INTRODUCTION TO PROGRAMMING & MACHINE INTELLIGENCE CSC 202

SUMMER 2023

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WHAT IS MACHINE INTELLIGENCE?

- **Machine intelligence**, or *artificial intelligence*, involves the automation of tasks traditionally carried out by humans.

- What are some examples of machine intelligence?

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BY SARAH MIN
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Andre Esteva ✉, Brett Kuprel ✉, Roberto A. Novoa ✉, Justin Ko, Susan M. Swetter, Helen M. Blau &
Sebastian Thrun ✉

Nature **542**, 115–118 (02 February 2017) | Download Citation ⬇

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  - https://www.cbsnews.com/news/netflix-trailers-made-by-ai-netflix-is-investing-in-automation-to-make-trailers/
  - https://www.nature.com/articles/nature21056

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https://www.wcvb.com/article/grocery-store-robot-coming-to-hundreds-of-stop-and-shop-giant-martins-locations/25915618

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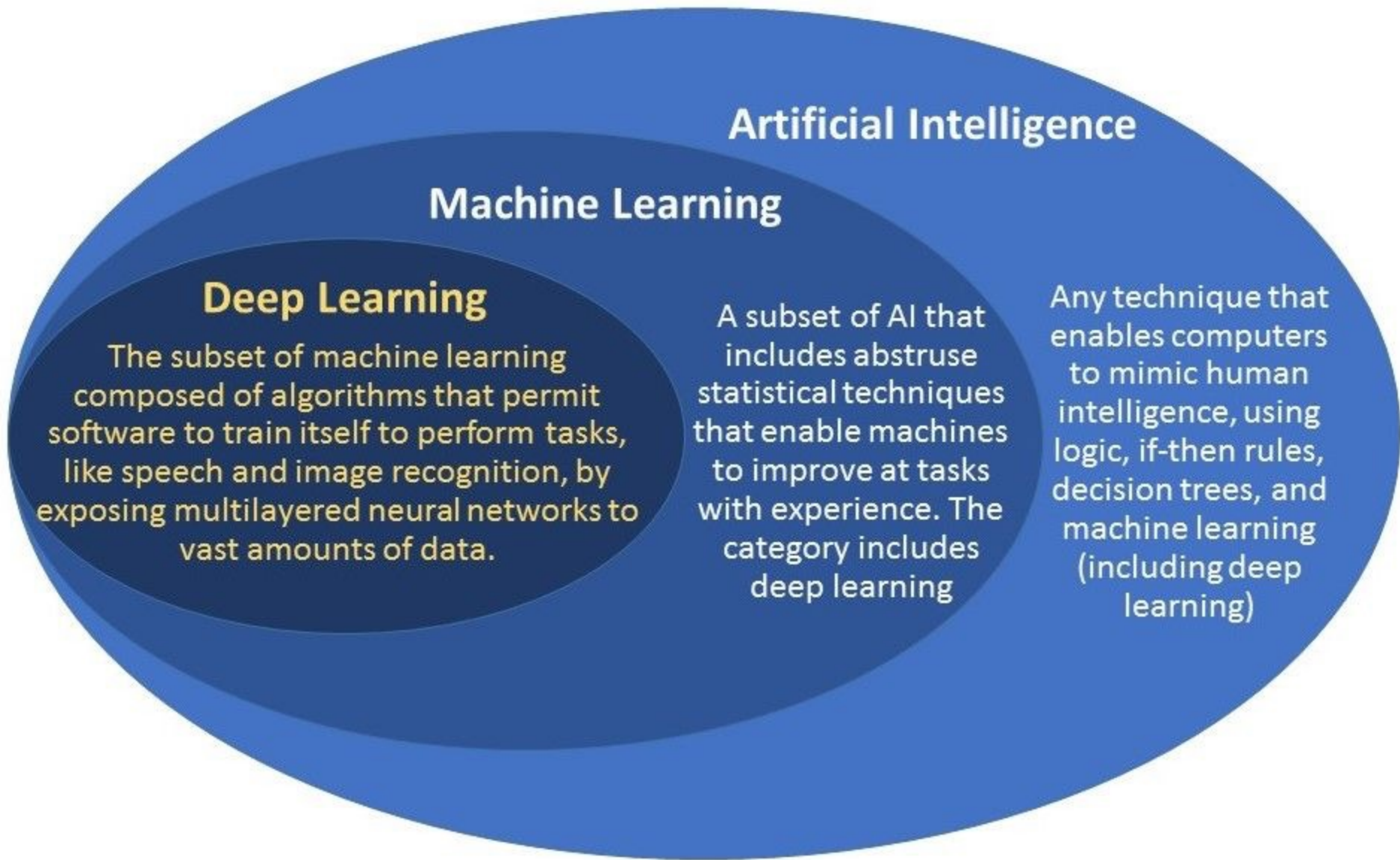
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- Sources
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  - https://www.wired.com/story/best-algorithms-struggle-recognize-black-faces-equally/
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HOW DOES MACHINE INTELLIGENCE WORK?

- Example: tic-tac-toe, https://www.google.com/search?q=tic+tac+toe
- Some possible approaches:
  - Logic-based:
    - Analyze board, if you can win, go for it
    - Otherwise, if the other player has 2 in a row, block them, etc
  - Search and optimization:
    - Look at all possible games that can be played from the current configuration, and make the "best" move (typically the move that minimizes the best outcome of the opponent)
    - For tic-tac-toe, there are *only* 255,168 possible games
  - Machine learning (learning from data):
    - The machine learns from a "training" dataset, consisting of a specific moves for different board configurations and the final outcome of the game.
    - The machine "learns" how to play by playing a large number of games against itself and learning which moves maximizes the value of a "cost function" (Reinforcement Learning)

WHAT WILL WE LEARN IN THIS CLASS?

- Python is a general-purpose programming language commonly used for Machine Intelligence

- While the details of many methods are complex, many methods can be used directly within Python or by using Python and the application program interfaces (APIs) of cloud-based services

- We will learn the basic concepts of:

  - Python

  - Natural Language Processing

  - ~~Data Mining Twitter~~

  - Machine Learning and Neural Networks, including those for image recognition

  - ~~Machine learning as a service (in the cloud), including Digital Assistants~~