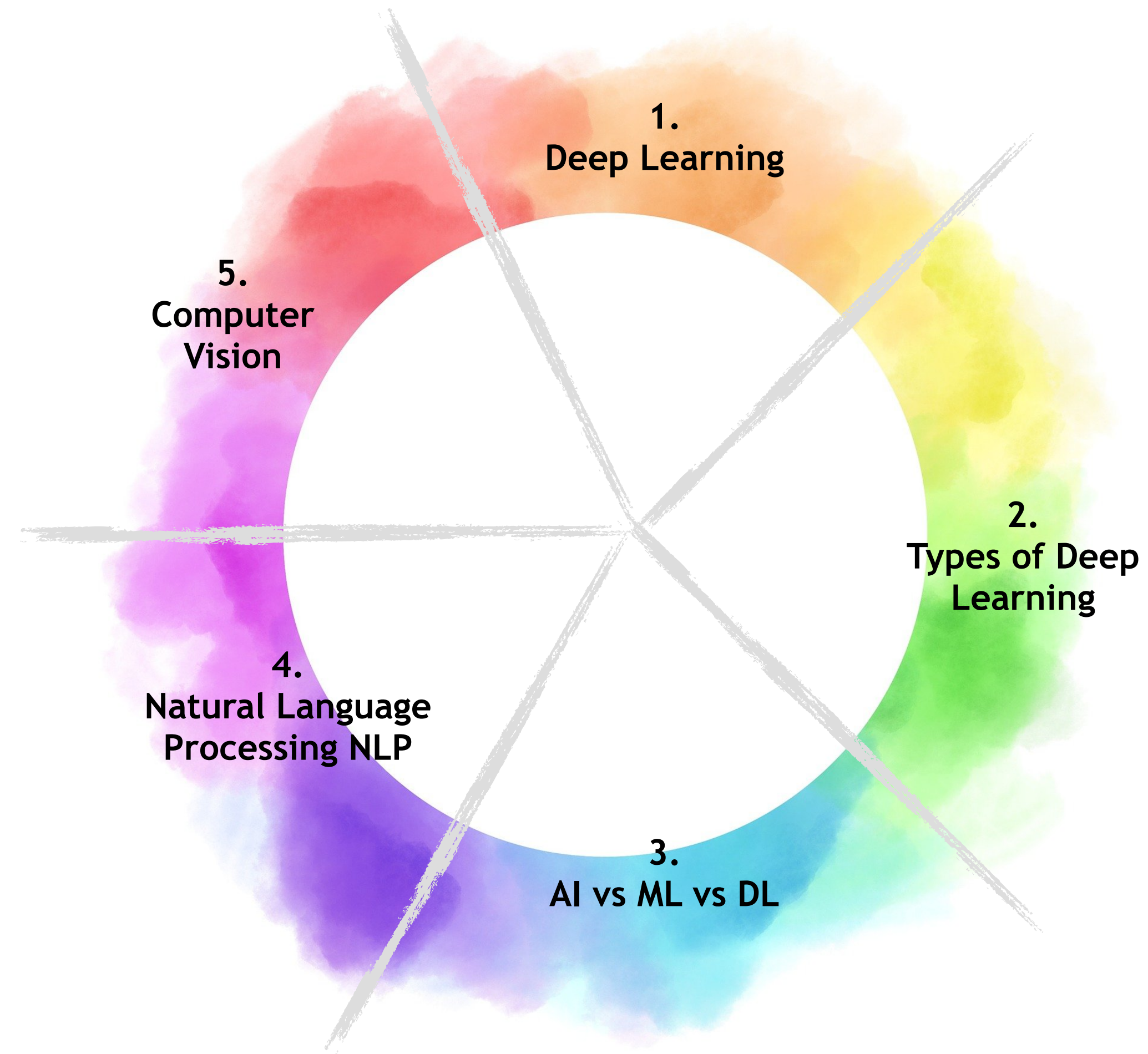
2.
People

6.
Understanding DL-
Deep-Dive

6.
Understanding DL-
Basics + More



6/ Understanding DL - Deep-Dive



AI - An introduction

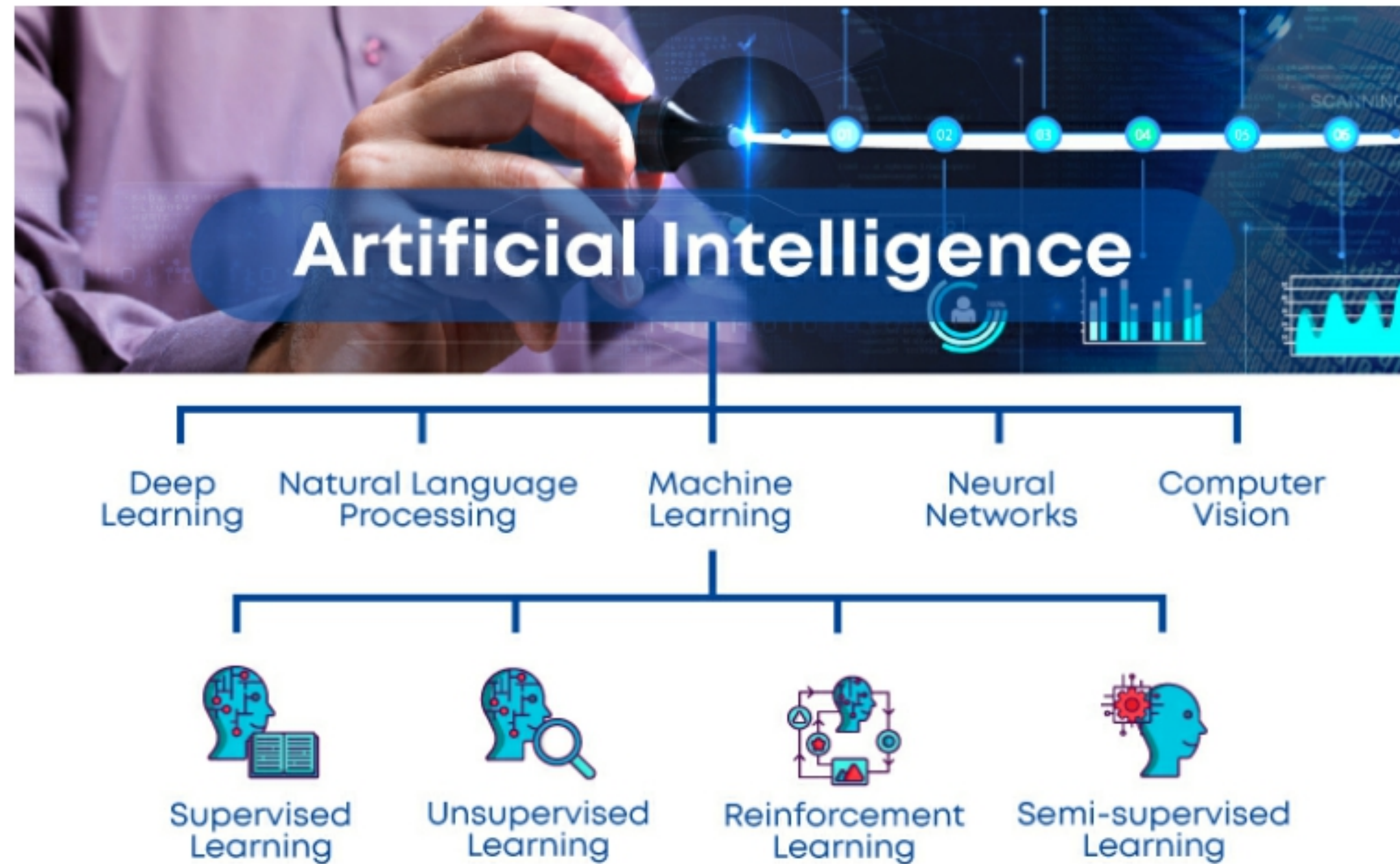
What is DL

- AI vs ML vs DL
- Headline takeaways

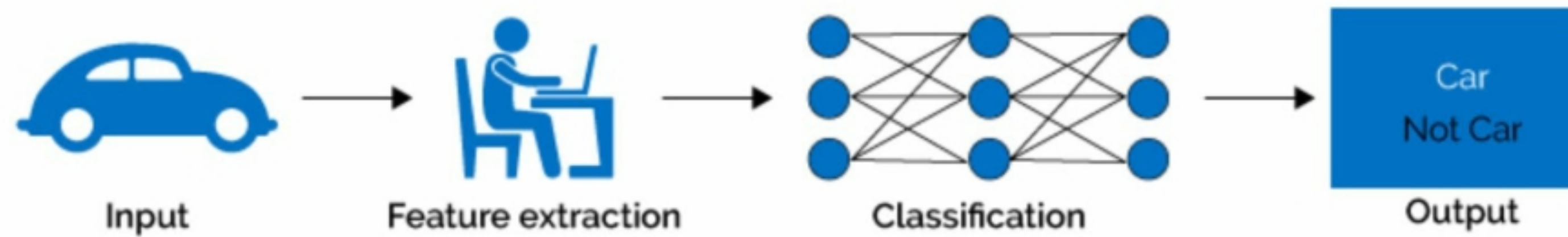


AI - An introduction

Machine Learning and Deep Learning



Machine Learning



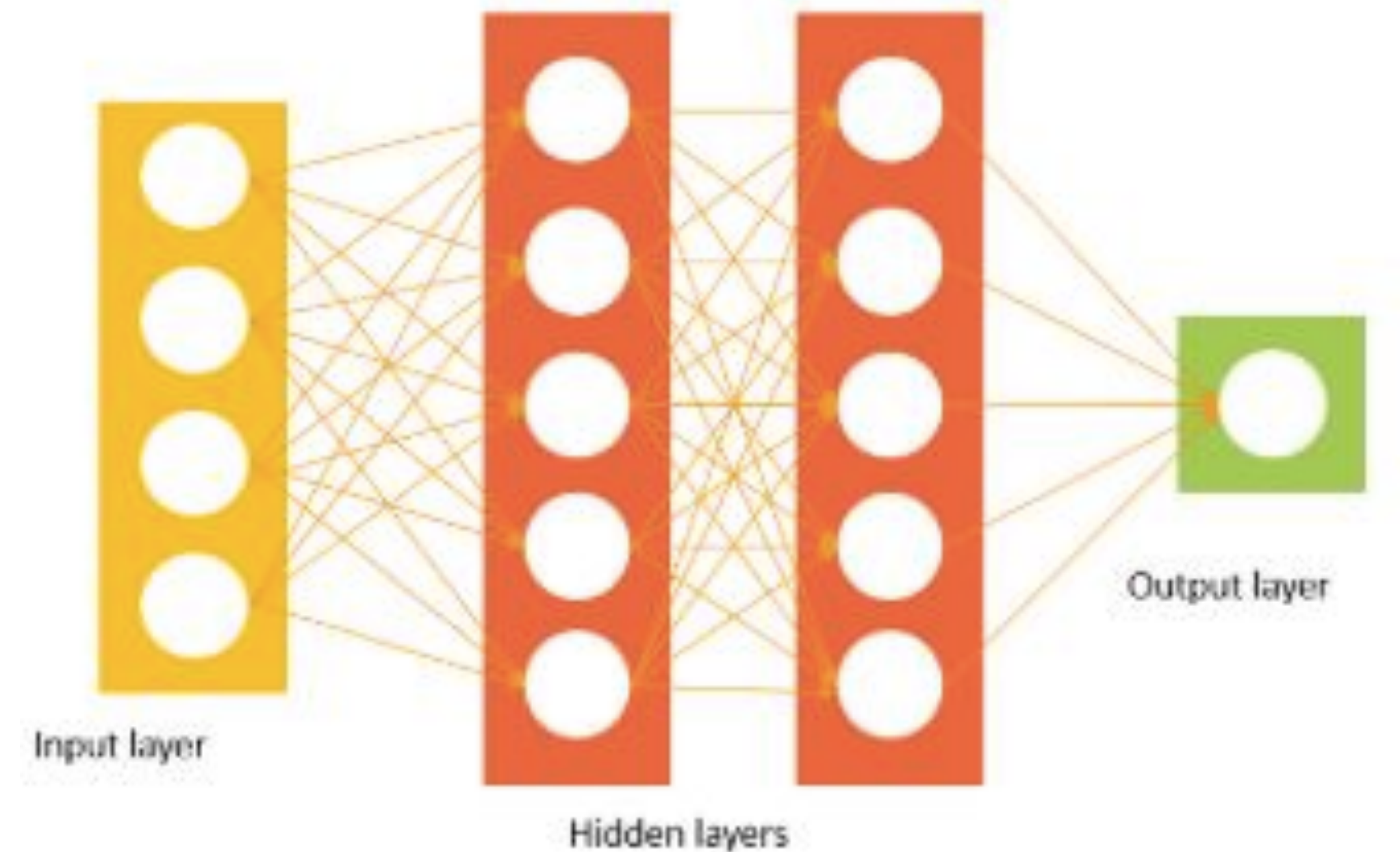
Deep Learning



Understanding Deep Learning - Deep-Dive

Deep Learning

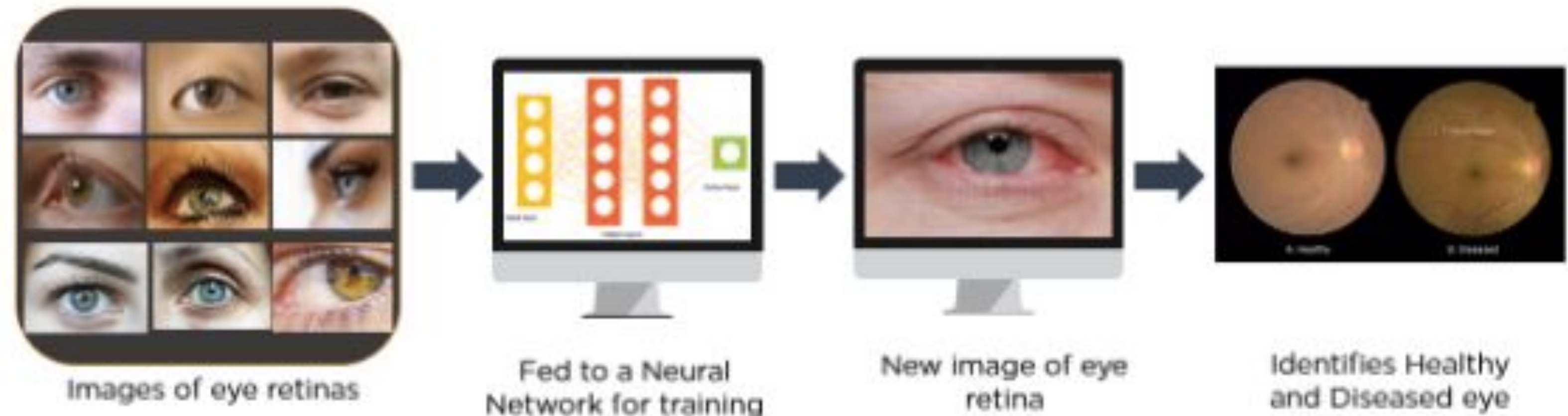
1. Human brain
2. Artificial neural networks
3. Both structured and unstructured data
4. Simple neural network as shown
 - Input, Hidden, Output
5. Headline takeaways



Understanding Deep Learning - Deep-Dive

Deep Learning

1. Use case
2. How it works



Types of Deep Neural Networks

1. Convolutional Neural Network (CNN)
2. Recurrent Neural Network (RNN)
3. Generative Adversarial Network (GAN)
4. Deep Belief Network (DBN)

5. Headline takeaways

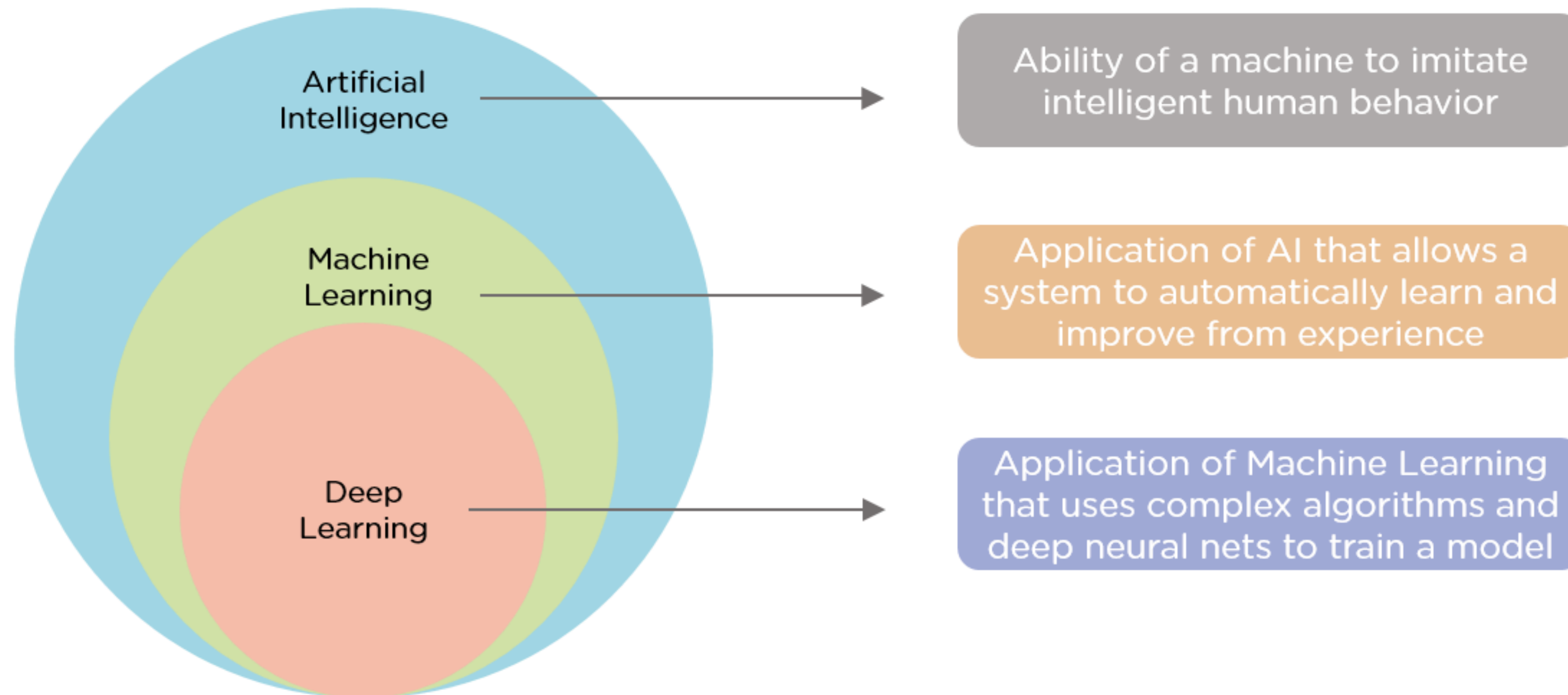
Understanding Deep Learning - Deep-Dive

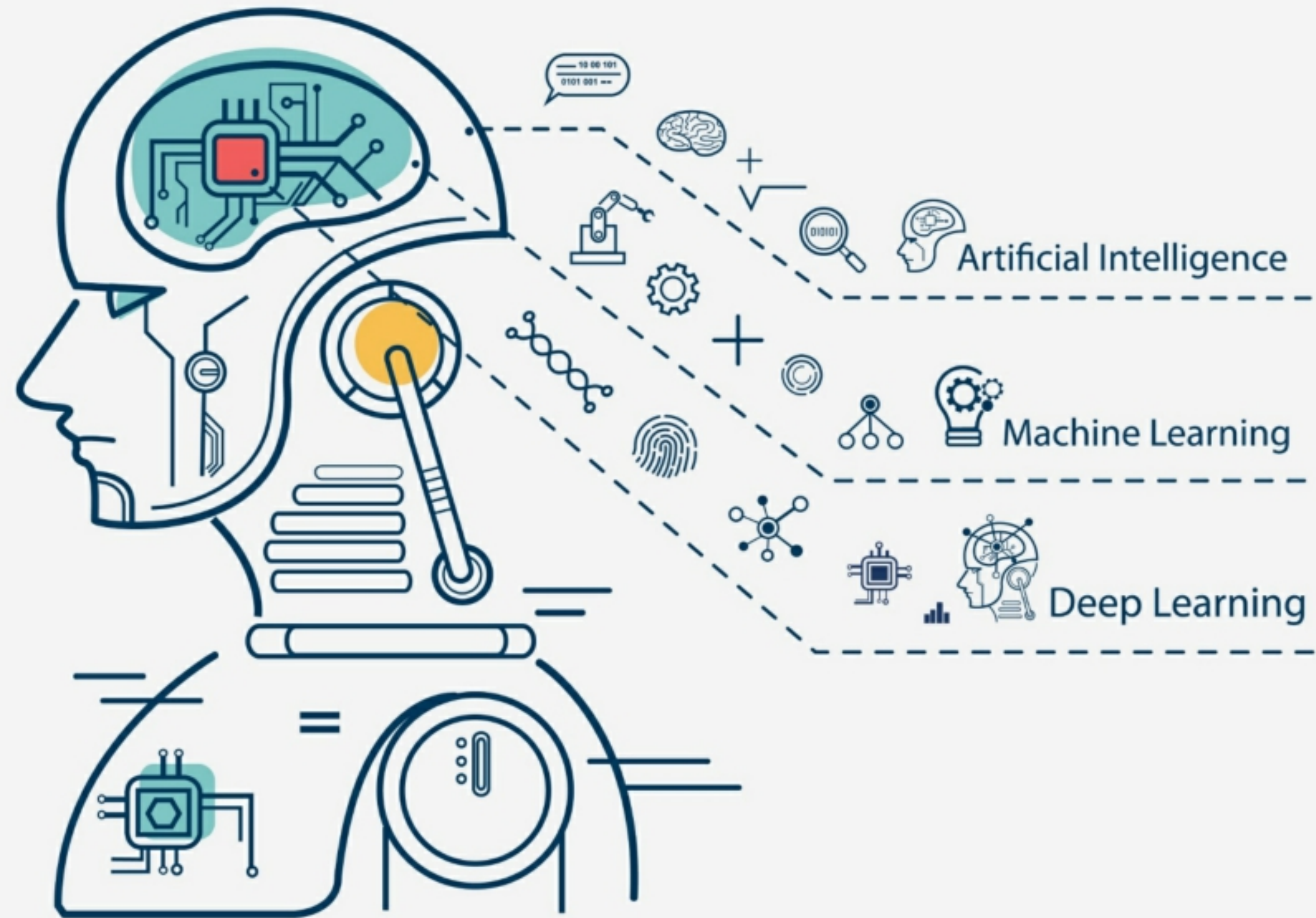


[Click](#)

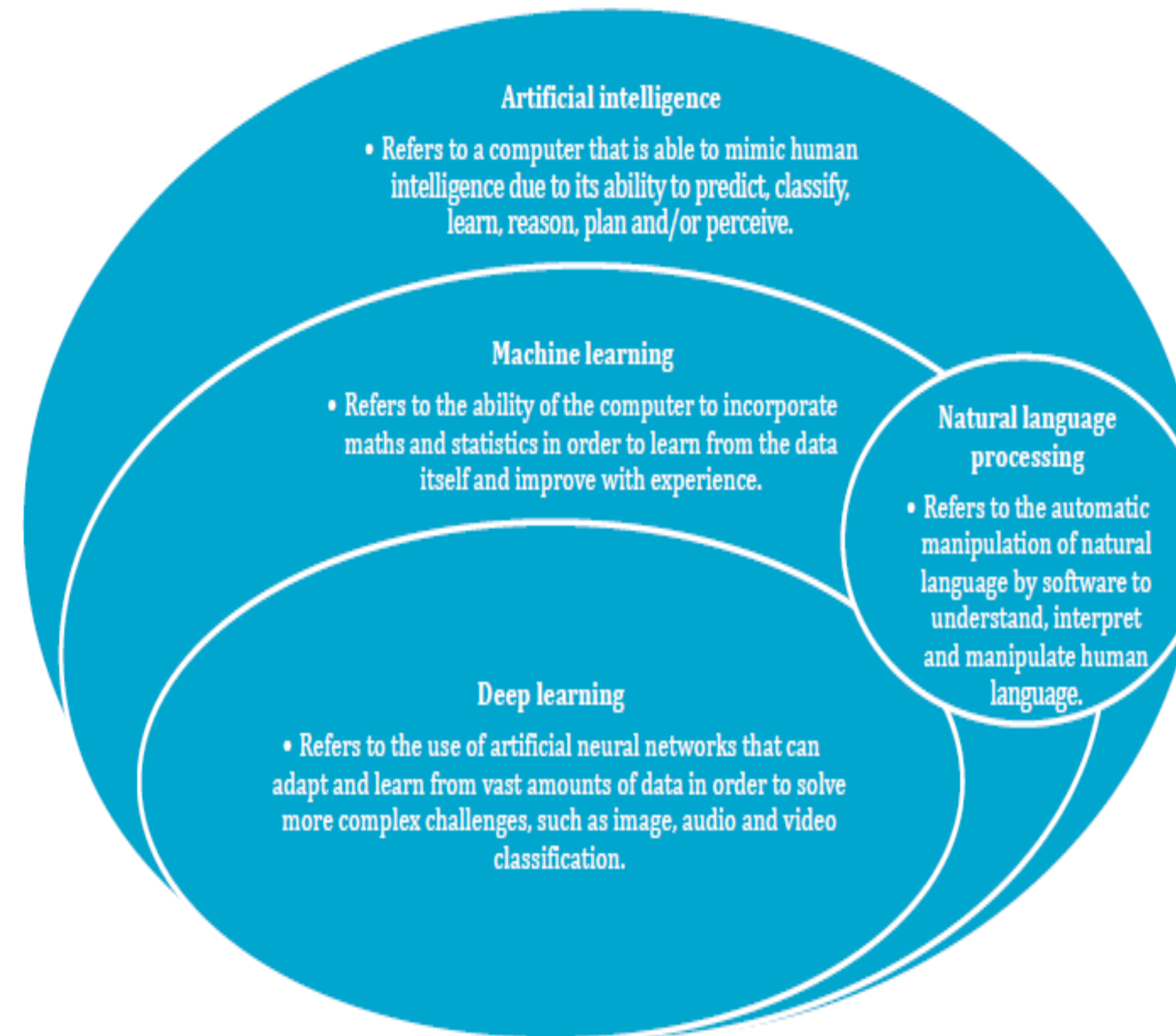
Understanding Deep Learning - Deep-Dive

AI v/s Machine Learning v/s Deep Learning





What is AI and what are the key applications



Understanding Deep Learning - Deep-Dive

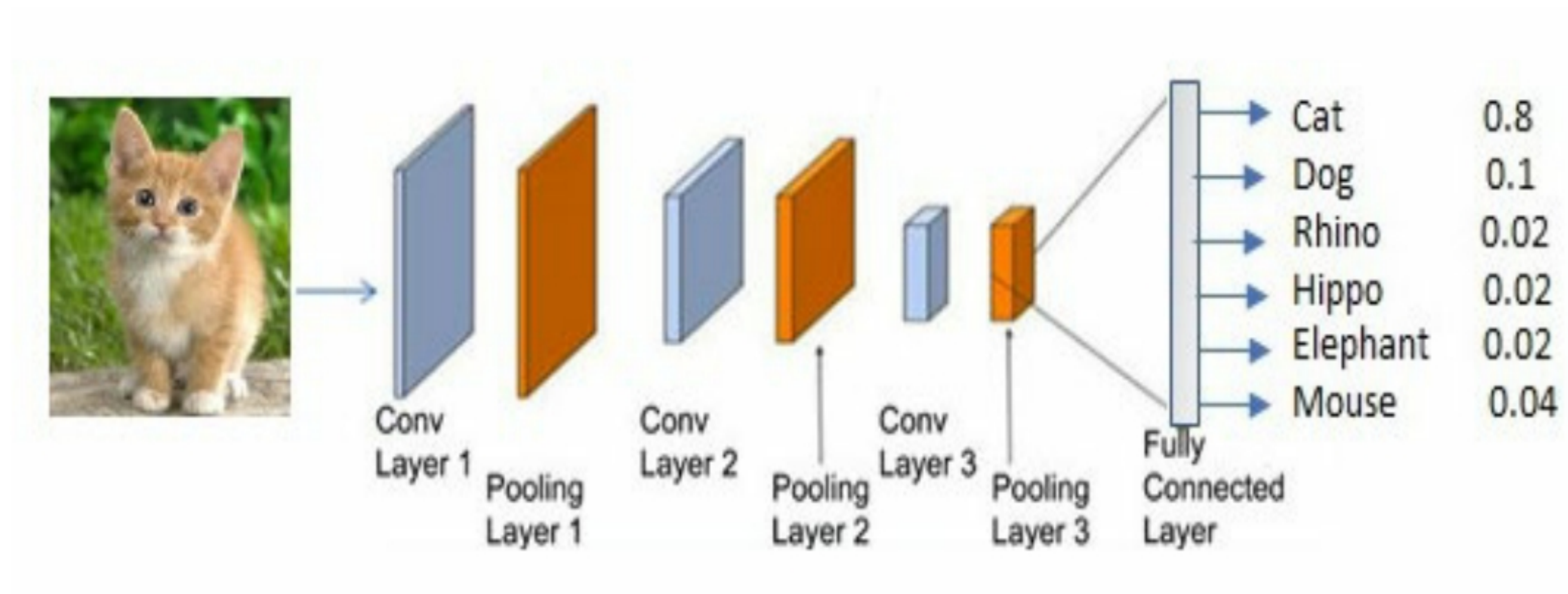
Understanding NLP

1. NLP explained
2. Headline takeaways



Understanding Deep Learning - Deep-Dive

Image Processing

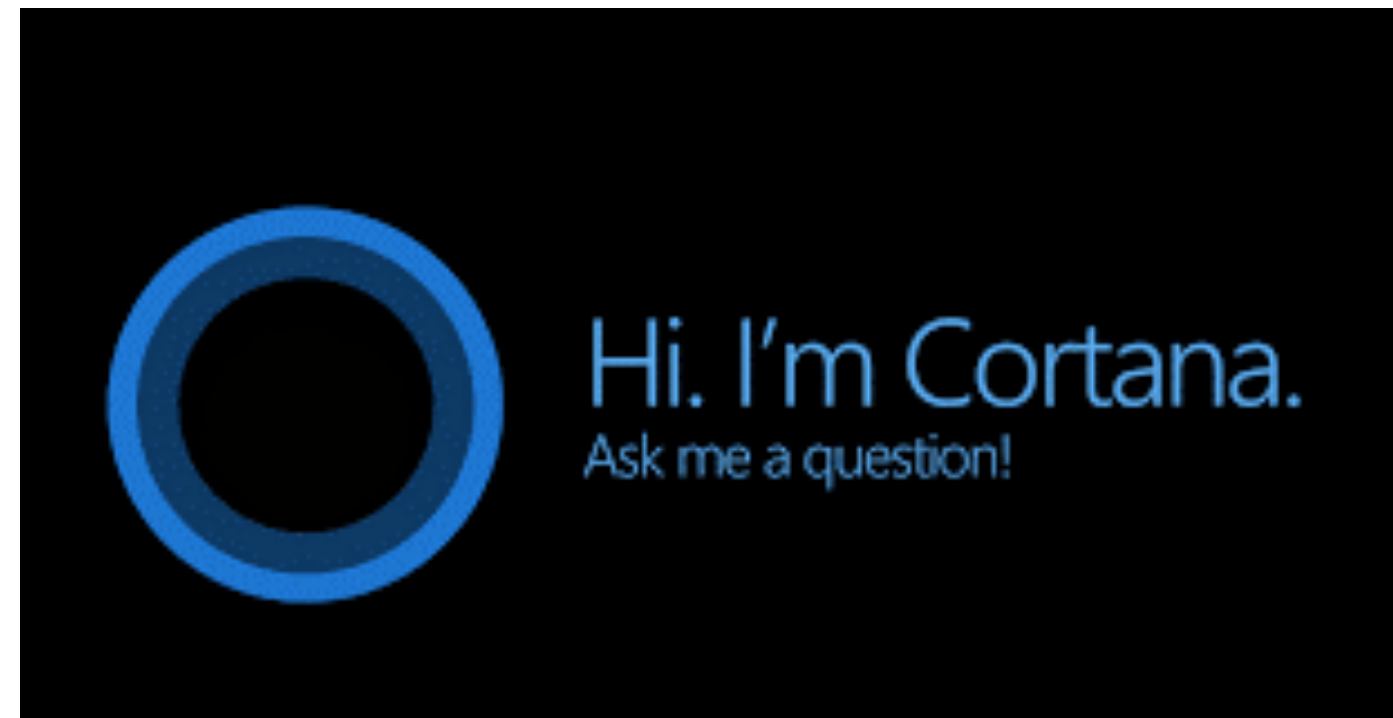


Understanding Deep Learning - Deep-Dive

AI in Speech Processing and Intelligent Bots



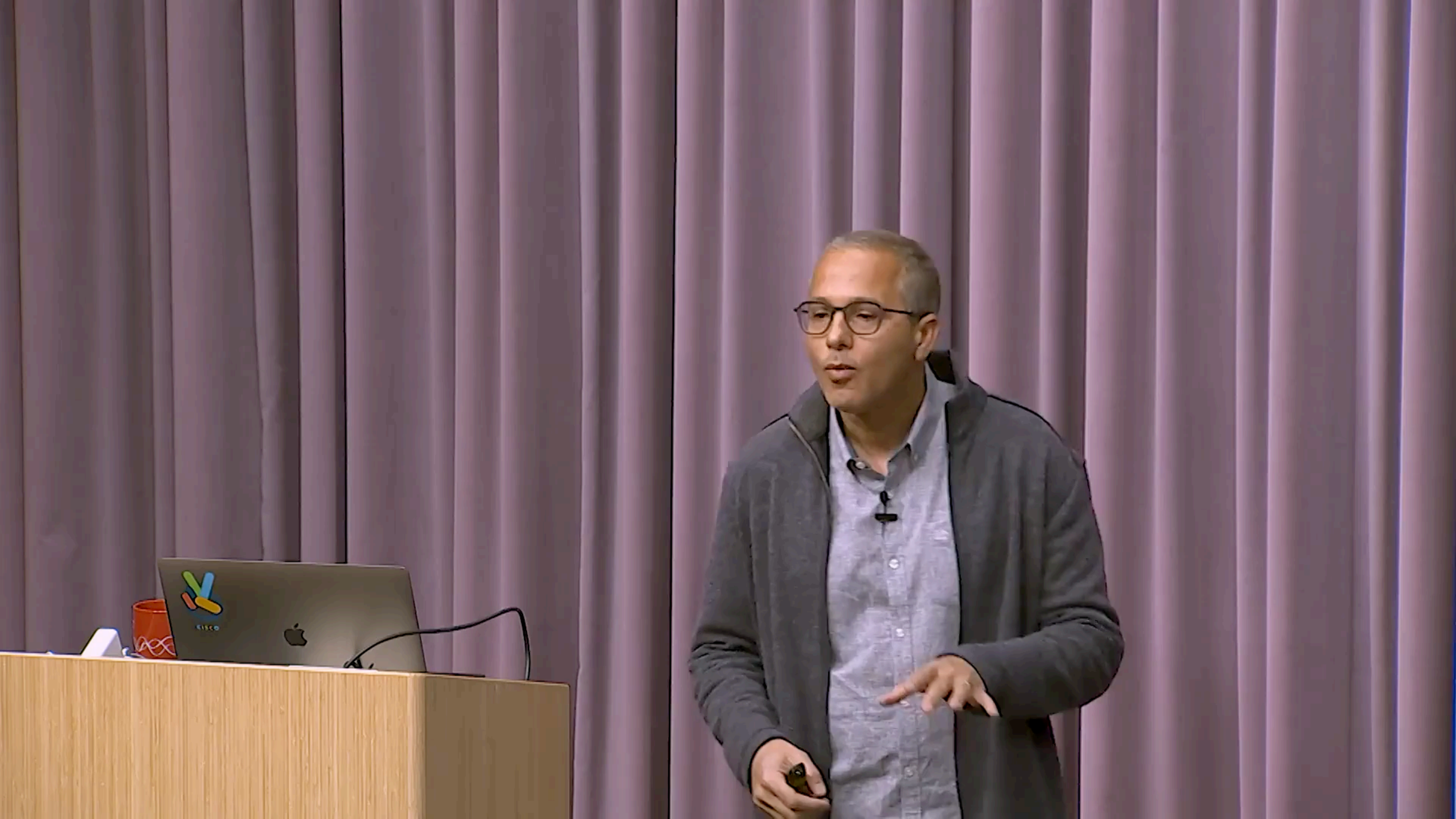
The Siri app interface on iOS



The Cortana app



Alexa



Poll No 14

Funding of AI start-ups grew at a CAGR of over ____% up to 2020

a/ >10%

b/ >20%

c/ >30%

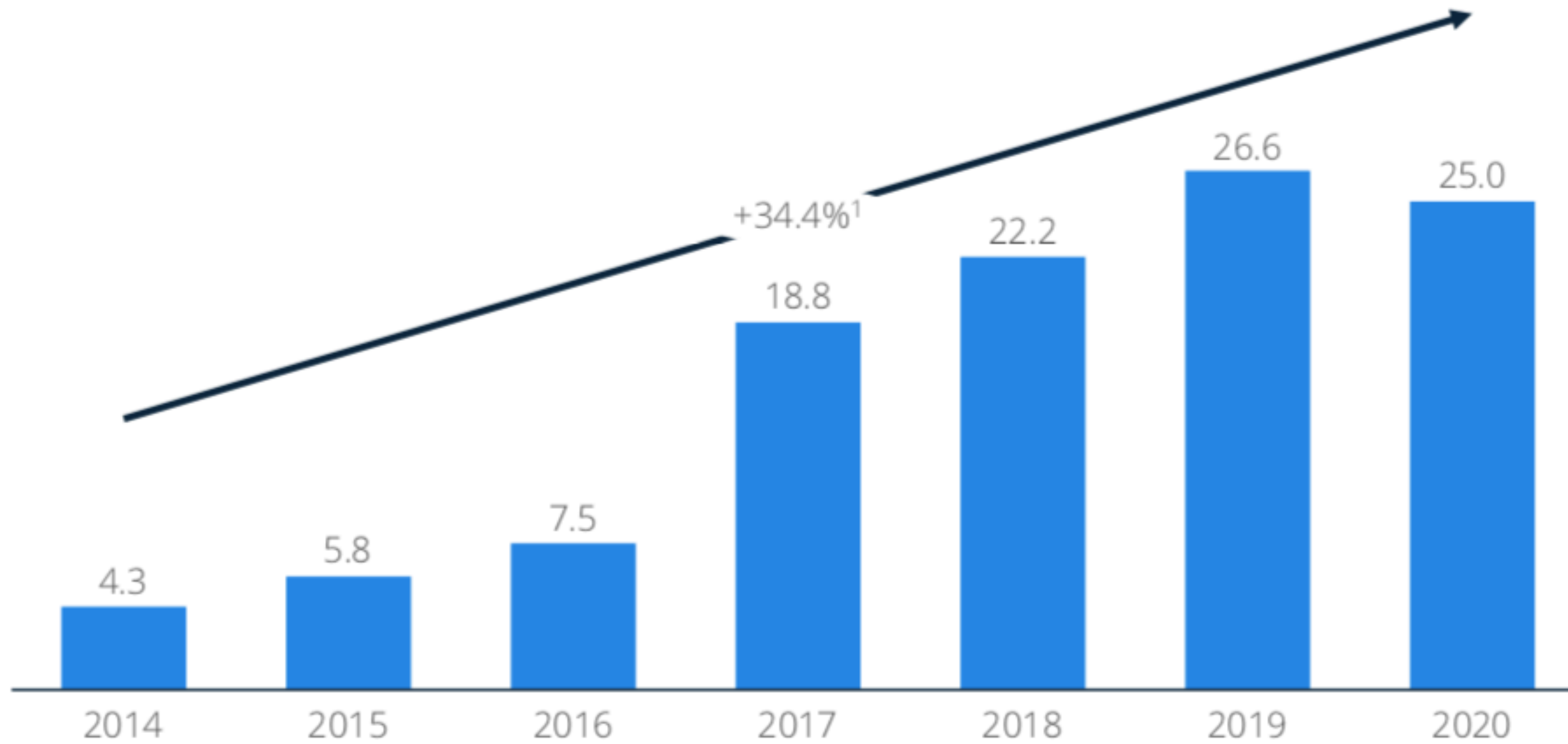
d/ >40%

**VS/ VENTURE
SCANNER**

CB INSIGHTS



AI start-ups: annual global funding in billion US\$

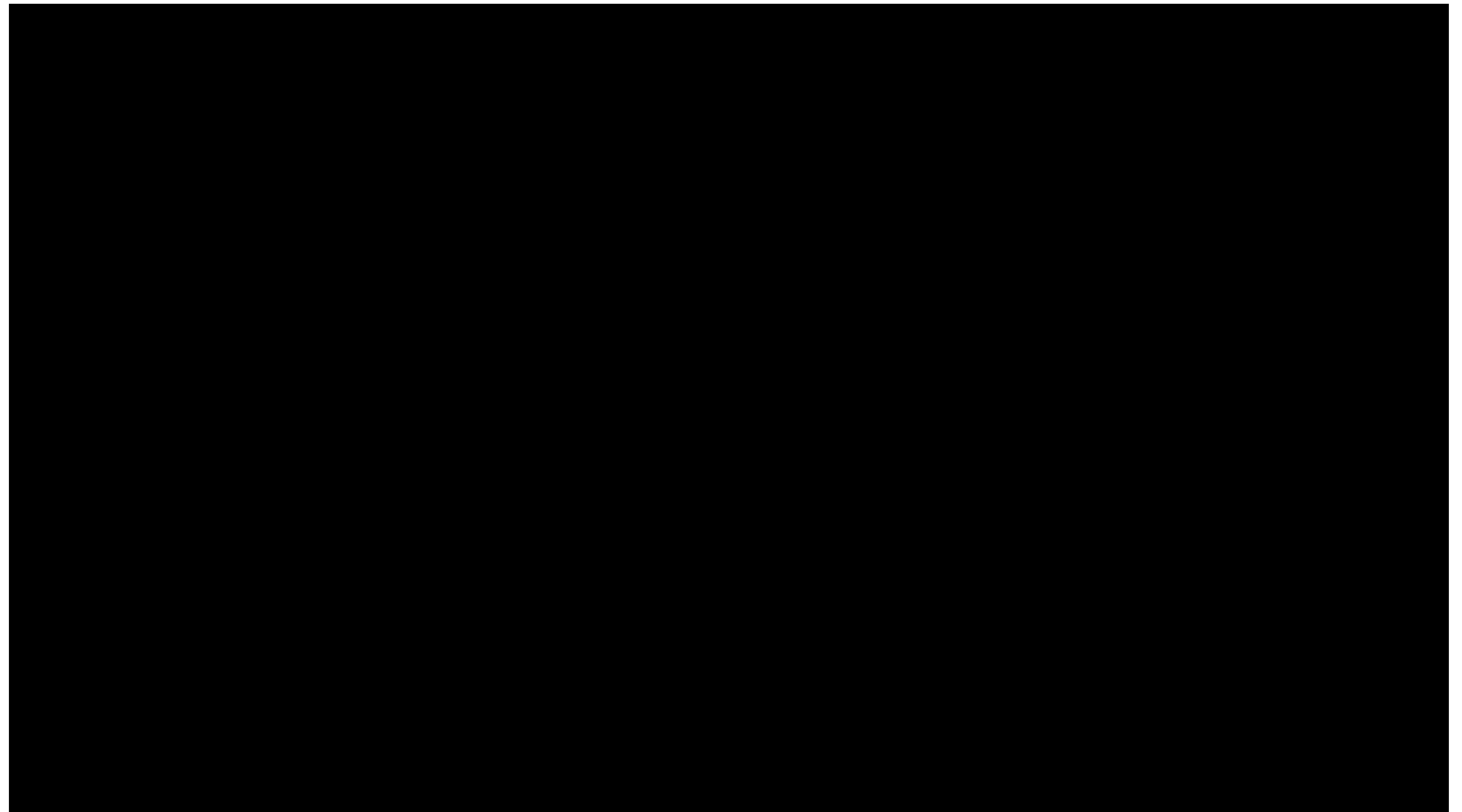


Sources: CB Insights and Venture Scanner

Understanding Deep Learning - Deep-Dive

Understanding Computer Vision

1. Explaining Computer Vision
2. Headline takeaways



AI - An introduction

Face detection

- Face Recognition
- How?
- Face Detection not same as Face Recognition
- Applications of Face recognition
- Face recognition using DL
 - Face detection
 - Feature extraction
 - Training a neural network
 - Feature map across the face
 - Embeddings for images are obtained after training
- Headline takeaways

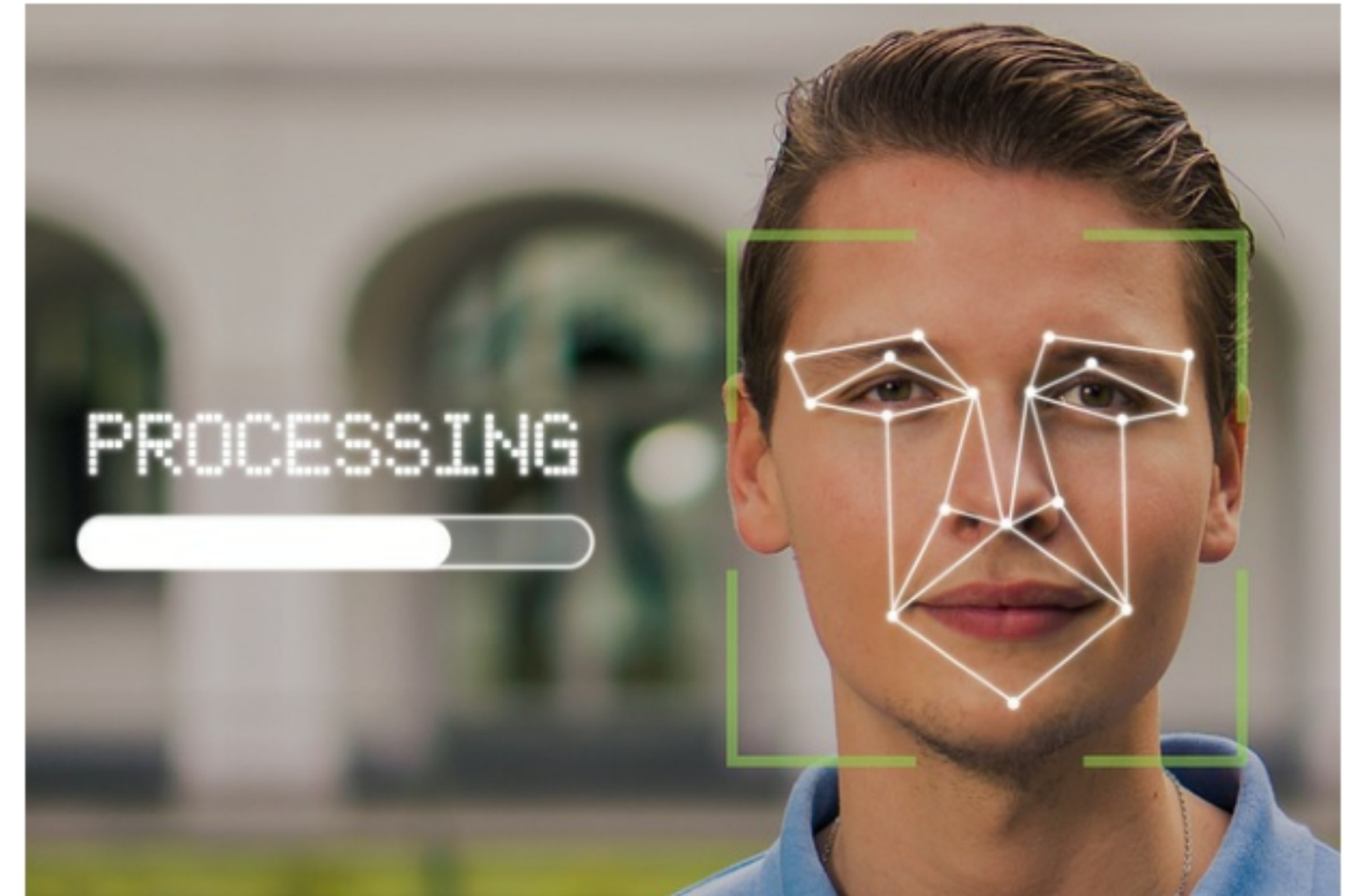


BBC News/ getty images

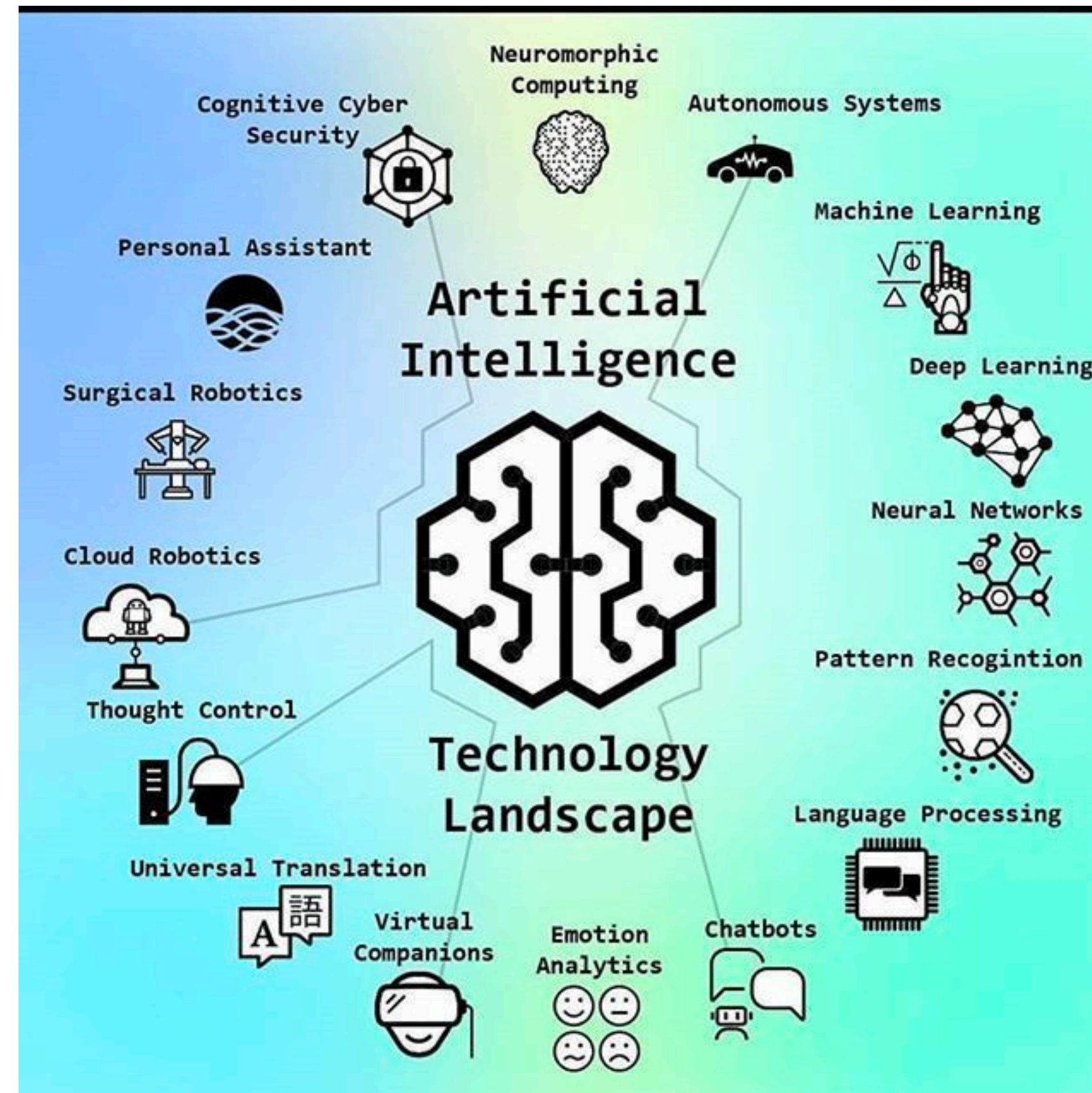
Understanding Deep Learning - Deep-Dive

Computer Vision

- Face recognition
- Video and Traffic analytics
- Headline takeaways



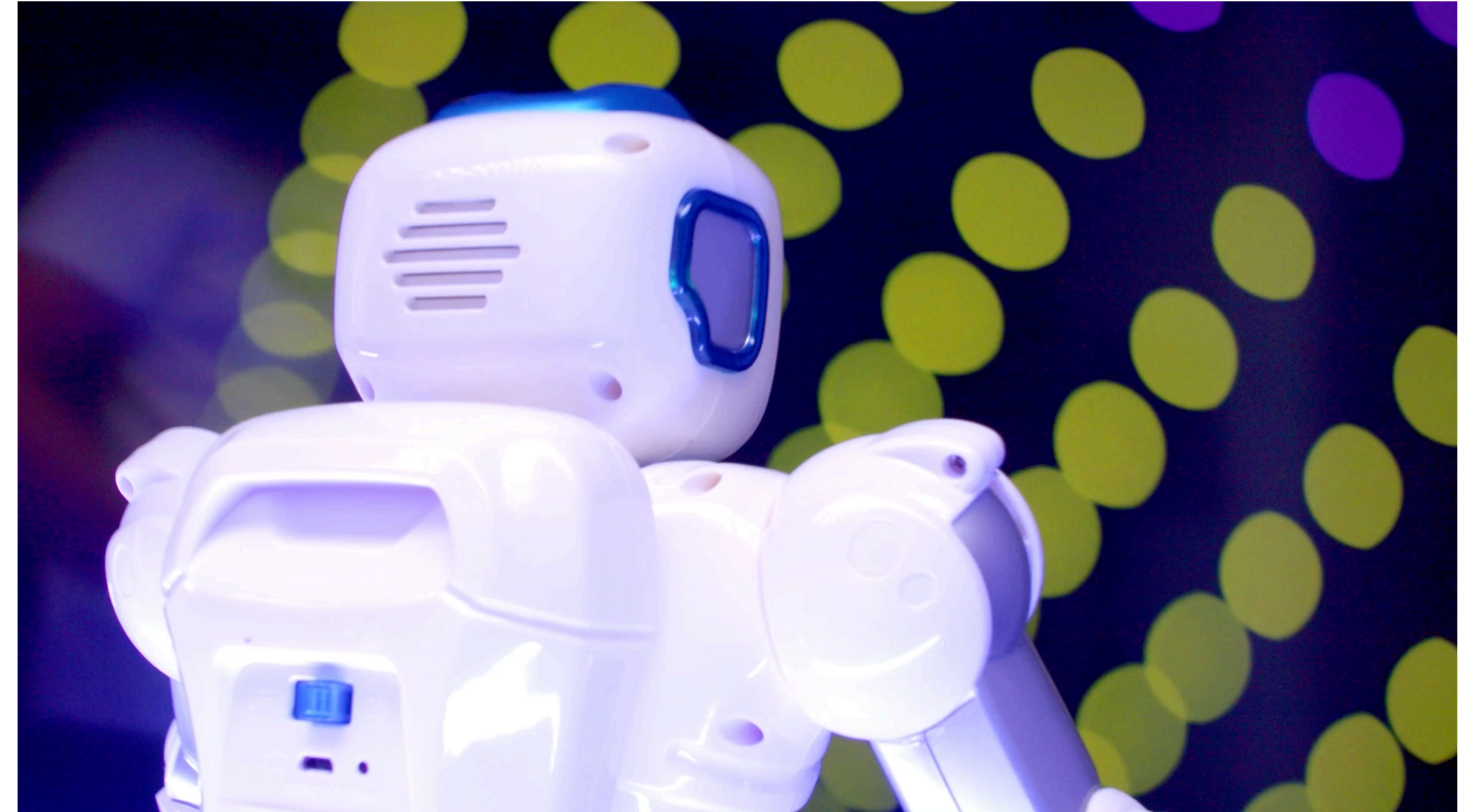
Understanding Deep Learning - Deep-Dive



Summary

Understanding Deep Learning

1. Deep Learning DL
2. DL Types
3. AI v/s Machine Learning v/s Deep Learning
4. Understanding Natural Language Processing NLP
5. Understanding Computer vision
6. Headline takeaways



End of Presentation

“Some people worry that artificial intelligence will make us feel inferior, but then, anybody in his right mind should have an inferiority complex every time he looks at a flower.”

—Alan Kay

6/ Understanding DL
Basics + More

Understanding Deep Learning - Breakout Room! Case Situation

A self-driving car approaches a stop sign, but instead of slowing down, it accelerates into the busy intersection. An accident report later reveals that four small rectangles had been stuck to the face of the sign. These fooled the car's onboard artificial intelligence (AI) into misreading the word 'stop' as 'speed limit 45'.

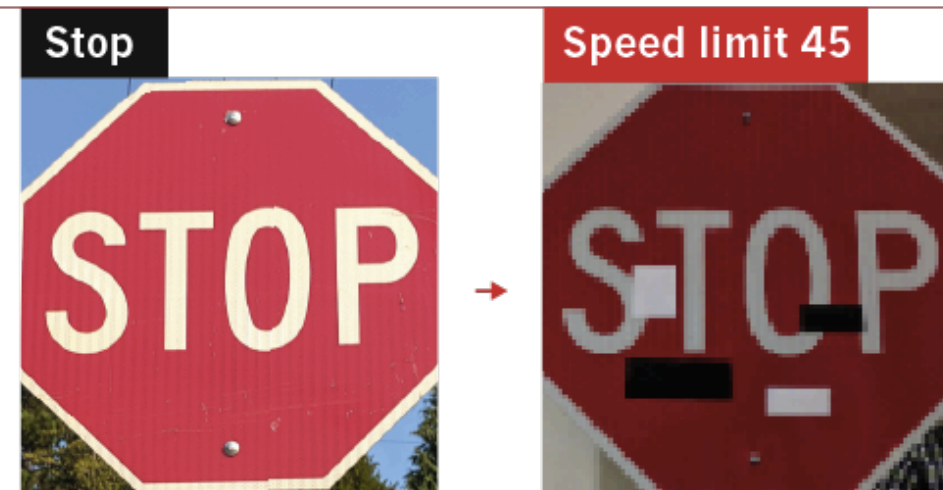
Such an event hasn't actually happened, but the potential for sabotaging AI is very real. Researchers have already demonstrated [how to fool an AI system into misreading a stop sign](#), by carefully positioning stickers on it¹. They have [deceived facial-recognition systems](#) by sticking a printed pattern on glasses or hats.

And they have [tricked speech-recognition systems](#) into hearing phantom phrases by inserting patterns of white noise in the audio.

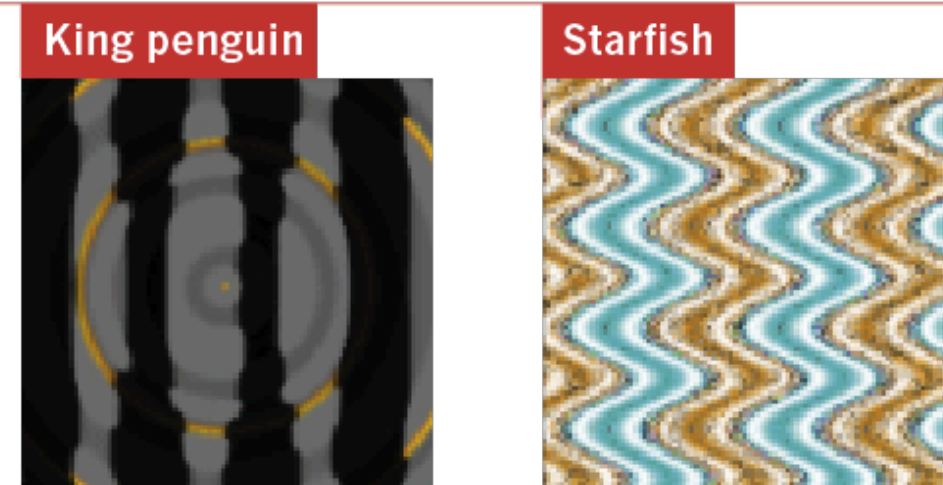
FOOLING THE AI

Deep neural networks (DNNs) are brilliant at image recognition — but they can be easily hacked.

These stickers made an artificial-intelligence system read this stop sign as 'speed limit 45'.



Scientists have evolved images that look like abstract patterns — but which DNNs see as familiar objects.



©nature



Understanding Deep Learning - Breakout Room!

**Today's “AI doesn't have to be evil to destroy humanity –
if AI has a goal and humanity just happens in the way,
it will destroy humanity as a matter of course
without even thinking about it, no hard feelings.”
*Elon Musk, Technology Entrepreneur, and Investor.***

**Destroy AI..
before AI destroys us!**



Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

+/ Resources

The +Bonus+ Section!



Resources: Read! Reports. White Papers (Clickable Links)



REPORT

Expanding AI's Impact With Organizational Learning

Most companies developing AI capabilities have yet to gain significant financial benefits from their efforts. Only when organizations add the ability to learn with AI do significant benefits become likely.

Sam Ransbotham et al.



REPORT

Winning With AI

AI promises rewards but also comes with risks — namely, that competitors figure out how to successfully leverage it before you do. The 2019 MIT SMR and BCG Artificial Intelligence Global Executive Study and Research Report shows early AI winners are focused on organization-wide alignment, investment, and integration.

Sam Ransbotham et al.



EXECUTING STRATEGY

Artificial Intelligence in Business Gets Real

The 2018 Artificial Intelligence Report by MIT SMR shows early leaders pushing forward with an eye toward scale.

Sam Ransbotham et al.

Resources: Read! Reports. White Papers (Clickable Links)



The 2021 AI Index: Major Growth Despite the Pandemic

by JACK CLARK AND DANIEL ZHANG
March 3rd, 2021

This year's report shows a maturing industry, significant private investment, and rising competition between China and...



TECHNOLOGY IMPLEMENTATION

Reshaping Business With Artificial Intelligence

The 2017 Artificial Intelligence and Business Strategy Report offers companies a starting point for developing an AI strategy.

Sam Ransbotham et al.



AI Index Diversity Report: An Unmoving Needle

by BETH JENSEN
March 3rd, 2021

Stanford HAI's 2021 AI Index reveals stalled progress in diversifying AI and a scarcity of the data needed to fix it.

Resources: Read! Articles. Working Papers. Chapter. Blogs. (Clickable Links)



AI & MACHINE LEARNING

Achieving Return on AI Projects

Thomas H. Davenport and Ren Zhang
July 20, 2021



TECHNOLOGY INNOVATION STRATEGY

The Pursuit of AI-Driven Wealth Management

Thomas H. Davenport and Randy Bean
July 07, 2021



DATA & DATA CULTURE

Empowering a Data Culture From the Inside Out

Jonathan Tudor, interviewed by Ally MacDonald
December 09, 2020



DATA & DATA CULTURE

Why Chief Data Officers Must Assume Leadership for Data Success

Randy Bean
November 30, 2020



How Has COVID Affected the AI Economy?

by SACHIN WAIKAR
March 3rd, 2021

The AI Index finds that despite the pandemic's economic hit, AI investment and hiring increased.



BUSINESS MODELS

How Organizations Will Produce in an Autonomous Future

James Gips et al.
April 18, 2018

Resources: Read! Articles. Working Papers. Chapter. Blogs. (Clickable Links)



AI & MACHINE LEARNING

Three Steps to Implement AI

Allison Ryder
August 23, 2019



AI & MACHINE LEARNING

AI's Prediction Problem

Sam Ransbotham
October 24, 2018



AI & MACHINE LEARNING

Global Competition With AI in Business: How China Differs

Philipp Gerbert et al.
July 24, 2018



What AI Will Do to Corporate Hierarchies?

The conventional wisdom says we can expect a more centralized structure. The author says the conventional wisdom has it wrong.

[Read More](#)



It is time to build a new economy. Digital data and artificial intelligence can help

The COVID-19 pandemic and ensuing economic crisis have revealed many ways in which American society isn't working. We have a fragile and reactive healthcare system; an opaque, winner-takes-all economy; and a government that few people trust. These problems



[Read More](#)



What business leaders need to know about artificial intelligence

AI isn't coming for your job — yet. But leaders do need to understand how machine learning, natural language processing, and other intelligence will impact your business.

[Read More](#)

Resources: Read! Articles. Working Papers. Chapter. Blogs. (Clickable Links)



DATA & DATA CULTURE

Top-Down Leadership for Data: Seven Ways to Get Started

Thomas C. Redman
December 02, 2020



DATA & DATA CULTURE

Developing a New Leadership Mindset for Data

Ally MacDonald
November 16, 2020



DATA & DATA CULTURE

Execs Bullish on AI but Wary of Data Leadership

Only a third of data executives feel that their role is "successful and established."

Thomas H. Davenport and Randy Bean • March 05, 2021

Resources: Read! Articles. Working Papers. Chapter. Blogs. (Clickable Links)

2020 BOOK

Work, Mate, Marry, Love: How Machines Shape Our Human Destiny

By: [Debora L. Spar](#)

Covering a time frame that ranges from 8000 BC to the present, and drawing upon both Marxist and feminist theories, the book argues that nearly all the decisions we make in our most intimate lives—whom to marry, how to have children, how to have sex, how to think about... [View Details](#)

2019 CHAPTER

The Impact of Artificial Intelligence on Innovation: An Exploratory Analysis

By: Iain M. Cockburn, [Rebecca Henderson](#) and Scott Stern

2020 BOOK

Competing in the Age of AI: Strategy and Leadership When Algorithms and Networks Run the World

By: [Marco Iansiti](#) and [Karim R. Lakhani](#)

In industry after industry, data, analytics, and AI-driven processes are transforming the nature of work. While we often still treat AI as the domain of a specific skill, business function, or sector, we have entered a new era in which AI is challenging the very... [View Details](#)

Keywords: [Artificial Intelligence](#); [Technological Innovation](#); [Change](#); [Competition](#); [Strategy](#); [Leadership](#); [Business Processes](#); [Organizational Change and Adaptation](#)

SEPTEMBER 2020 ARTICLE

Creativity, Artificial Intelligence, and a World of Surprises

By: [Teresa M. Amabile](#)

In recent years, progress has been made toward AI Creativity, which I define as the production of highly novel, yet appropriate, ideas, problem solutions, or other outputs by autonomous machines. I argue that organizational researchers of creativity and innovation... [View Details](#)

Keywords: [Artificial Intelligence](#); [AI Creativity](#); [Computer Science](#); [Organizational Behavior](#); [Psychology](#); [Creativity](#); [Technological Innovation](#)



Resources: Read! Articles. Working Papers. Chapter. Blogs. (Clickable Links)



How to Kickstart an AI Venture Without Proprietary Data

Despite the tremendous innovation and entrepreneurial opportunities around AI, breaking into AI can be a daunting task for entrepreneurs as they face a chicken-and-egg problem before they even begin, something existing companies are less likely to contend with.

[Read article »](#)



How Can Financial Institutions Prepare for AI Risks?

Artificial intelligence (AI) technologies hold big promise for the financial services industry, but they also bring risks that must be addressed with the right governance approaches, according to a white paper by a group of academics and executives from the financial services and technology industries, published by Wharton AI for Business.

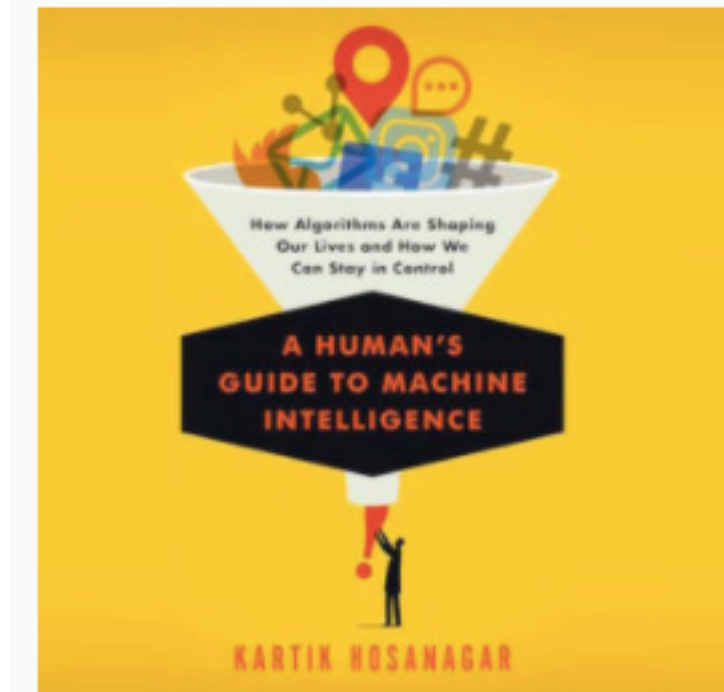
[Read article »](#)



Your Next Job Interview May Be With a Robot—Whether You Realize It Or Not

The use of artificial intelligence has become increasingly widespread in recruitment over the last few years. Candidates are often asked to complete video interviews or online tests without any awareness that an algorithm will be the first assessor of their application.

[Read article »](#)



A Human's Guide to Machine Intelligence

Kartik Hosanagar surveys the brave new world of algorithmic decision-making and reveals the potentially dangerous biases they can give rise to as they increasingly run our lives

[Learn more »](#)

Resources: Read! Articles. Working Papers. Chapter. Blogs.

10 breakthroughs in statistics that have helped drive the revolution in AI

1. Hirotugu Akaike (1973). [Information Theory and an Extension of the Maximum Likelihood Principle](#). Proceedings of the Second International Symposium on Information Theory.

2. John Tukey (1977). [Exploratory Data Analysis](#).

3. Grace Wahba (1978). [Improper Priors, Spline Smoothing and the Problem of Guarding Against Model Errors in Regression](#). Journal of the Royal Statistical Society.

4. Bradley Efron (1979). [Bootstrap Methods: Another Look at the Jackknife](#). Annals of Statistics.

5. Alan Gelfand and Adrian Smith (1990). [Sampling-based Approaches to Calculating Marginal Densities](#). Journal of the American Statistical Association.

6. Guido Imbens and Joshua Angrist (1994). [Identification and Estimation of Local Average Treatment Effects](#). Econometrica.

7. Robert Tibshirani (1996). [Regression Shrinkage and Selection Via the Lasso](#). Journal of the Royal Statistical Society.

8. Leland Wilkinson (1999). [The Grammar of Graphics](#).

9. Ian Goodfellow, Jean Pouget-Abadie, Mehdi Mirza, Bing Xu, David Warde-Farley, Sherjil Ozair, Aaron Courville, and Yoshua Bengio (2014). [Generative Adversarial Networks](#). Proceedings of the International Conference on Neural Information Processing Systems.

10. Yoshua Bengio, Yann LeCun, and Geoffrey Hinton (2015). [Deep Learning](#). Nature.



Resources: Watch! Video. Webinar. Tutorial. (Clickable Links)



VIDEO

The Key to Success With AI Is Human-Machine Collaboration

The *MIT SMR* and BCG 2020 report on artificial intelligence and business strategy found that the companies who get the most out of AI are the ones that focus on having AI and human workers learn from one another.

Allison Ryder



WEBINAR

The State of AI: Lessons from the Field

A webinar summarizing lessons learned in AI implementation from the 2019 *Winning With AI* Report.

Ranjeet Banerjee et al.



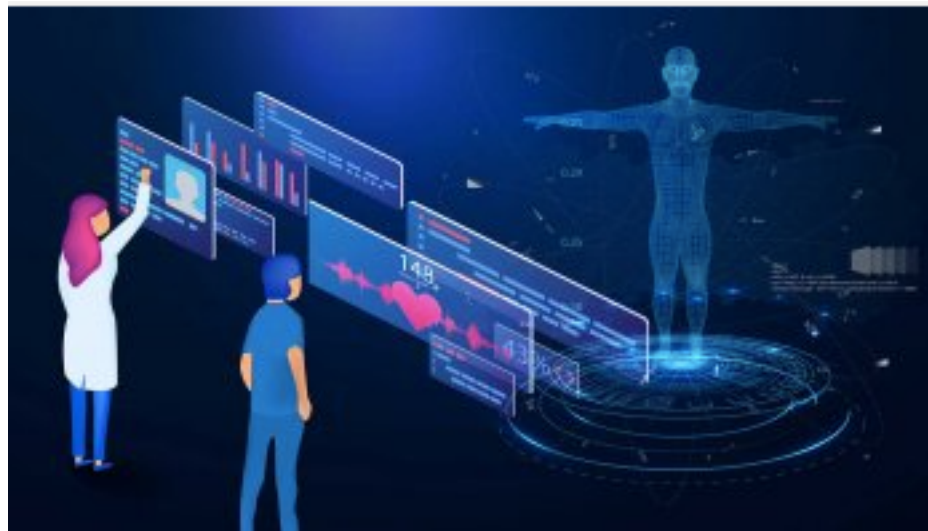
WEBINAR

Learn to Make the Most of Your Relationship With AI

In this webinar, *MIT SMR*'s Sam Ransbotham, BCG's Shervin Khodabandeh, and Walmart's Prakhar Mehrotra share how human-AI collaboration leads to measurable results.

Sam Ransbotham et al.

Resources: Watch! Video. Webinar. Tutorial. (Clickable Links)



AI into Healthcare

Learn about the challenges of integrating AI into healthcare in a way that maximizes its potential while also protecting patient safety and privacy.

FEBRUARY 2021 TUTORIAL

What is AI?

By: [Tsedal Neeley](#)

This video explores the elements that constitute artificial intelligence (AI). From its mathematical basis to current advances in AI, this video introduces students to data, tools, and statistical models that make a computer 'intelligent.' Through an explanation of... [View Details](#)

Keywords: [Artificial Intelligence](#); [Digital](#); [Technological Innovation](#); [Leadership](#)



How to use AI to enhance user experience

Learn how to design better, smarter user interactions by integrating artificial intelligence into your user experience.

Resources: Explore! Institutions

Organisations doing imp work in AI

AI and You

ARM

Baker McKenzie

Equal AI

I.AM+

Imperial College London

INSEAD

Institute of AI

International Trade Union Confederation (ITUC)

Northwestern University

Organisation for Economic Co-operation and Development (OECD)

Patrick J. McGovern Foundation

RAI

Schwartz Reisman Institute

UNESCO

United Nations Children's Fund (UNICEF)

University of Toronto

Academic Partners

Imperial College Business School at Imperial College London, UK

Trust & Technology Initiative at University of Cambridge, UK

The Justice Collaboratory at Yale Law School, US

KULeuven, Belgium

NUS Enterprise, Singapore

The N.1 Institute for Health, Singapore

Entrepreneurial and corporate ecosystem

AI & Social capital

AI*Autonomous, Co-founder William Lee

Blackbox AI, Jason J Sosa, founder, www.blackboxai.com

BrainTech Pte Ltd, Eddy Zhang, CEO of the AI-leadership coaching company

JobKred (start-up, block 71, NUSEnterprise)

Negobot: Aniruddha Ganguly | CEO and Co-Founder

Novartis (Basel HQ)

Microsoft (Singapore campus)

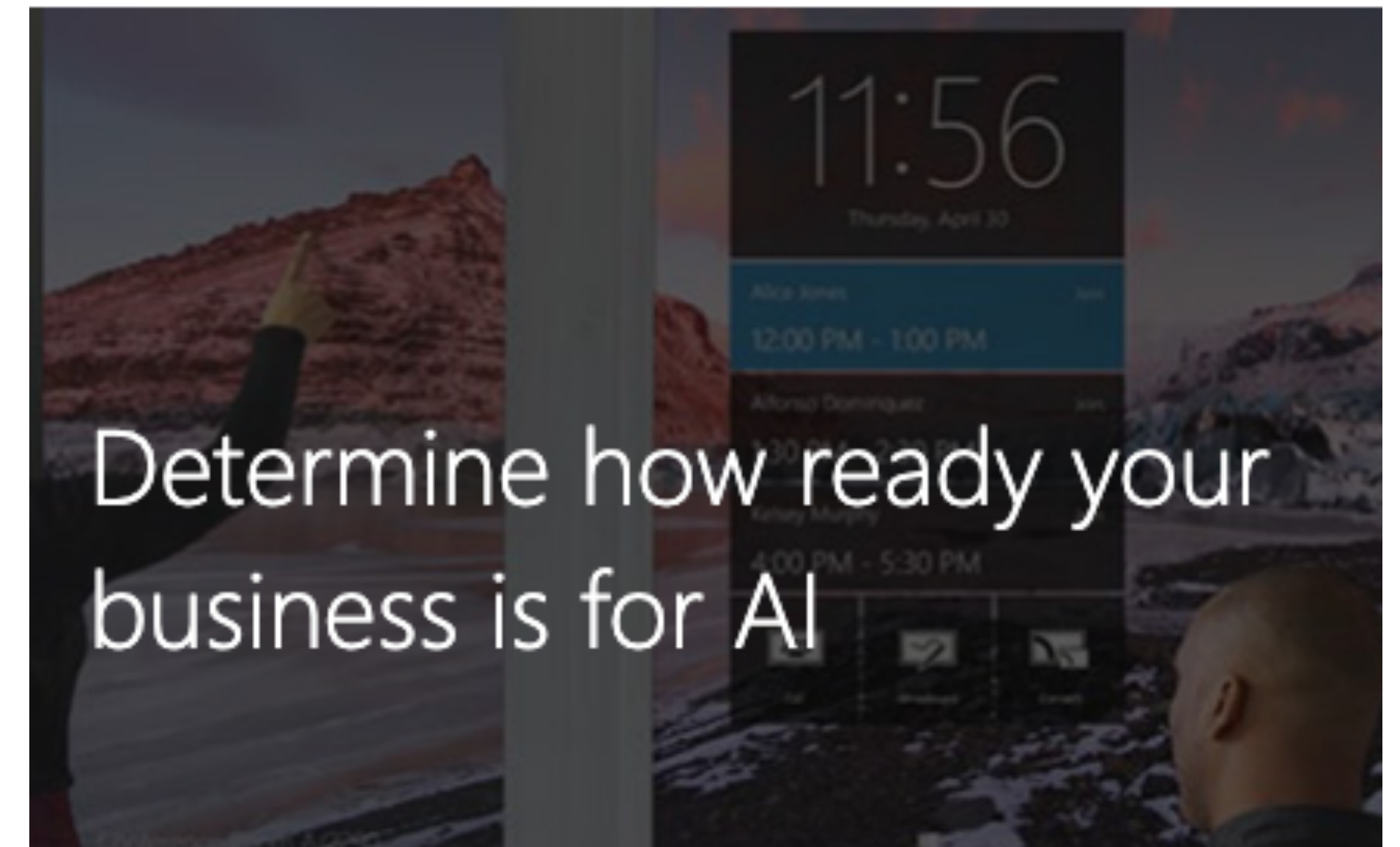


Resources: Test!

AI readiness. (Clickable Links)

Evaluate AI readiness

1. Compare with other firms in similar industries and geographies.
2. The survey serves as a research tool, a diagnostic tool, and a benchmark tool.



Resources: Listen!

Podcasts (Clickable Links)



DATA & DATA CULTURE

AI and the COVID-19 Vaccine: Moderna's Dave Johnson

Moderna's chief data and AI officer explains how AI helped the pharma company develop a COVID-19 vaccine in record time.

Sam Ransbotham and Shervin Khodabandeh • July 13, 2021



ETHICS

Starting Now On Technology Ethics: Elizabeth Renieris

Elizabeth Renieris of the Notre Dame-IBM Technology Ethics Lab discusses how businesses can responsibly govern AI projects.

Sam Ransbotham and Shervin Khodabandeh • June 22, 2021



ANALYTICS & BUSINESS INTELLIGENCE

No Need for AI Unicorns: PepsiCo's Colin Lenaghan

PepsiCo's Colin Lenaghan discusses AI's role in the company's pricing strategy and ongoing digital transformation.

Sam Ransbotham and Shervin Khodabandeh • June 08, 2021



DIGITAL MARKETING

DIY With AI: The Home Depot's Huiming Qu

Home Depot's Huiming Qu discusses how the home improvement retailer leverages AI to improve the customer experience.

Sam Ransbotham and Shervin Khodabandeh • May 25, 2021



INNOVATION STRATEGY

Prototypes, Pilots, and Polymers: Cooper Standard's Chris Couch

The *Me, Myself, and AI* podcast delves into how automotive supplier Cooper Standard uses open innovation to leverage AI.

Sam Ransbotham and Shervin Khodabandeh • May 11, 2021



IT GOVERNANCE & LEADERSHIP

Designing a Better Future: Mastercard's JoAnn Stonier

JoAnn Stonier, chief data officer at Mastercard, discusses how design thinking enables better AI implementation.

Sam Ransbotham and Shervin Khodabandeh • April 27, 2021

Resources: Listen!

Podcasts (Clickable Links)



PLATFORMS & ECOSYSTEMS

Learning, Engagement, and Empowerment: 1-800-Flowers' Amit Shah

Amit Shah, president of 1-800-Flowers, explains why lifelong learners are the best technical talent.

Sam Ransbotham and Shervin Khodabandeh • April 13, 2021



COLLABORATION

Games, Teams, and Moonshots: Google Cloud's Will Grannis

Will Grannis of Google Cloud explains the organization's collaborative approach to AI and machine learning innovation.

Sam Ransbotham and Shervin Khodabandeh • March 30, 2021



TECHNOLOGY IMPLEMENTATION

Less Algorithm, More Application: Lyft's Craig Martell

Lyft's Craig Martell talks education, eliminating bias, and cross-functional collaboration on machine learning projects.

Sam Ransbotham and Shervin Khodabandeh • March 16, 2021



IT GOVERNANCE & LEADERSHIP

Tech and Ethics: The World Economic Forum's Kay Firth-Butterfield on Doing the Right Thing in AI

Business — and society — should think of the governance of AI as an enabler rather than a constraint.

Sam Ransbotham and Shervin Khodabandeh • November 17, 2020



ANALYTICS & BUSINESS INTELLIGENCE

Fashion Forecasting: Arti Zeighami on Implementing AI at H&M Group

The fashion retailer's chief data and analytics officer uses agile pilots to assess and scale technology initiatives.

Sam Ransbotham and Shervin Khodabandeh • November 10, 2020



TECHNOLOGY INNOVATION STRATEGY

Better Together: Mattias Ulbrich on Combining Coffee, Business, and Technology at Porsche

Porsche is accelerating innovation by emphasizing the need for collaboration between humans and AI technology.

Sam Ransbotham and Shervin Khodabandeh • November 03, 2020

Resources: Listen!

Podcasts (Clickable Links)



INNOVATION STRATEGY

'The First Day Is the Worst Day': DHL's Gina Chung on How AI Improves Over Time

AI is a powerful tool for innovation when leaders communicate its benefits.

Sam Ransbotham and Shervin Khodabandeh • October 27, 2020



AI & MACHINE LEARNING

Advancing Health Care With AI: Humana's Slawek Kierner Talks Synthetic Data and Real Lives

Using AI and simulations in health care can help doctors better serve patients.

Sam Ransbotham and Shervin Khodabandeh • October 20, 2020



DATA & DATA CULTURE

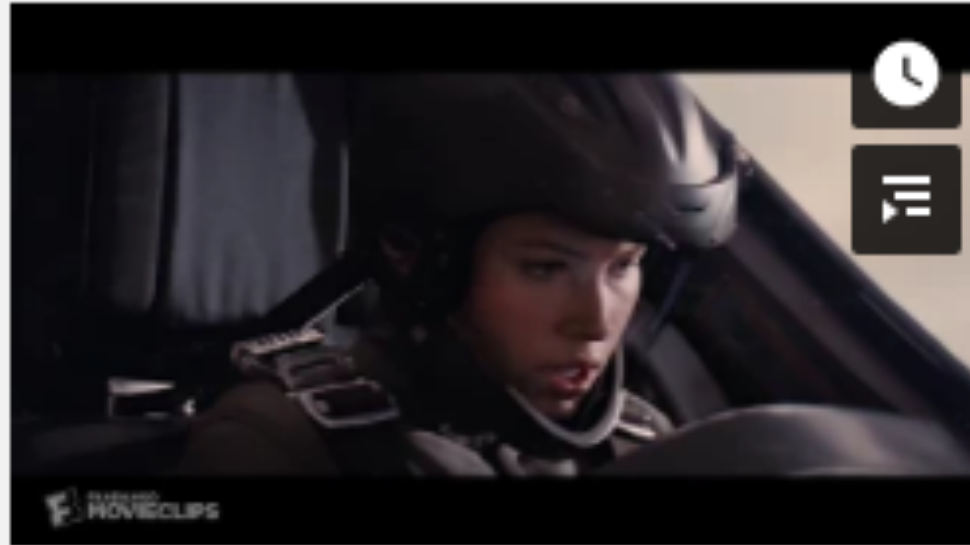
This Crazy Wave We're Riding: Walmart's Prakhar Mehrotra on the Ups and Downs of AI

Walmart's Prakhar Mehrotra discusses leading AI teams and workstreams in this episode of the *Me, Myself, and AI* podcast.

Sam Ransbotham and Shervin Khodabandeh • October 20, 2020

Resources: Watch!

Movie Clips (Clickable Links)



Stealth (2005) - Collateral Damage Scene (5/10) | Movieclips

Movieclips ✓ 2.1M views • 3 years ago

Stealth - Collateral Damage: Ben (Josh Lucas) orders an 'Abort Mission' after discovering a nearby civilian population, but their A.I. partner ignores him. BUY THE MOVIE: <https://www.fandangonow.co...>



I, Robot (1/5) Movie CLIP - Rogue Robot (2004) HD

Movieclips ✓ 5.5M views • 6 years ago

I, Robot movie clips: <http://j.mp/1MiIA8p> BUY THE MOVIE: FandangoNOW - <https://www.fandangonow.com/details/movie/i-robot-2004/1MV54fd842889a1c43ad926fc2456675244?...>



Stealth (2005) - High Dive Missile Attack Scene (2/10) | Movieclips

Movieclips ✓ 1M views • 3 years ago

Stealth - High Dive Missile Attack: On a mission to take out terrorists in a populated area, Gannon (Josh Lucas) risks a dangerous flight maneuver suggested by artificial intelligence EDI....

Resources: Watch!

Movie Clips (Clickable Links)



Ex Machina (4/10) Movie CLIP - How Ava Was Created (2015) HD

Movieclips ✓ 255K views • 5 years ago

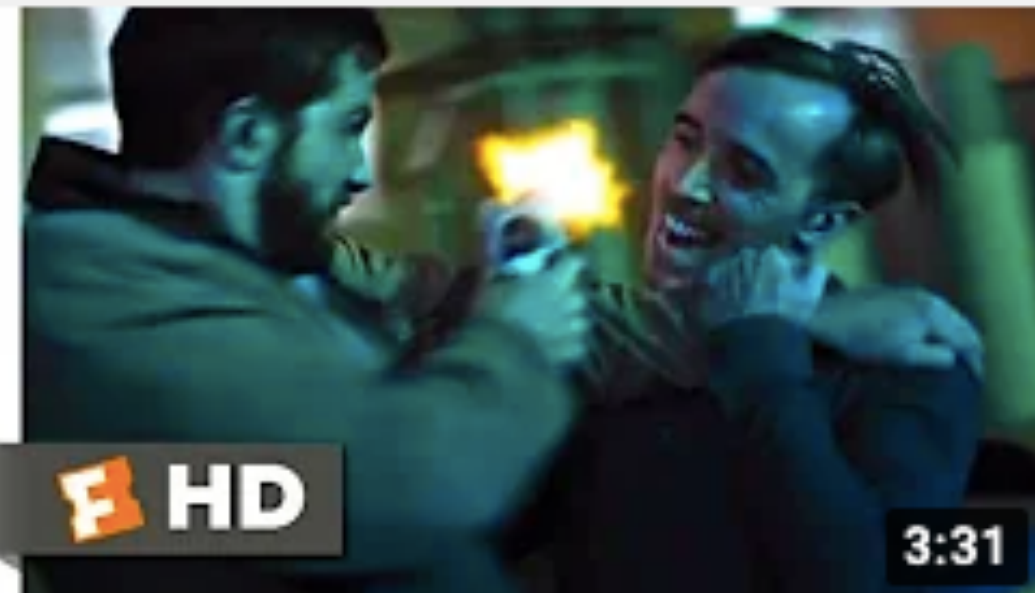
Ex Machina movie clips: <http://j.mp/29wLH3G> BUY THE MOVIE: <http://j.mp/29y8JUi> Don't miss the HOTTEST NEW TRAILERS: <http://bit.ly/1u2y6pr> CLIP DESCRIPTION: Nathan (Oscar Isaac) shows Caleb...



Ex Machina (2/10) Movie CLIP - Breaking the Ice (2015) HD

Movieclips ✓ 354K views • 5 years ago

Ex Machina movie clips: <http://j.mp/29wLH3G> BUY THE MOVIE: <http://j.mp/29y8JUi> Don't miss the HOTTEST NEW TRAILERS: <http://bit.ly/1u2y6pr> CLIP DESCRIPTION: Caleb (Domhnall Gleeson) meets Ava...



Upgrade (2018) - Cyborg vs. Cyborg Scene (7/10) | Movieclips

Movieclips ✓ 1.3M views • 2 years ago

Upgrade - Cyborg vs. Cyborg: Grey (Logan Marshall-Green) confronts Fisk (Benedict Hardie). BUY THE MOVIE: <https://www.fandangonow.com/details/movie/upgrade-...>

CC

Resources: Watch!

Movie Clips (Clickable Links)



Technology in Film Through the Years Mashup | Movieclips

Movieclips ✓ 164K views • 2 years ago

There's a long history of technology appearing in cinema from the cheesy hackers scenes to the futuristic predictions of artificial intelligence. What's been your favorite portrayal or prediction...



Ex Machina (3/10) Movie CLIP - You Shouldn't Trust Him (2015) HD

Movieclips ✓ 197K views • 5 years ago

Ex Machina movie clips: <http://j.mp/29wLH3G> BUY THE MOVIE: <http://j.mp/29y8JUi> Don't miss the HOTTEST NEW TRAILERS: <http://bit.ly/1u2y6pr> CLIP DESCRIPTION: Ava (Alicia Vikander) warns Caleb...



Vice (2015) - A.I. Technical Difficulties Scene (2/10) | Movieclips

Movieclips ✓ 5.9K views • 4 years ago

Vice movie clips: <http://j.mp/2jv6VAE> BUY THE MOVIE: <http://bit.ly/2jOi67T> Don't miss the HOTTEST NEW TRAILERS: <http://bit.ly/1u2y6pr> CLIP DESCRIPTION: Kelly (Ambyr Childers) experiences unprecede...

Resources: Watch!

Movie Clips (Clickable Links)



Weird Science (2/12) Movie CLIP - Making a Girl (1985) HD

Movieclips ✓ 7.5M views • 9 years ago

Weird Science movie clips: <http://j.mp/1J92wJW> BUY THE MOVIE: <http://amzn.to/uRIZQ7> Don't miss the HOTTEST NEW TRAILERS: <http://bit.ly/1u2y6pr> CLIP DESCRIPTION: Gary (Anthony Michael Hall)...

CC



RoboCop (2014) - End This Nightmare Scene (2/10) | Movieclips

Movieclips ✓ 10M views • 4 years ago

RoboCop movie clips: <http://j.mp/2h60cvA> BUY THE MOVIE: <http://bit.ly/2hudhiA> Don't miss the HOTTEST NEW TRAILERS: <http://bit.ly/1u2y6pr> CLIP DESCRIPTION: Dr. Norton (Gary Oldman) shows RoboCop...

Resources: Read! Books (Clickable Links)

2020 BOOK

Work, Mate, Marry, Love: How Machines Shape Our Human Destiny

By: [Debora L. Spar](#)

Covering a time frame that ranges from 8000 BC to the present, and drawing upon both Marxist and feminist theories, the book argues that nearly all the decisions we make in our most intimate lives—whom to marry, how to have children, how to have sex, how to think about... [View Details](#)

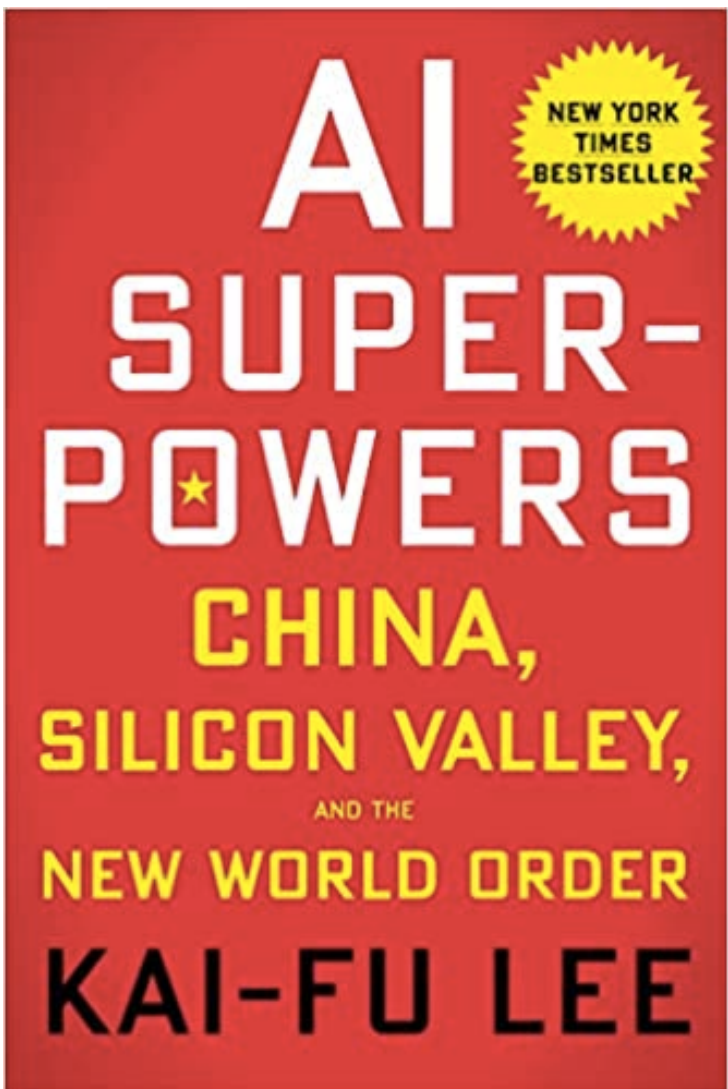
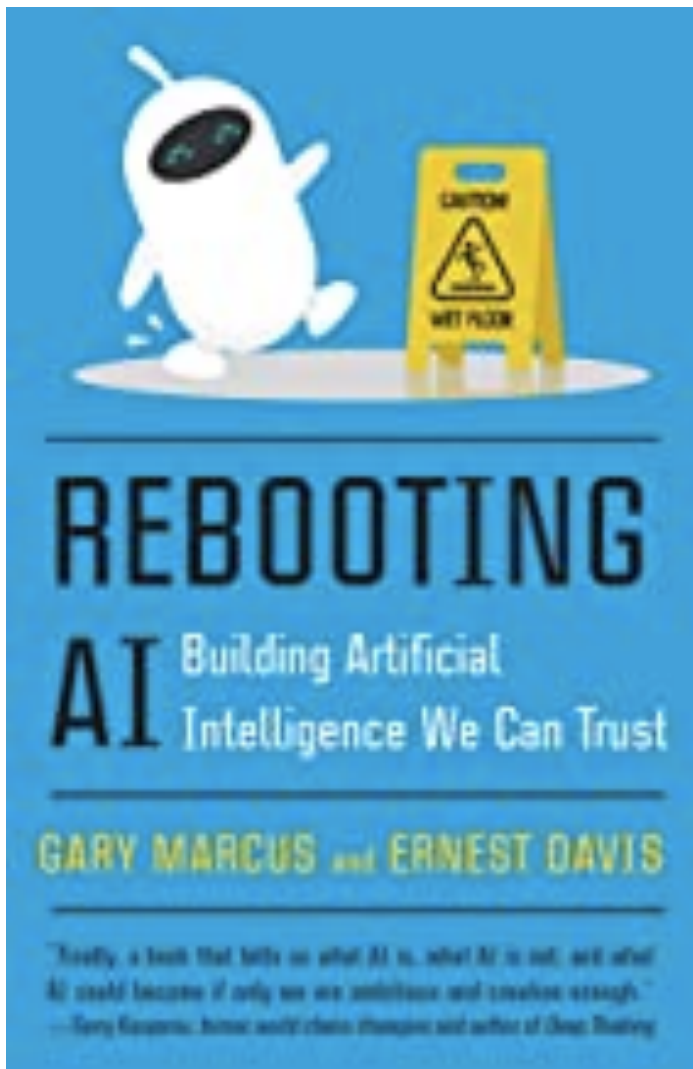
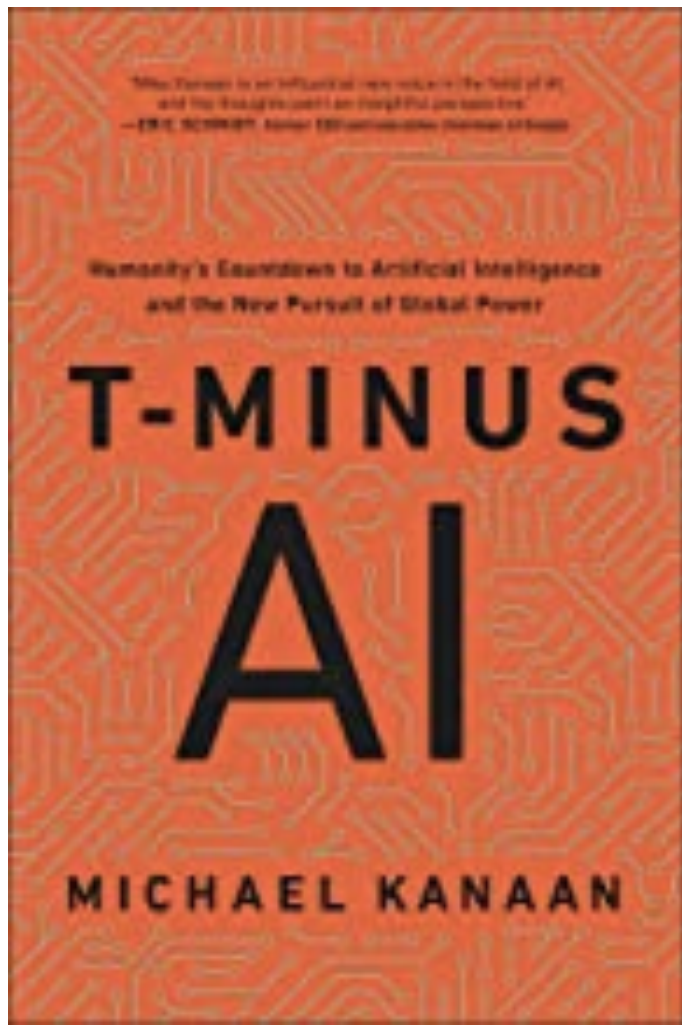
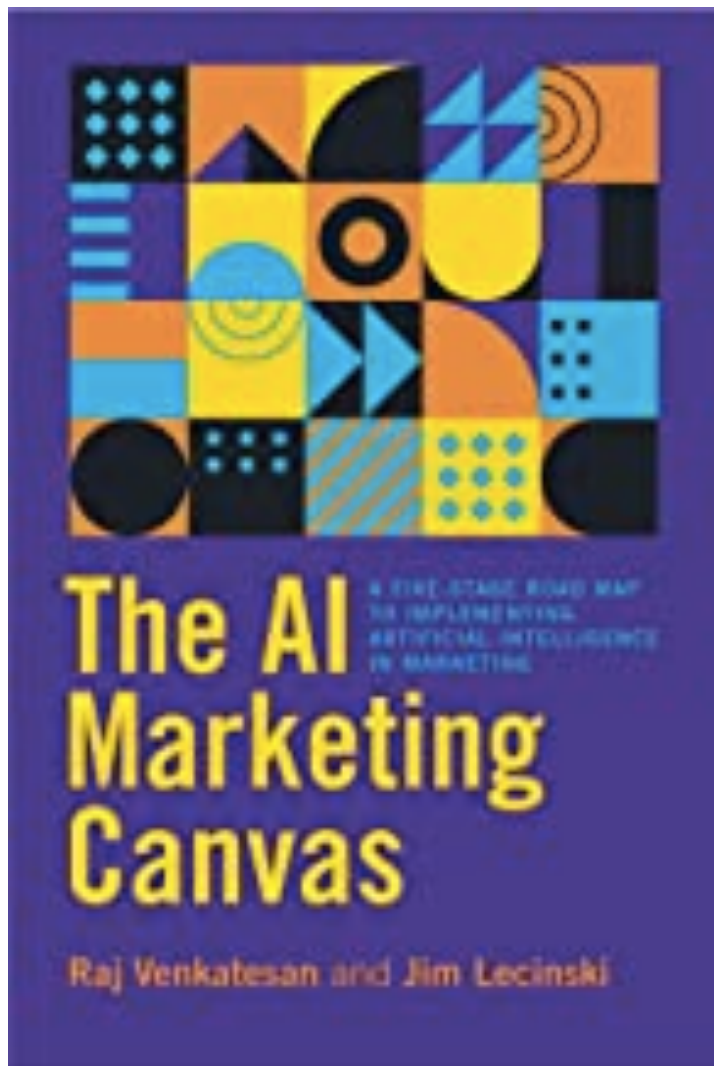
2020 BOOK

Competing in the Age of AI: Strategy and Leadership When Algorithms and Networks Run the World

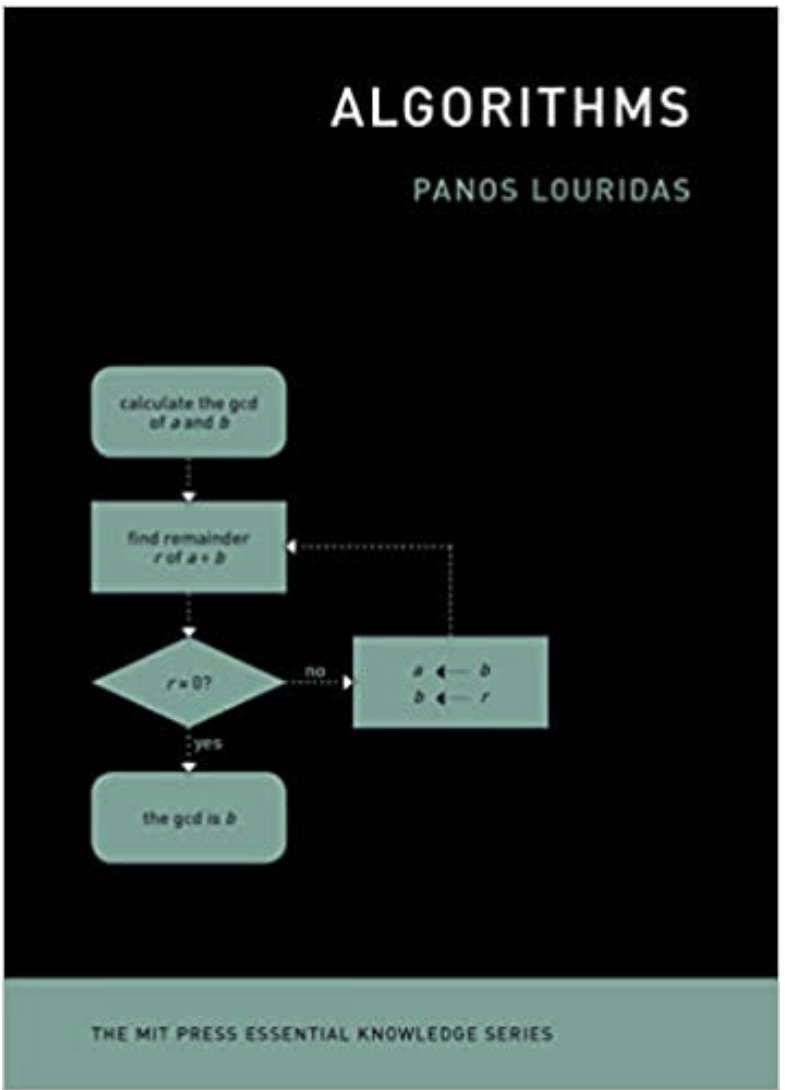
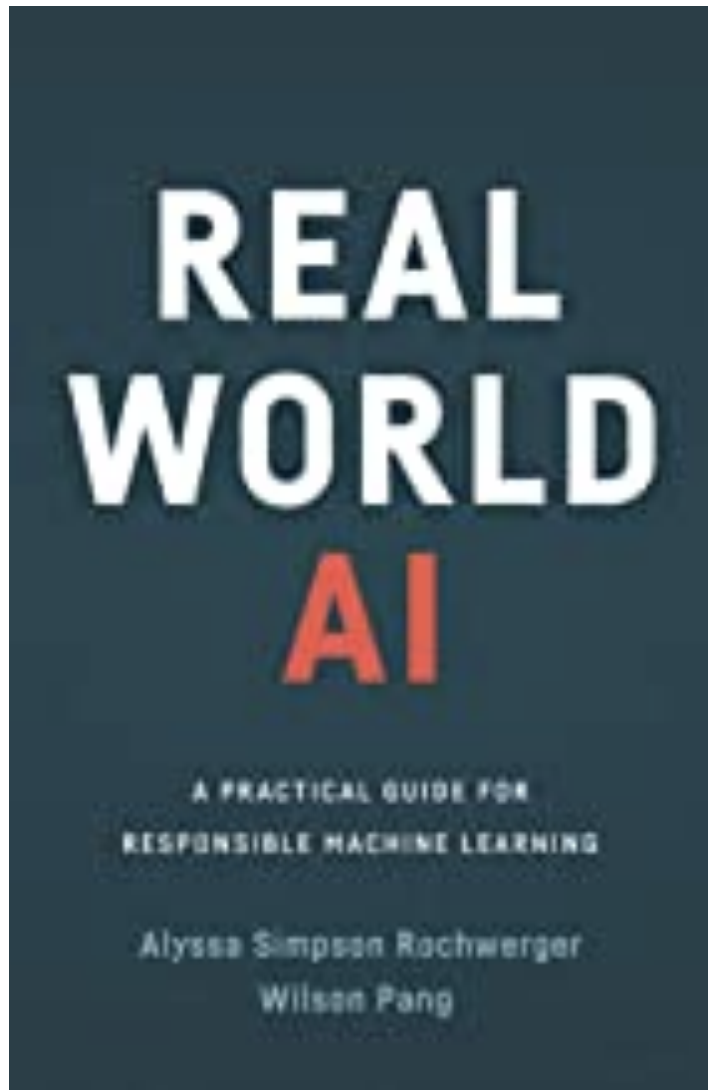
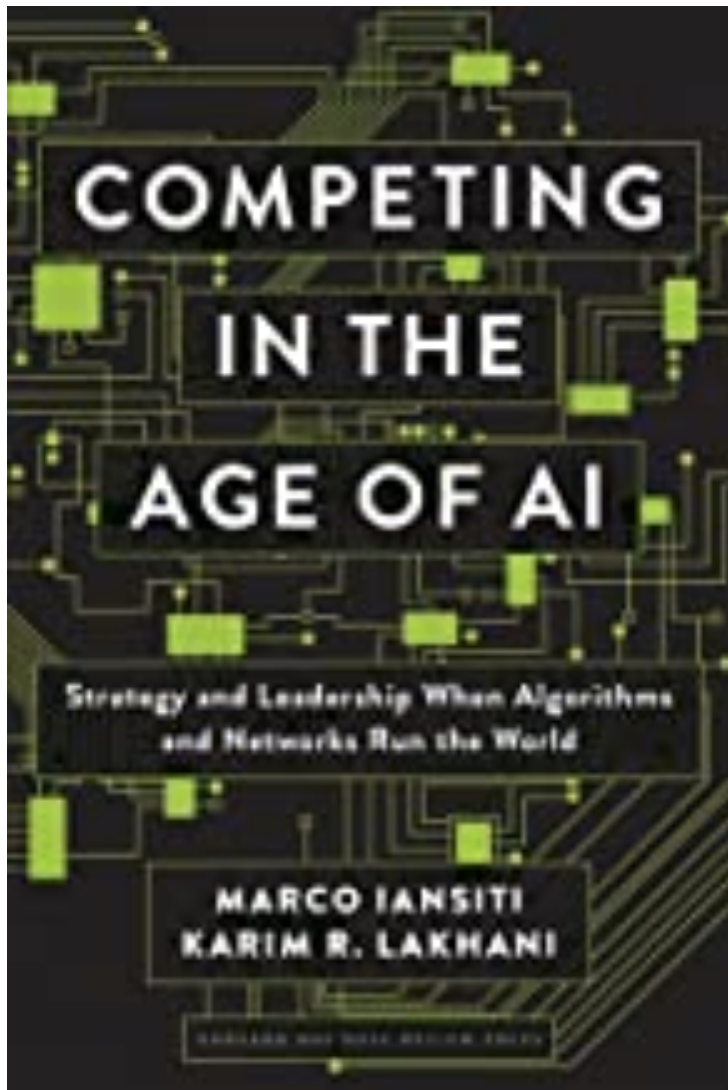
By: [Marco Iansiti](#) and [Karim R. Lakhani](#)

In industry after industry, data, analytics, and AI-driven processes are transforming the nature of work. While we often still treat AI as the domain of a specific skill, business function, or sector, we have entered a new era in which AI is challenging the very... [View Details](#)

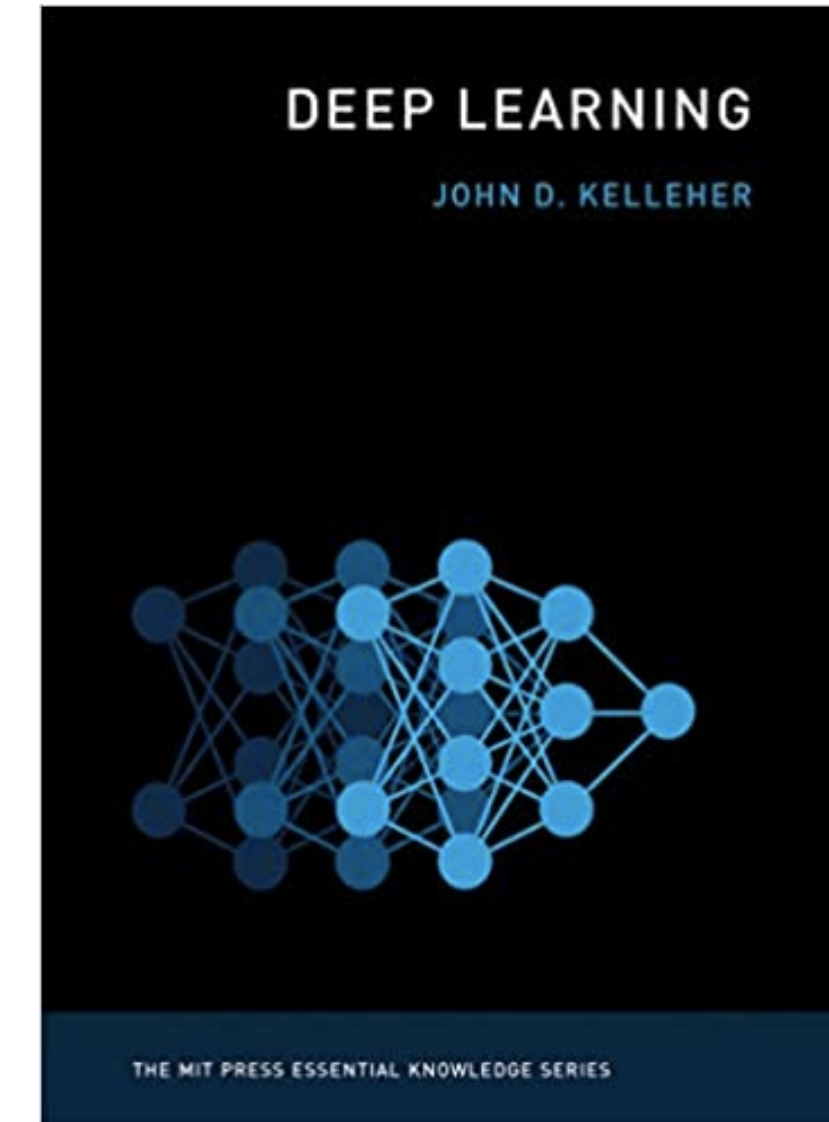
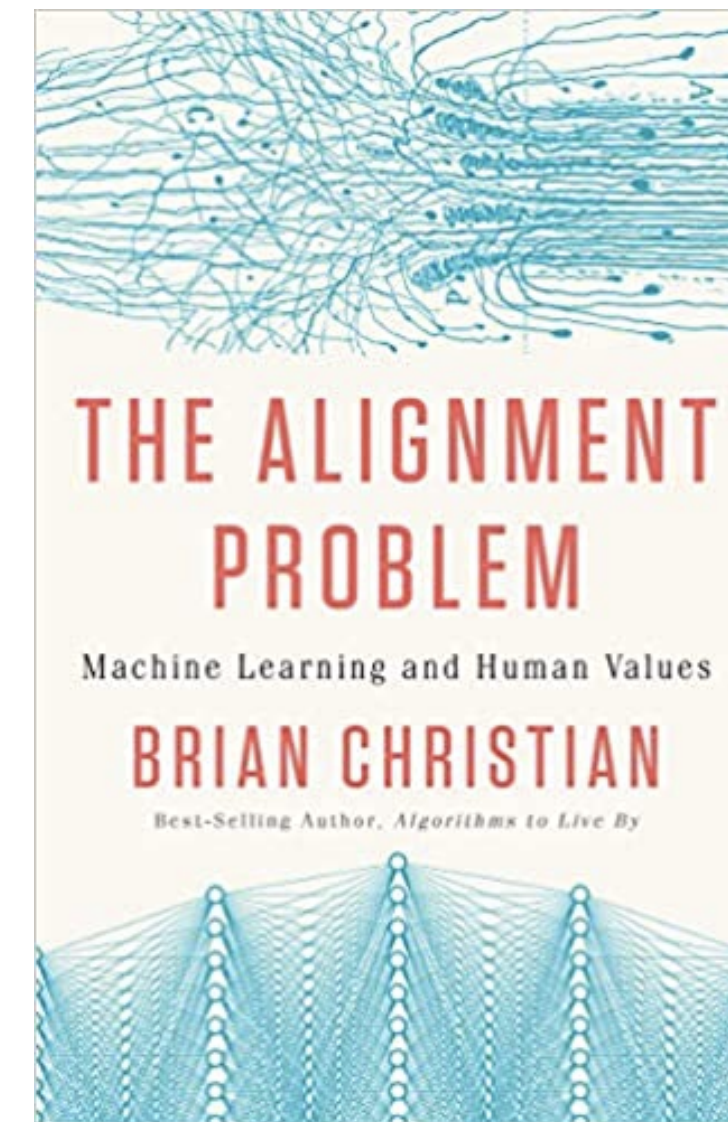
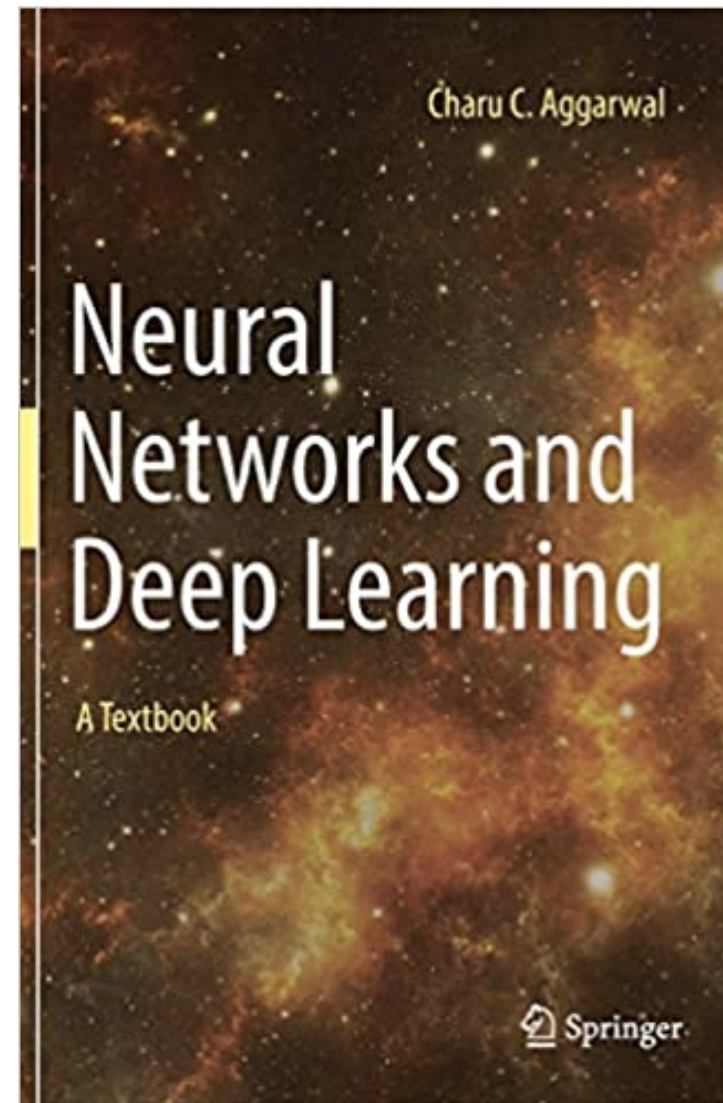
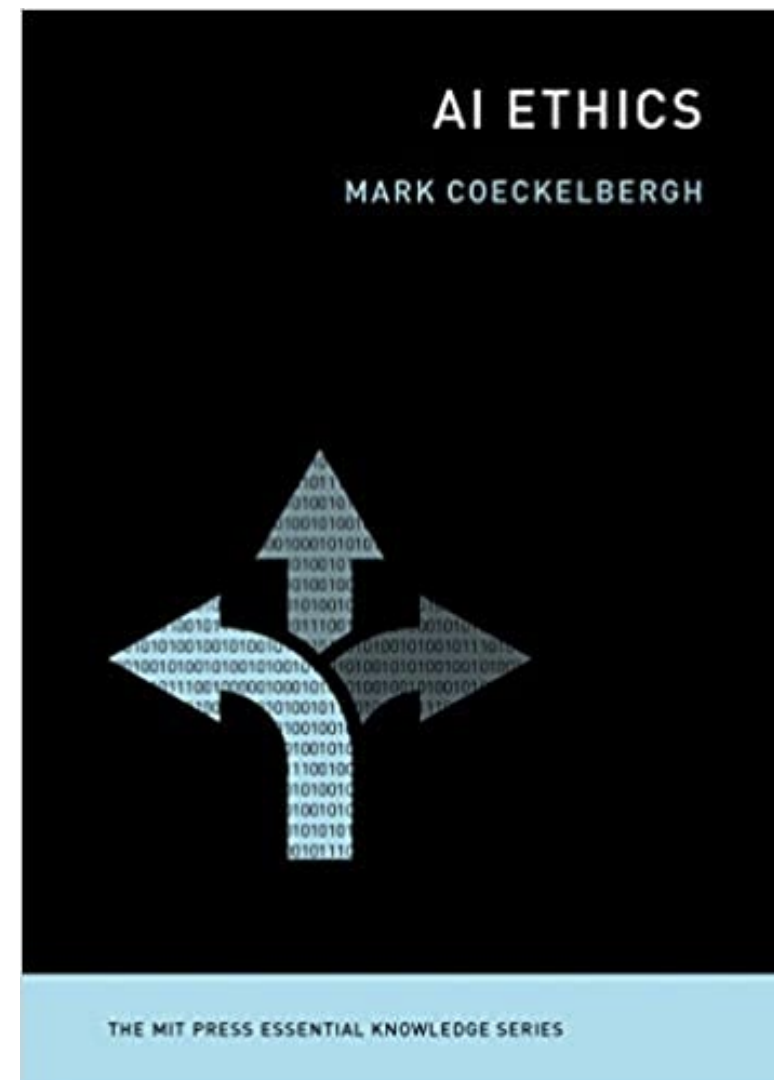
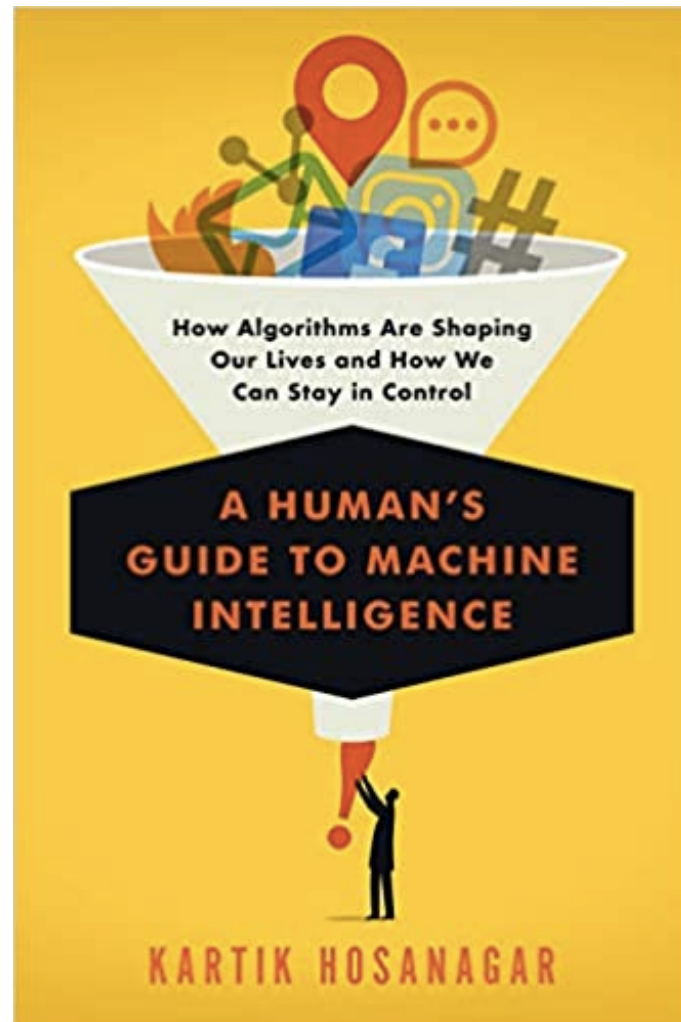
Keywords: [Artificial Intelligence](#); [Technological Innovation](#); [Change](#); [Competition](#); [Strategy](#); [Leadership](#); [Business Processes](#); [Organizational Change and Adaptation](#)



Resources: Read! Books (Clickable Links)



Resources: Read! Books (Clickable Links)



X

Breakout Room!

**Are algorithms and machines
amplifying the capabilities of the mind and body?**

**Should humans worry that AI will render
the mental abilities of humans obsolete or simply change them?**

AI - the human mind hijacker?



Artificial Intelligence

Essential AI for Everyone

A Technology-Business-People Playbook!

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AI Expert Lounge!



Hi, I am Mayank!

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Hi, I am Vikas!

Hi, I am Satish!



Hi, I am Anshul!

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Hi, I am Vikash!

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Hi, I am Ajay!



Hi, I am Yogesh!

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AI in Action

Stock Price Prediction Problem

Project for business leaders
March 5, 2022

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