Machine learning and the 4th industrial revolution

Dr Loubna Bouarfa, Founder and CEO at OKRA.ai

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Hunter-gatherer era

4 million humans, symbiotic harmony with nature.

12.000 years ago

10.000 years ago

Agrarian era

Starting in the fertile crescent the agrarian society prospered establishing a form of social organization that was characterised by the ownership of land and division of labour.

First industrial revolution

Men started using water and steam power to mechanize production.

1760

1870

Second industrial revolution

The widespread adoption of technological systems such as the telegraph, the development of sewage systems and the use of electric power allowed us to reach mass production.

An embryonic hierarchical leadership model is developed; humanity divides work into specialties.

Third industrial revolution

The digital revolution is characterized by the spread of electronics, information technology and the internet.

1990

2020

Fourth industrial revolution

Far from the rule-based approach, it is characterised by the symbiotic relationship between human and machines to solve big problems that our world is facing from climate change, healthcare, and inequality.

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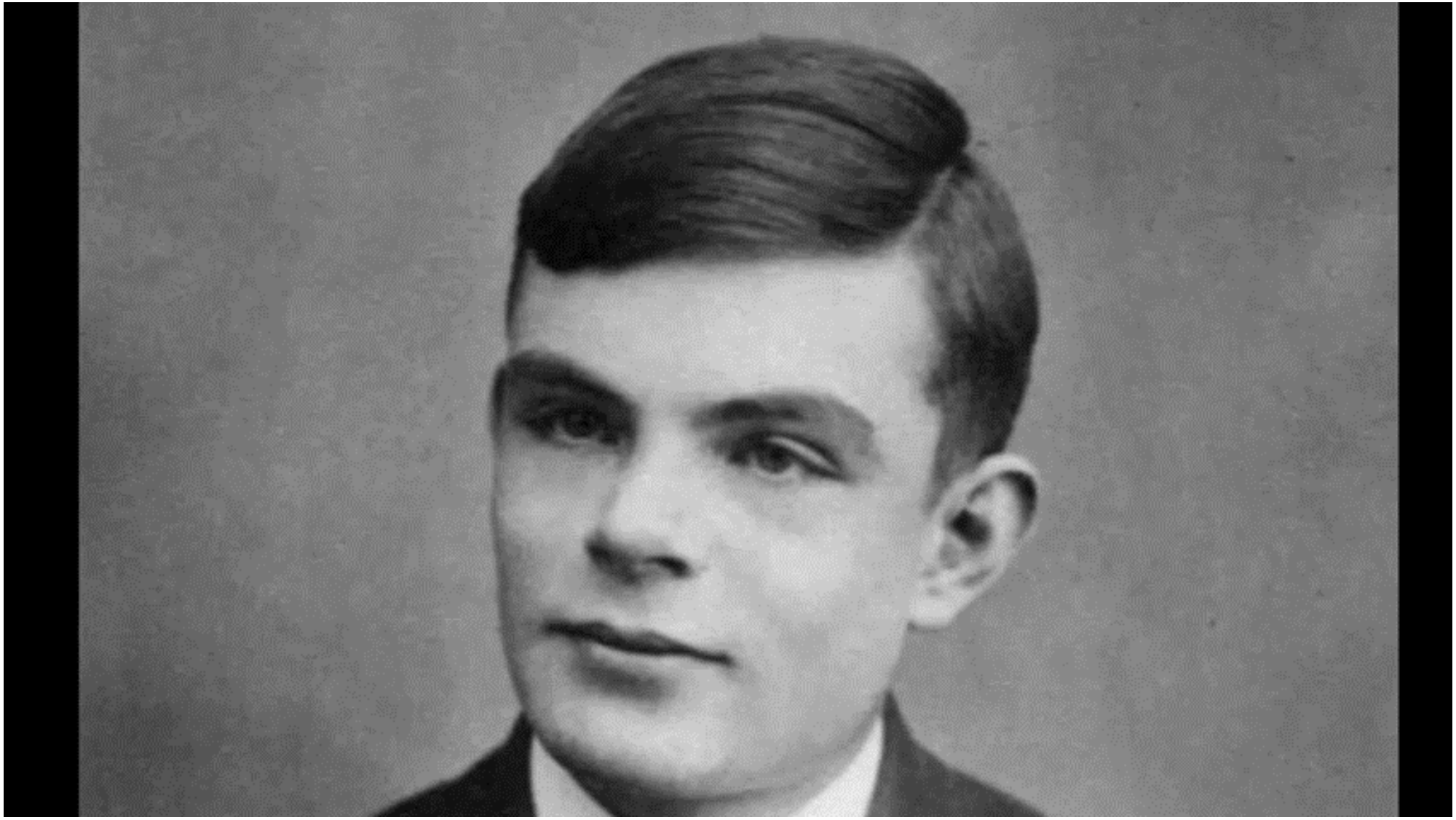

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AI to aid cancer diagnosis

OKRA: The leading artificial intelligence platform for healthcare

Example Practices	Explanation
RADIOLOGY	Deep learning algorithm (DL) outperformed physicians in classification and nodule detection for malignant pulmonary nodules on chest radiography [7];
	DL for assessing mammographic breast density – comparable with experienced mammographers [8]
PATHOLOGY	Invasive breast cancer - DL algorithm for quantifying tumor extent [9]
DERMATOLOGY	Melanoma diagnosis – 58 international dermatologists vs convolutional neural network: ROCs 0.79 vs 0.86 respectively [10]
GASTROENTEROLOGY	Real-time use of artificial intelligence in identification of diminutive polyps (<5mm, nonneoplastic) during colonoscopy [11]

AI to aid cancer diagnosis

[7] Nam et al. (2018, Sep 25). Development and Validation of Deep Learning-based Automatic Detection Algorithm for Malignant Pulmonary Nodules on Chest Radiographs. *Radiology, vol 290*(1). doi: 10.1148/radiol2018180237
[8] Lehman et al. (2018, Oct 16). Mammographic Breast Density Assessment Using Deep Learning: Clinical Implementation. *Radiology vol 290*(1). doi: 10.1148/radiol.2018180694)
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[10] Haenssle et al. (2018, Aug 28). Man against machine: diagnostic performance of a deep learning convolutional neural network for dermoscopic melanoma recognition in comparison to 58 dermatologists. *Annals of Oncology vol 29*(8), 1836-1842. doi: 10.1093/annonc/mdy166
[11] Mori et al. (2018, Aug 14). Real-Time Use of Artificial Intelligence in Identification of Diminutive Polyps During Colonoscopy: A Prospective Study. *Annals of Internal Medicine vol 169*(6), 357-366.doi: 10.7326/M18-0249

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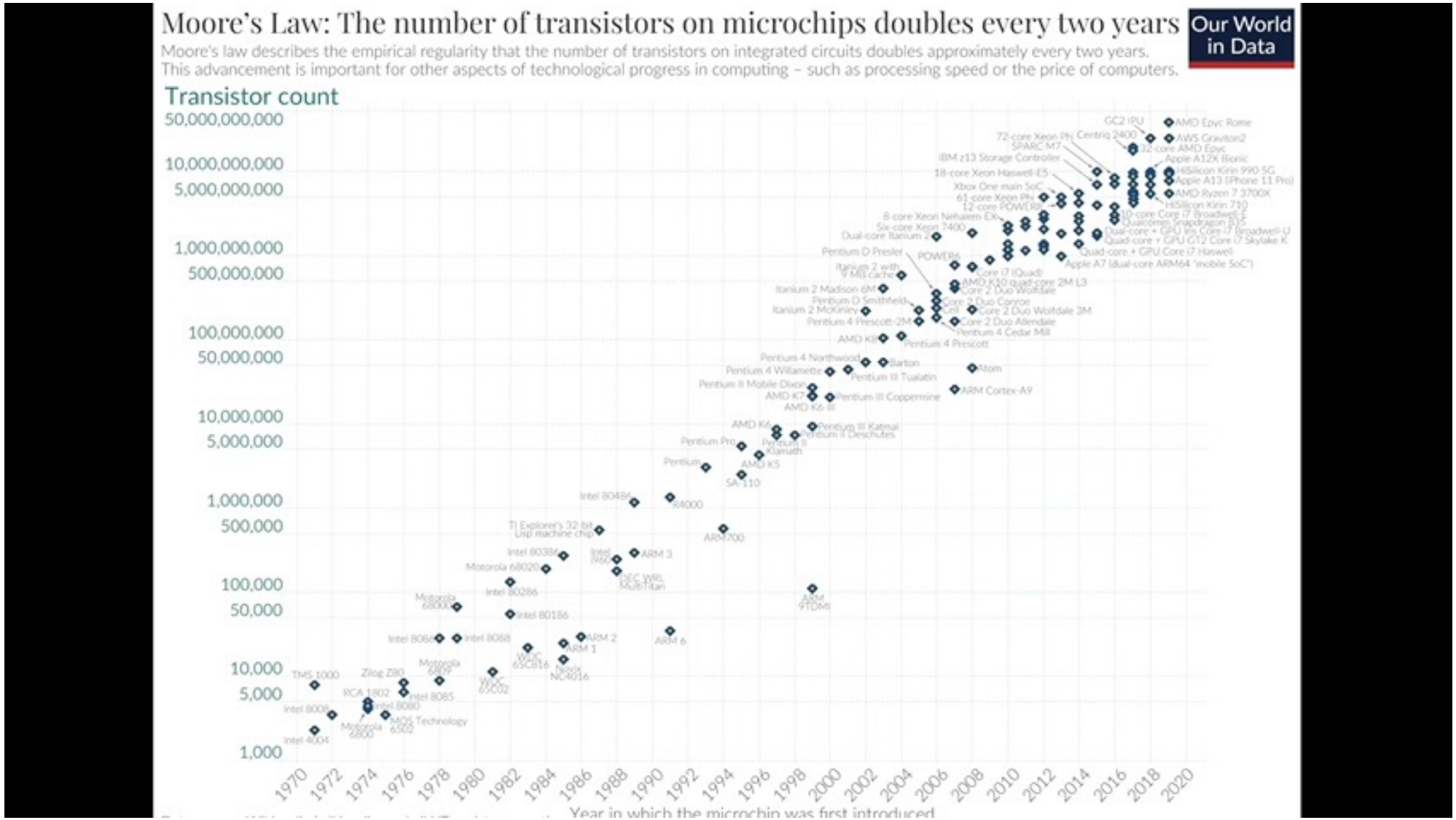
Moore's Law: The number of transistors on microchips doubles every two years
Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years.
This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.
Our World in Data
Transistor count
50,000,000,000
10,000,000,000
5,000,000,000
1,000,000,000
500,000,000
100,000,000
50,000,000
10,000,000
5,000,000
1,000,000
500,000
100,000
50,000
10,000
5,000
1,000
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Year in which the microchip was first introduced

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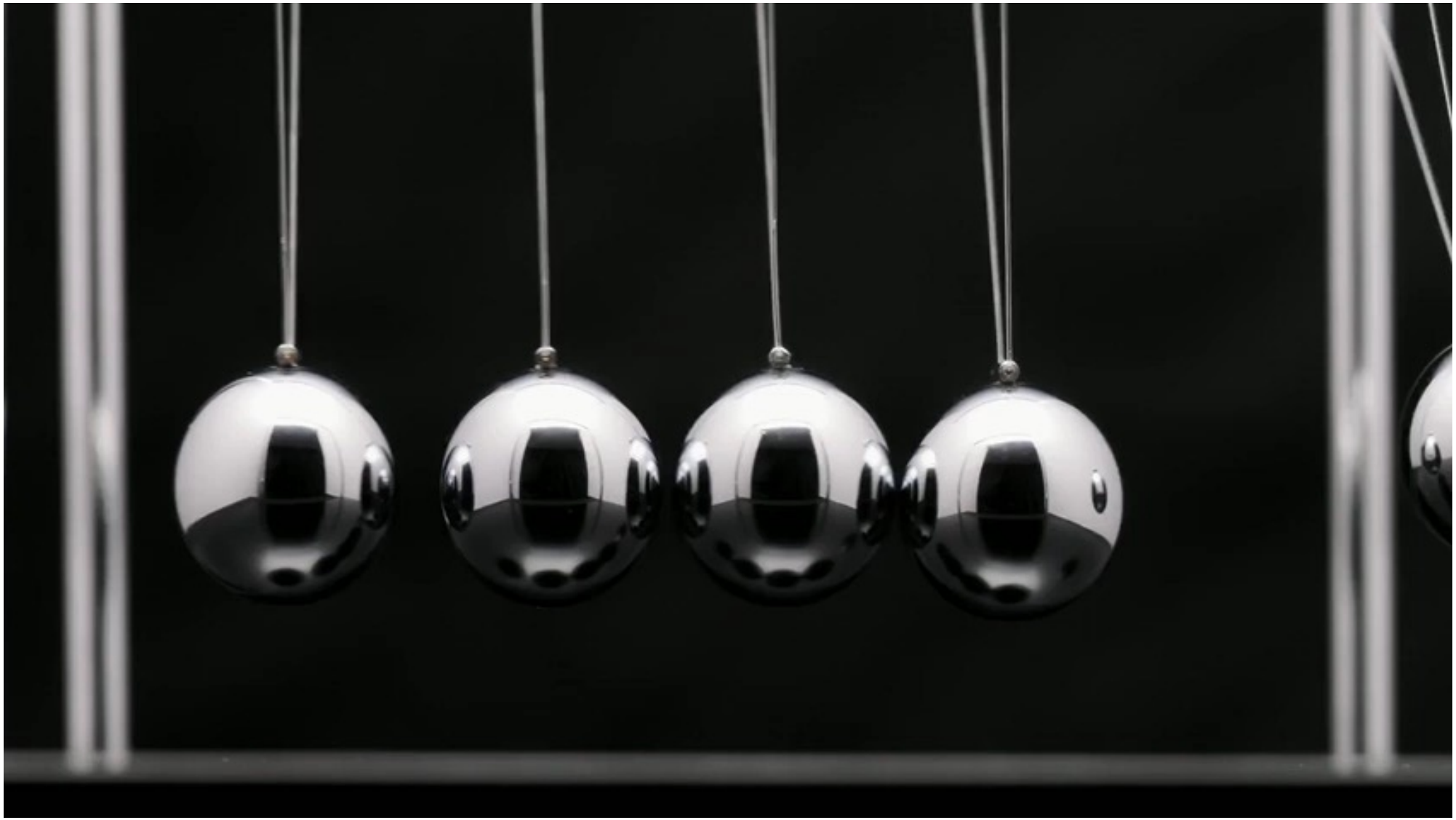

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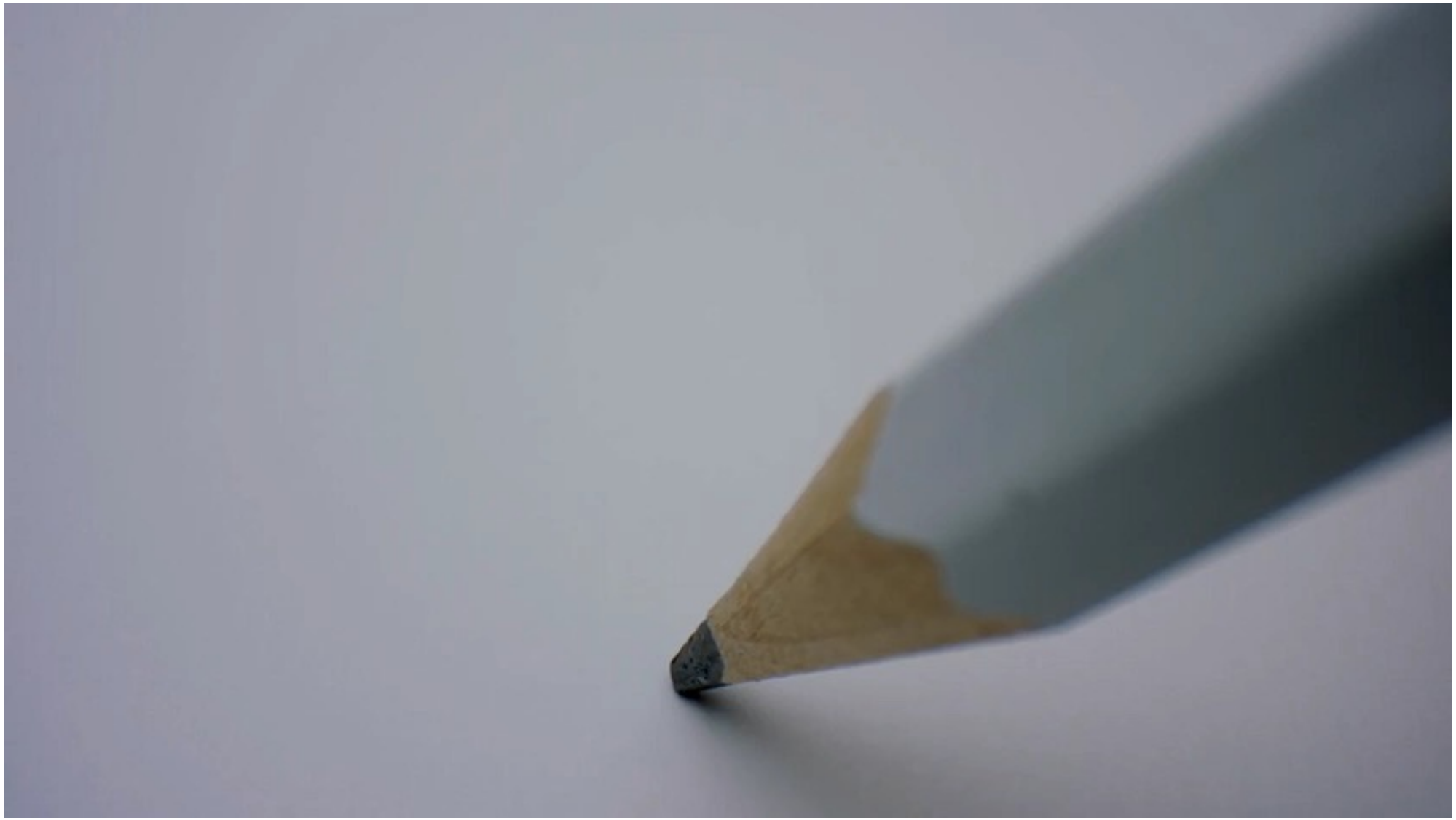

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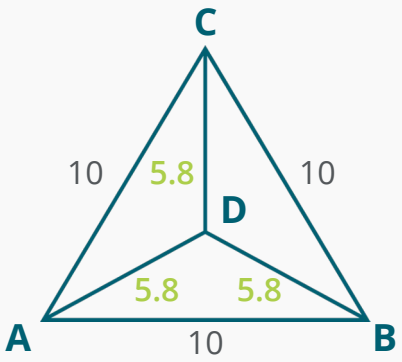
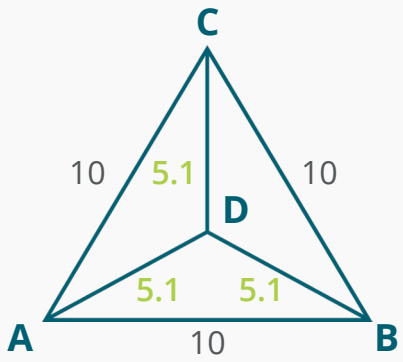
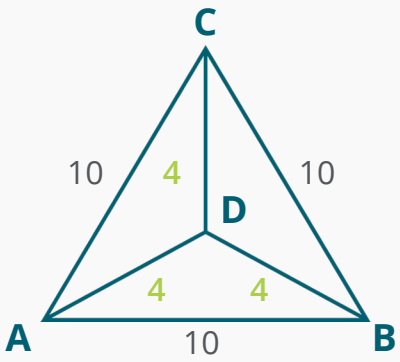


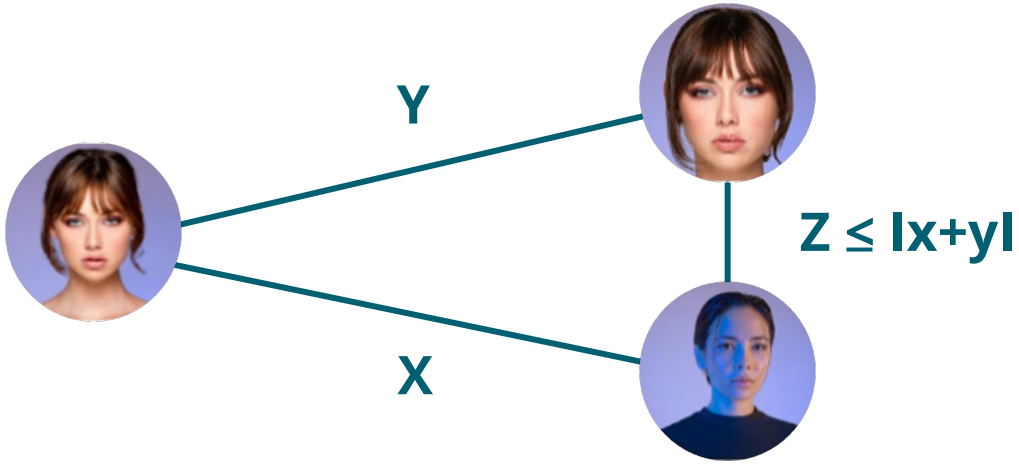
Euclidean
Metric
Triangle inequality
z = |x+y|



Non-Euclidean
Metric
Triangle inequality
z < |x+y|



Non-Euclidean Non-
Metric
Triangle inequality
z > |x+y|



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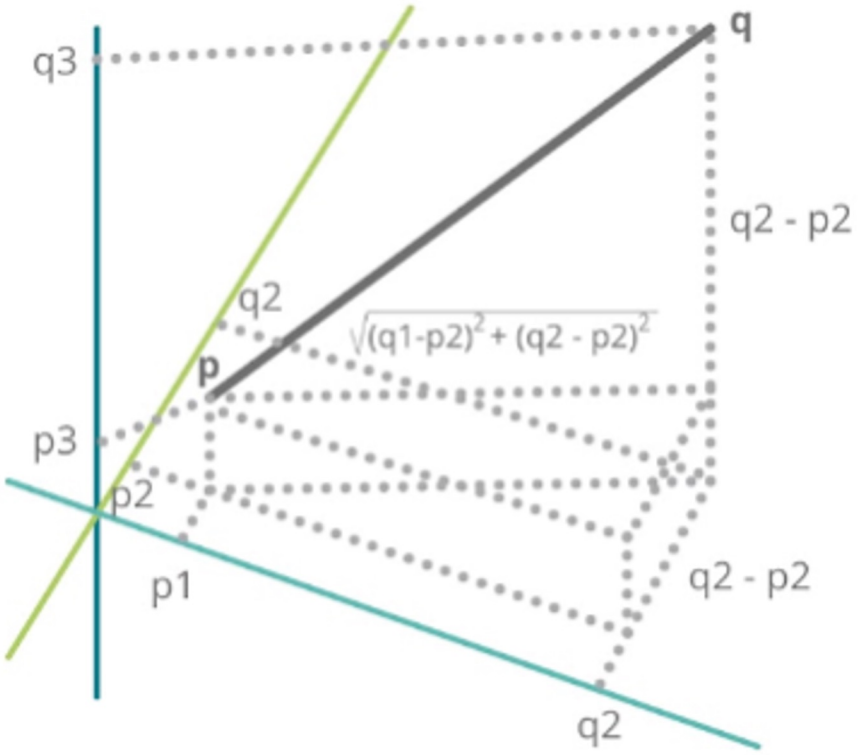

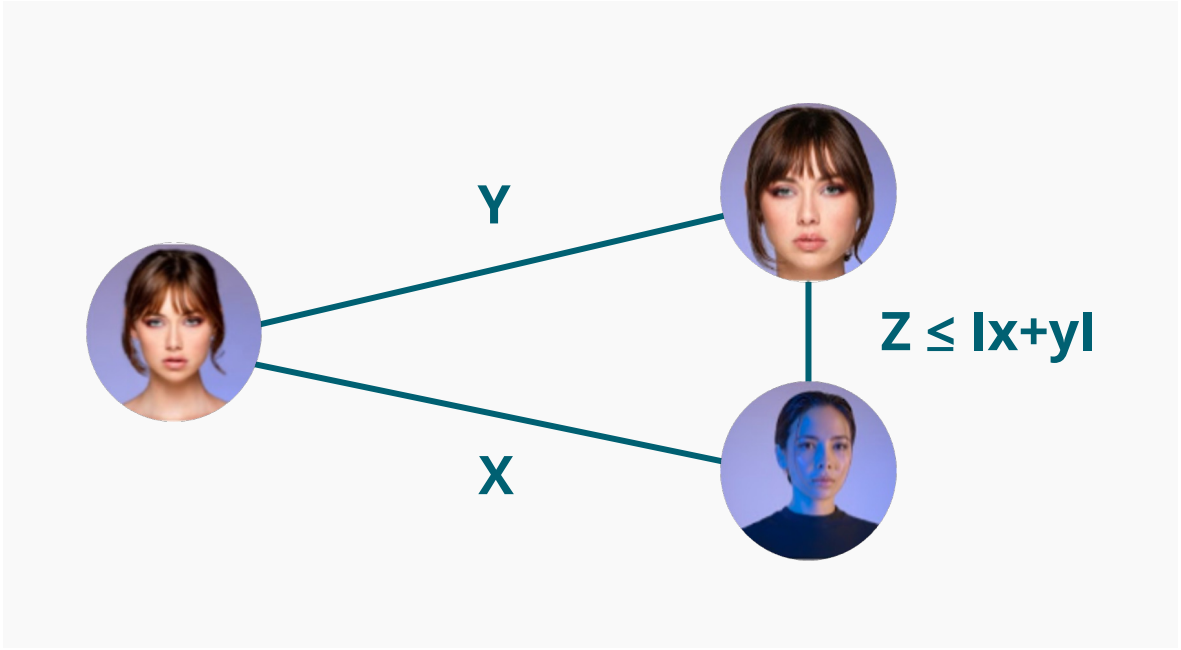

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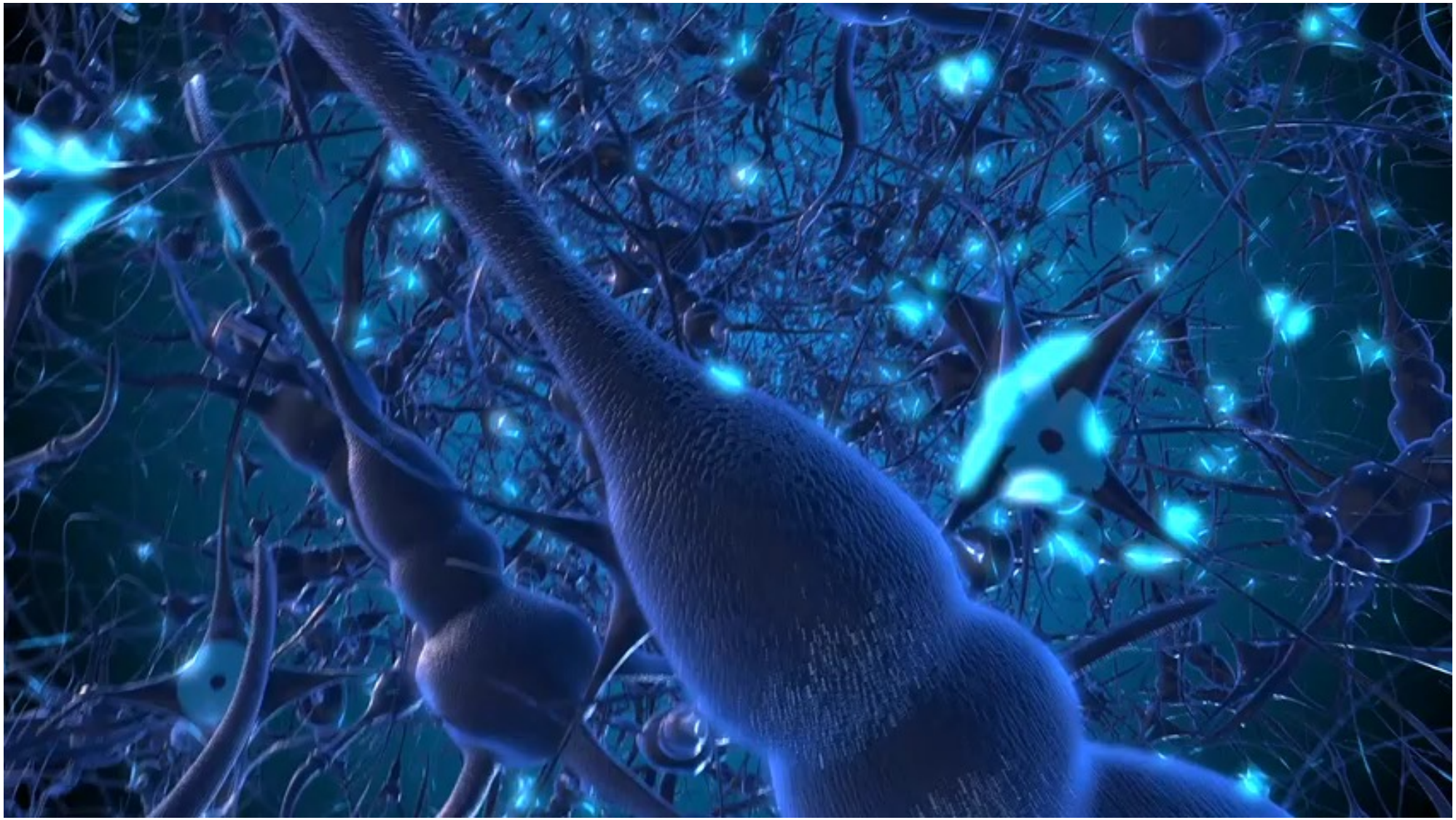

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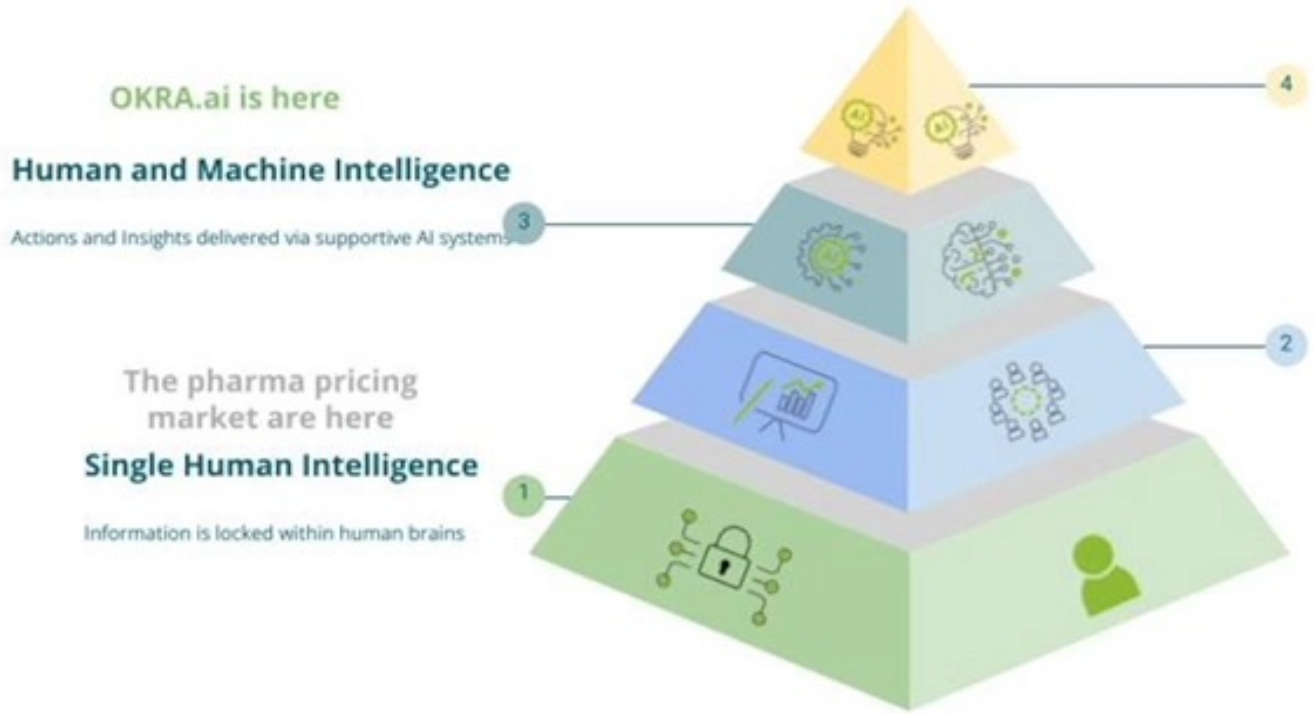
Is the market ready for Human and Machine intelligence



OKRA.ai is here

Human and Machine Intelligence

Actions and Insights delivered via supportive AI systems

3

The pharma pricing market are here

Single Human Intelligence

Information is locked within human brains

1

4

Autonomous AI systems

2

Collective Human Intelligence

Information is visualised and shared via dashboards

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95.8943
52.1882
22.1419
83.5262
63.6509
39.2908
29.4951
93.2673
29.9251
77.3334

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ACTIVE STORES
AFFILIATES
Income
Balance
108552
Summary
Market
785097
Data
Annual Statistics
502007

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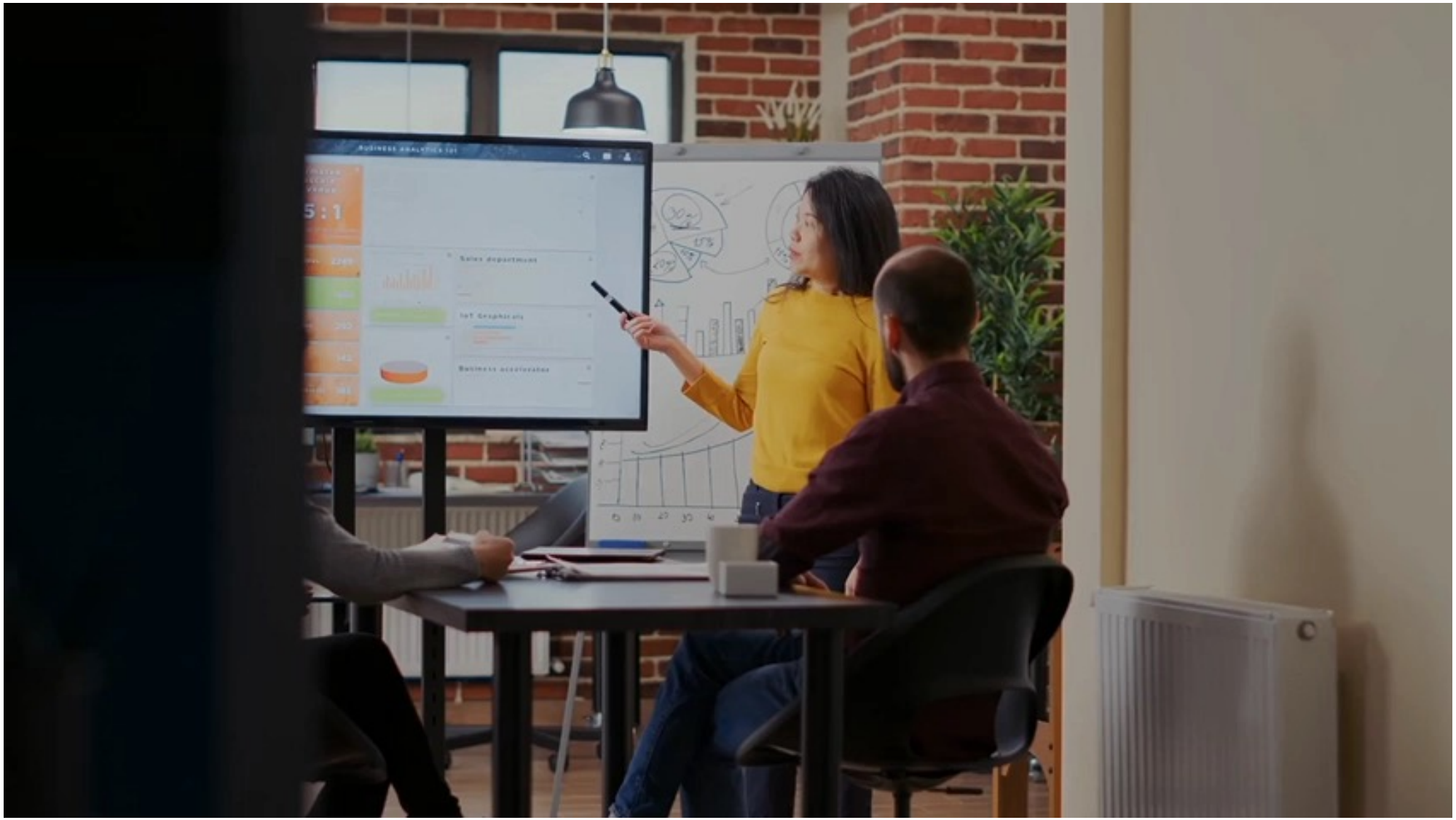

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Thank you!

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