

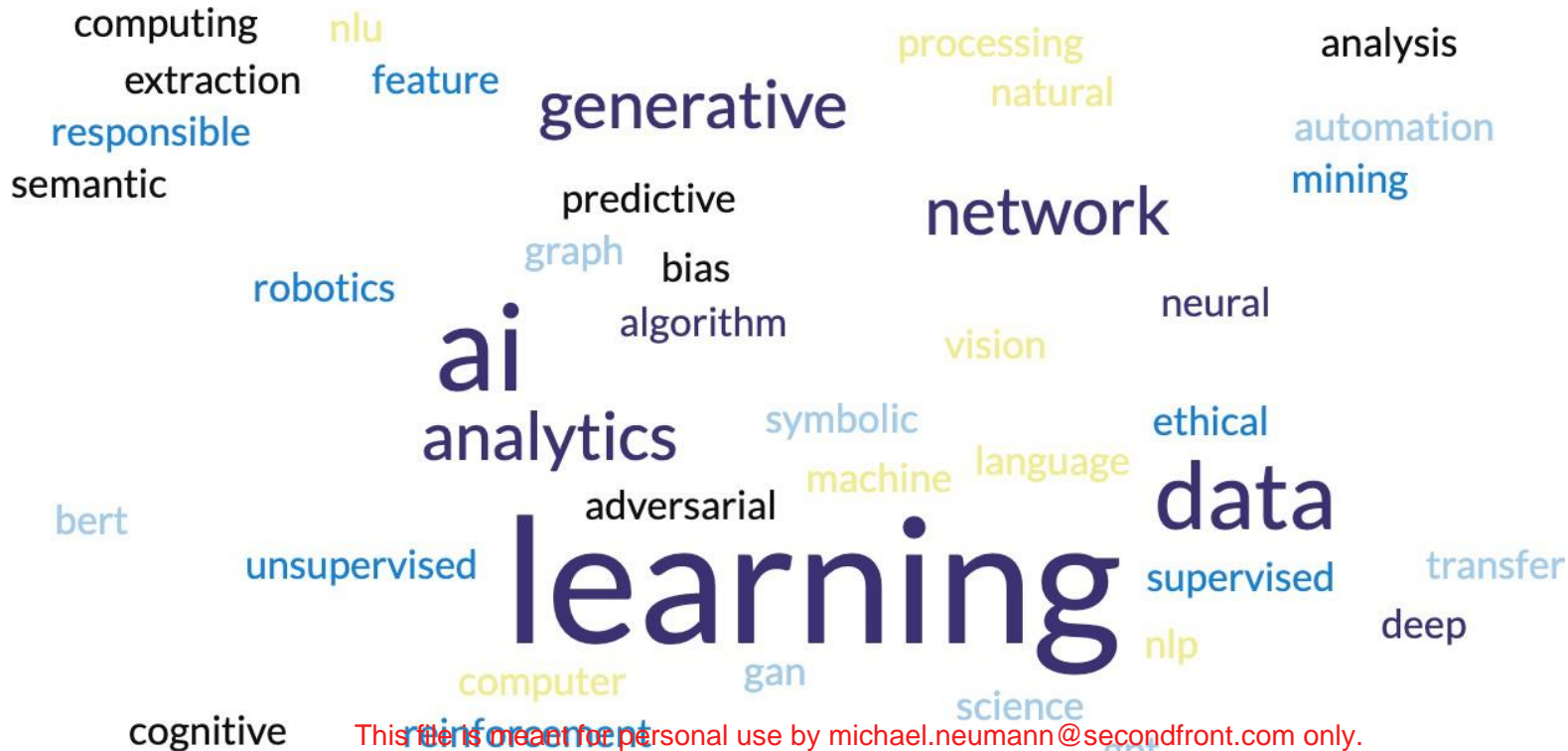
Learning Objectives

- Define common vocabulary, terms, and buzzwords in AI.

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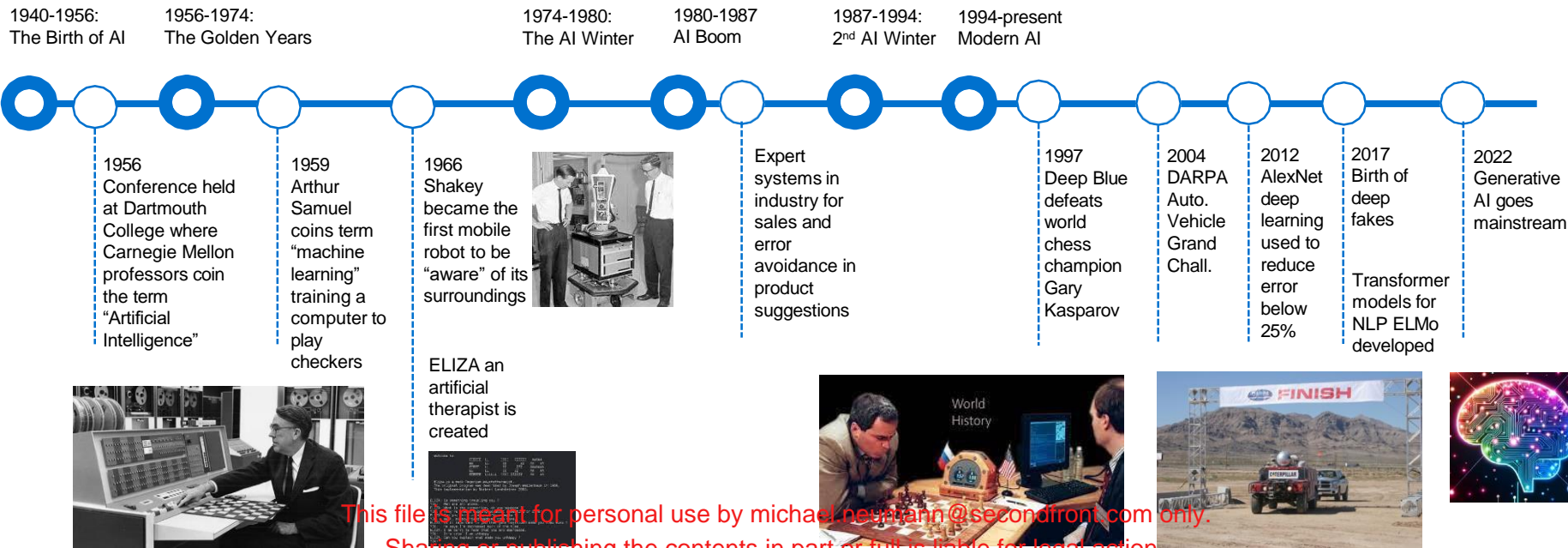
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History of AI

AI is a product of time and innovation. The term “artificial intelligence” was coined in 1956 and has been a topic of research and development for over 70 years. It is a re-branding of mathematical and statistical concepts that have existed for decades and reflect both human misunderstanding and the incredible opportunity to improve our world.

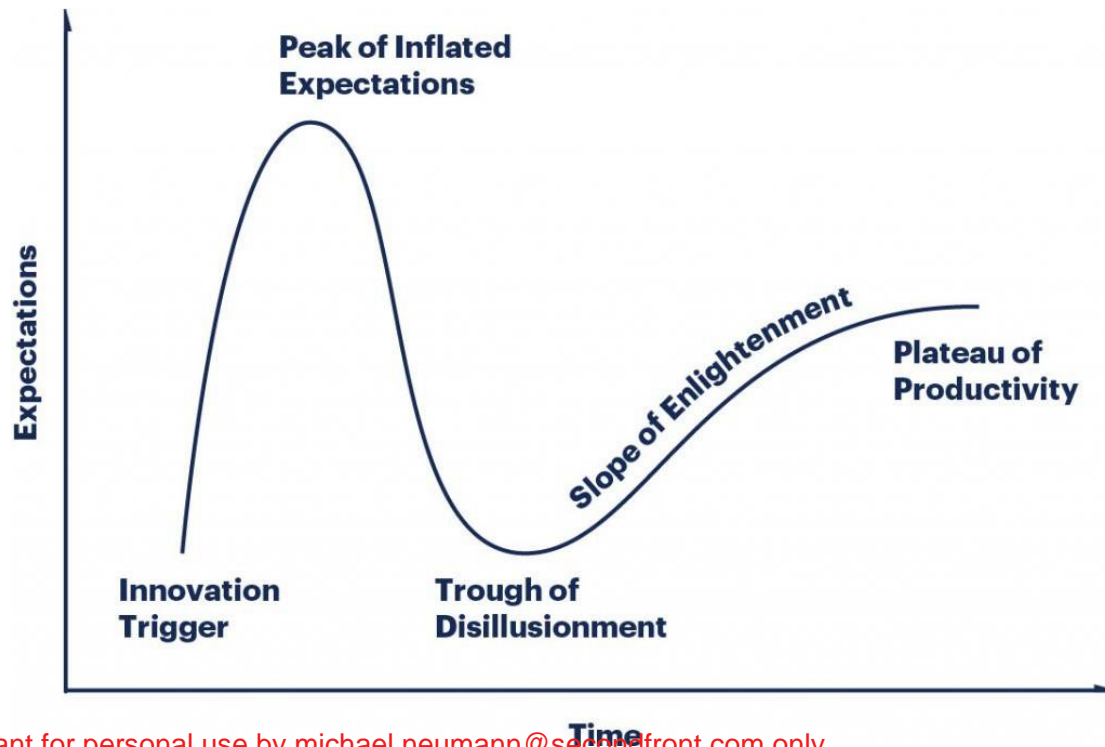
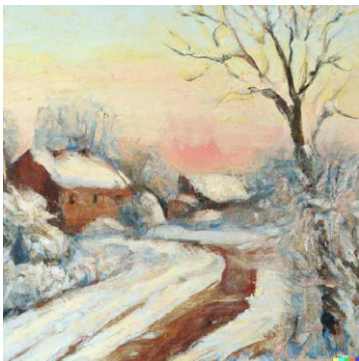


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AI Summers, AI Winters, & AI Hype Cycles



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Vashisth, S., Linden, A., Hare, J., & Krensky, P. (2019). Hype cycle for data science and machine learning, 2019. Gartner Research.
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Why is AI continuing to advance now?

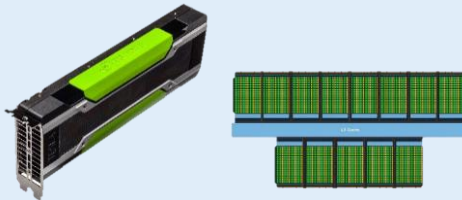
Data



Tens of thousands of social and political events indexed daily

Exponential rise in data generated through connected ecosystems.

Processing



- General purpose GPUs, capable of **trillions** of operations / sec
- Compute cost is exponentially less
- Growth in semiconductor industry for industrial machine learning

Cloud



amazon
web services™



Microsoft
Azure



Google Cloud Platform

Access to large scale processing power in the Cloud enables everyone to benefit from AI/Machine Learning

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What is AI? (1)

- **EU and OECD:** “A **machine-based system** that is designed to operate with varying levels of autonomy, and that can, for explicit or implicit objectives, generate outputs such as **predictions, recommendations, or decisions that influence physical or virtual environments**” – [EU AI Act](#)
- **Chinese Government:** “theories, methods, technologies, and application systems for using digital computers or **digital computer-controlled machines** to simulate, extend, and **expand human intelligence, perceive the environments, acquire knowledge, and use**” – China’s AI Standardization White Paper (2019)

Madiega, T. (2021). Artificial intelligence act. *European Parliament: European Parliamentary Research Service*.

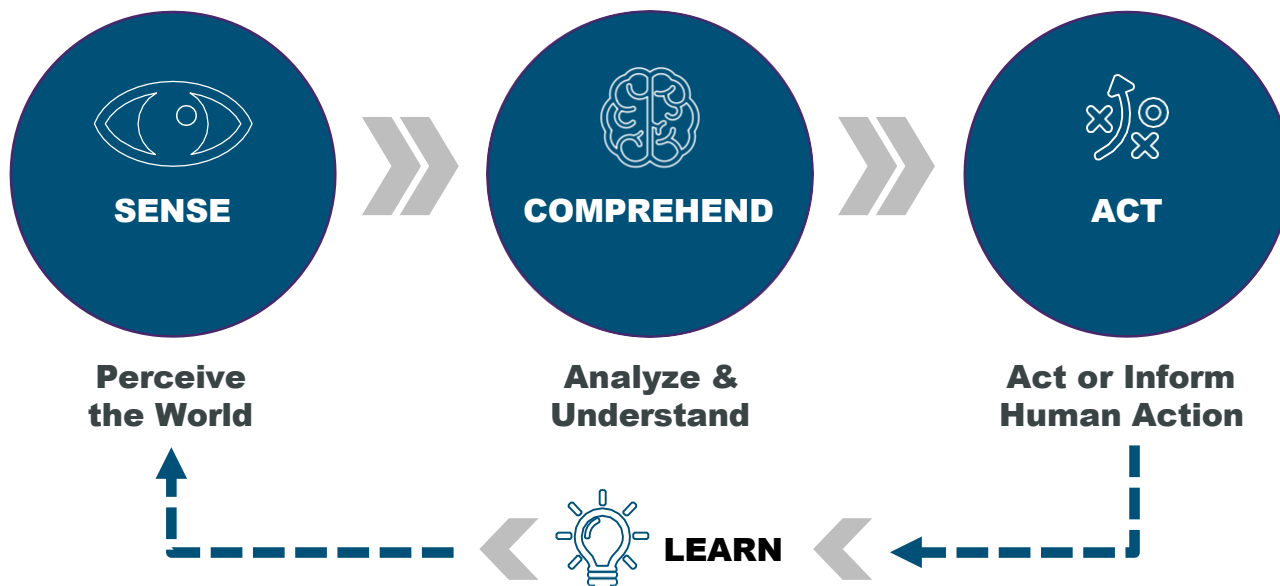
Murphy, B., & Lead, C. T. (Eds.). (2020). Artificial Intelligence Security Standardization White Paper (2019 Edition).

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What is AI? (2)



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AI is Often Powered by Machine Learning

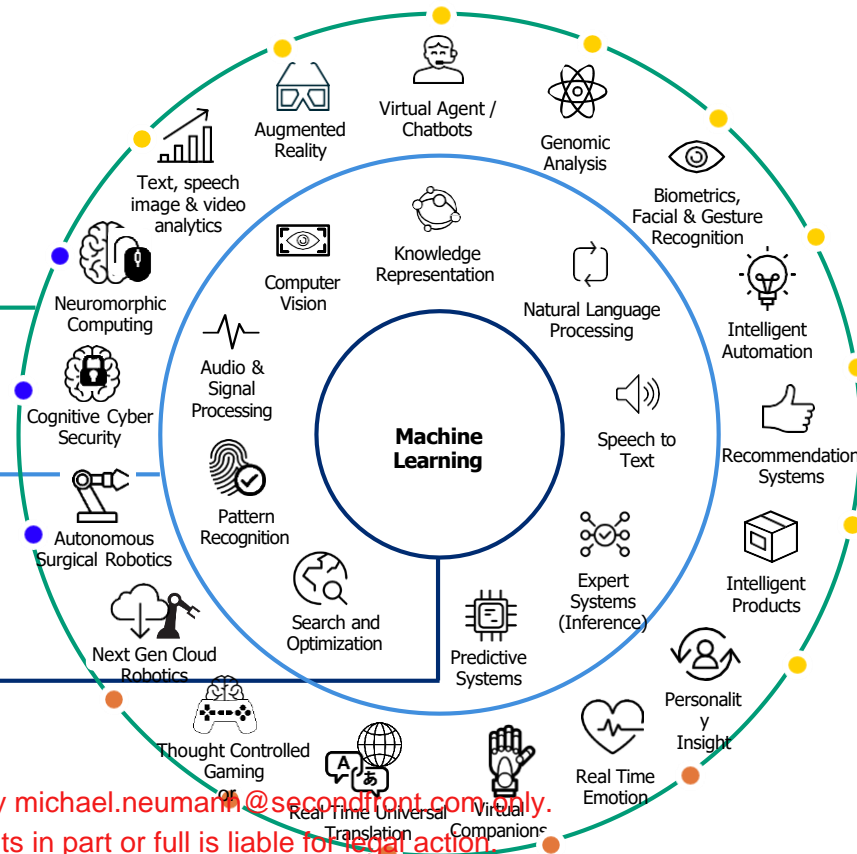
Readiness:

● Now ● Soon ● Active research

AI APPLICATIONS – Enable intelligent Enterprise using Machine Learning & Supporting Technologies

AI CAPABILITIES – Complement Machine Learning to Comprehend, Reason, Predict & Optimize Constraints

MACHINE LEARNING – Algorithms & Architectures that allow 'learning' (Supervised, Unsupervised, Reinforcement)

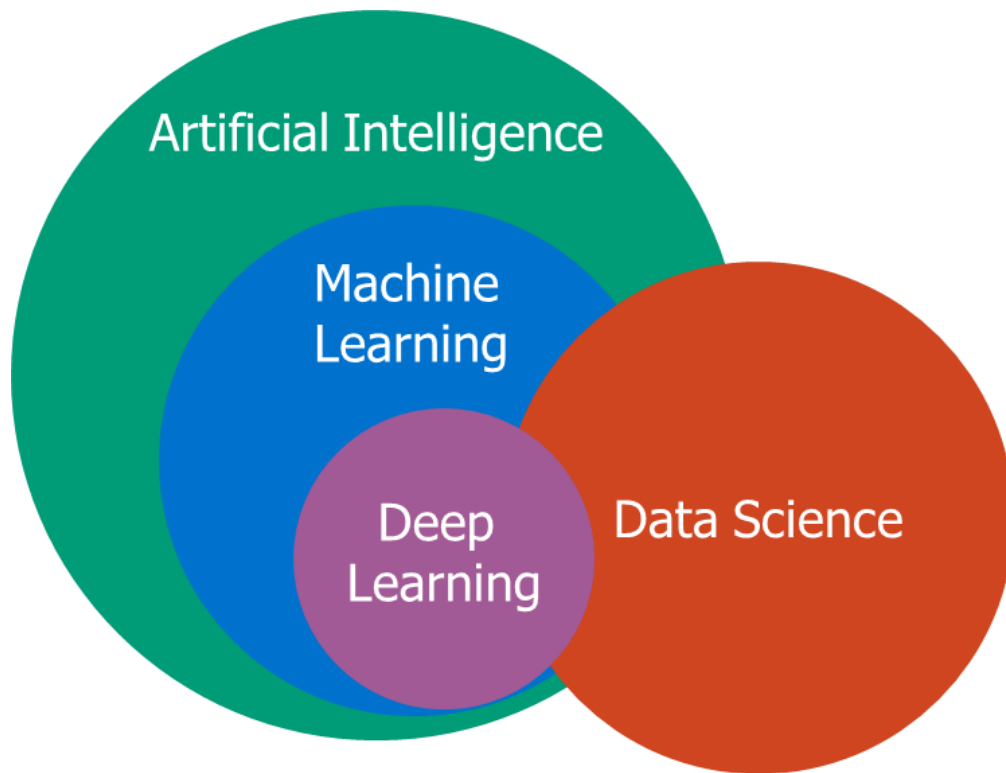


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Terminology

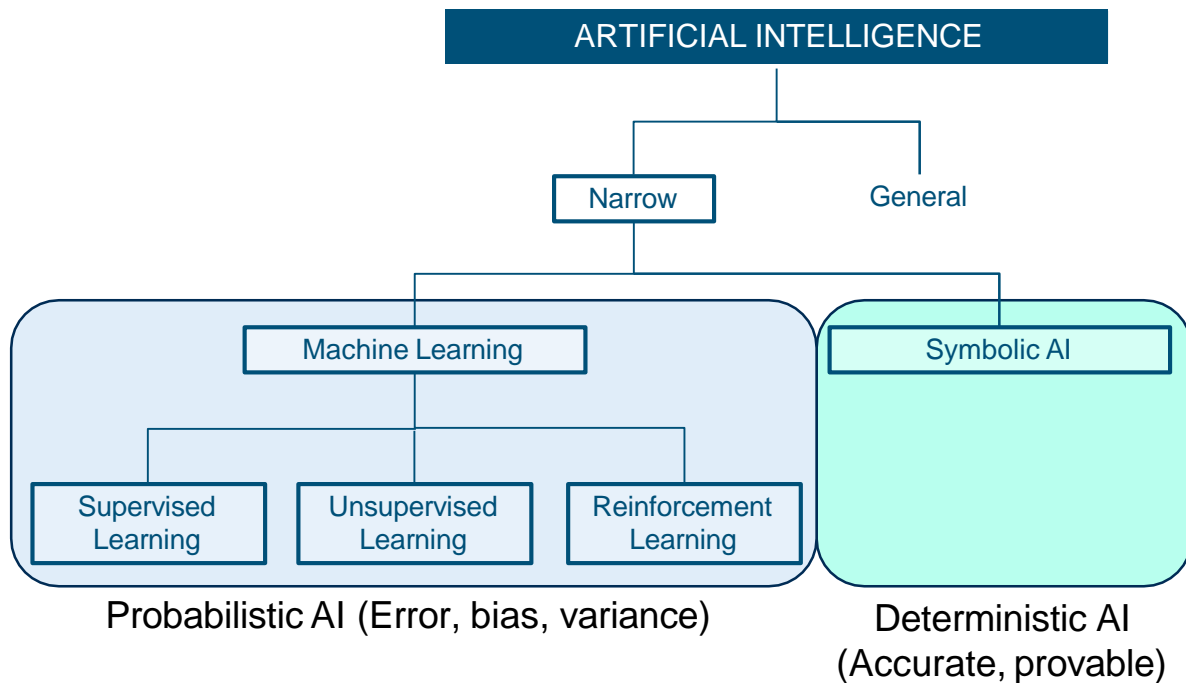


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Conceptualizing AI



Machine Learning (ML) lies at the core of AI systems and is the most prevalent AI solution today.

ML algorithms develop complex mapping functions that can learn from and make predictions on data.

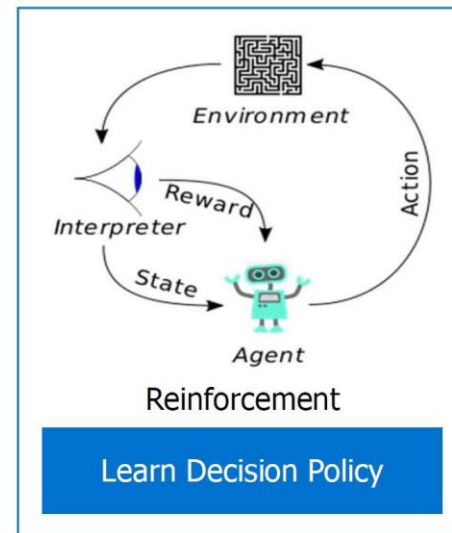
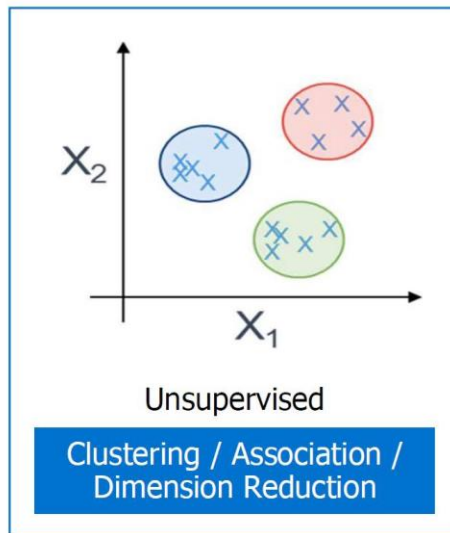
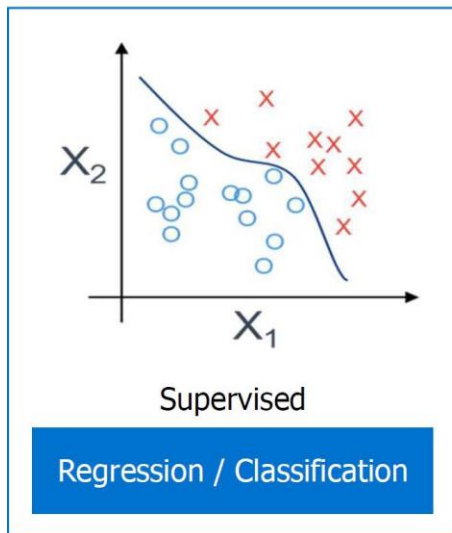
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Machine Learning

The study of data-driven algorithms



A more rigorous definition: A computer program is said to learn from experience E with respect to some class of tasks T , and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E .

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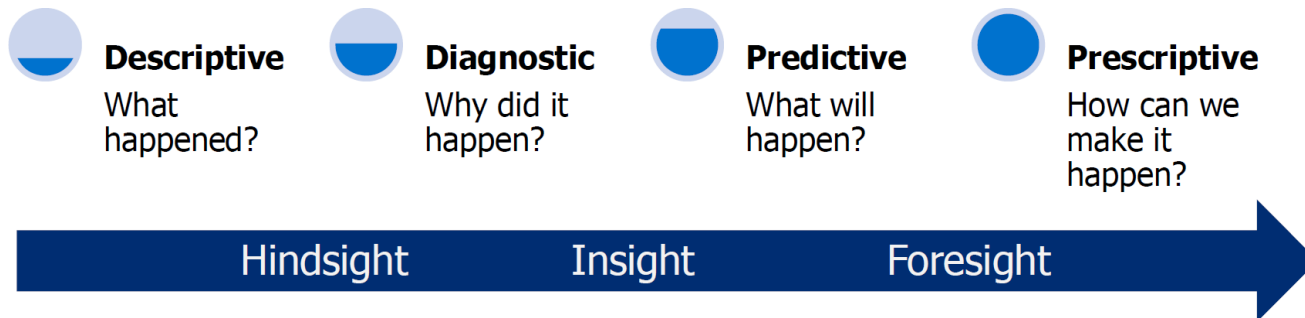
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Data Science

An interdisciplinary field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from noisy, structure, and unstructured data.

https://en.wikipedia.org/wiki/Data_science



Derived from <http://datascienceassn.org/content/descriptive-predictive-prescriptive-analytics>

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Risks Along the Path to AI

- People built bridges long before the scientific discipline of engineering.
- Bridge failure did not mean bridges were a bad idea or that they could not be built better.
- As with any technology, we must learn how to build, manage and implement AI wisely.



"Learning from bridge collapses I-35W Minneapolis and Tacoma Narrows" by Judy Brock is licensed under CC BY-SA 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-sa/2.0/>

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AI Winter

**AI-Enabled
Futures**

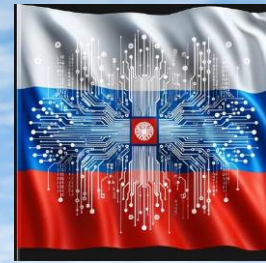


**Technology
Valley of Death**

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AI Winter



**AI-Enabled
Futures**



"People fear what they don't understand and hate what they can't conquer."

— Andrew Smith

"Fear and ignorance are the architects of stagnation, stifling the steps to a better world."

— Ian McCulloh

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