Artificial Intelligence and Data: Cooperation? Collaboration? Leadership?

Great Decisions

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Oceans and Artificial Intelligence (AI): Three Considerations

1. Susan Ariel Aaronson captures our attention on Artificial Intelligence as a public good in reference to oceans…need for healthy oceans, protein from the ocean. Non-governmental organizations (NGOs)--*OceanMind* using satellites and AI to study vessel movement and overfishing in the ocean.

2. AI in autonomous systems for deep-sea mining for mineral deposits, e.g., manganese, iron copper, nickel, cobalt, lead, nickel, zinc, titanium, lithium--with 28 exploration contracts with the International Sea Bed Authority. Public-private conferences, collaboration and cooperation.

3. Oceans and land depict distance and connectedness in an interdependent, global society—for collaboration and cooperation

Oceans Apart…Close as Neighbors

Artificial Intelligence –Key Domains

- Healthcare
- Education
- Government
- Transportation
- Retail
- Military
- Leisure

Artificial Intelligence and the Economy

- Gartner Research Firm expects an increase of the AI global economy from about $1.2 trillion last year to about $3.9 trillion by 2022

- McKinsey Global Institute anticipates global AI activity of about $13 trillion by 2030.

- Will replace jobs in bookkeeping, telemarketing, couriers, computer support specialists, and some jobs in various domains: healthcare, education, transportation

Artificial Intelligence –Historical Overview

- Appeared in Greek myths
- Mary Shelley's *Frankenstein* first performed in 1823
- *Michael Rennie's The Day the Earth Stood Still*, 1951
- British mathematician and computer scientist Alan Turing's Turing test of a machine's intelligent behavior as indistinguishable from a human's, 1950
- Computer Scientist John McCarthy coined the term "Artificial Intelligence" in 1955
- McCarthy organized the first AI conference –a summer workshop of mathematicians and scientists at Dartmouth College in 1956
- Sci-fi movies, e.g., *The Terminator,* 1984; Will Smith's *I, Robot*, 2004

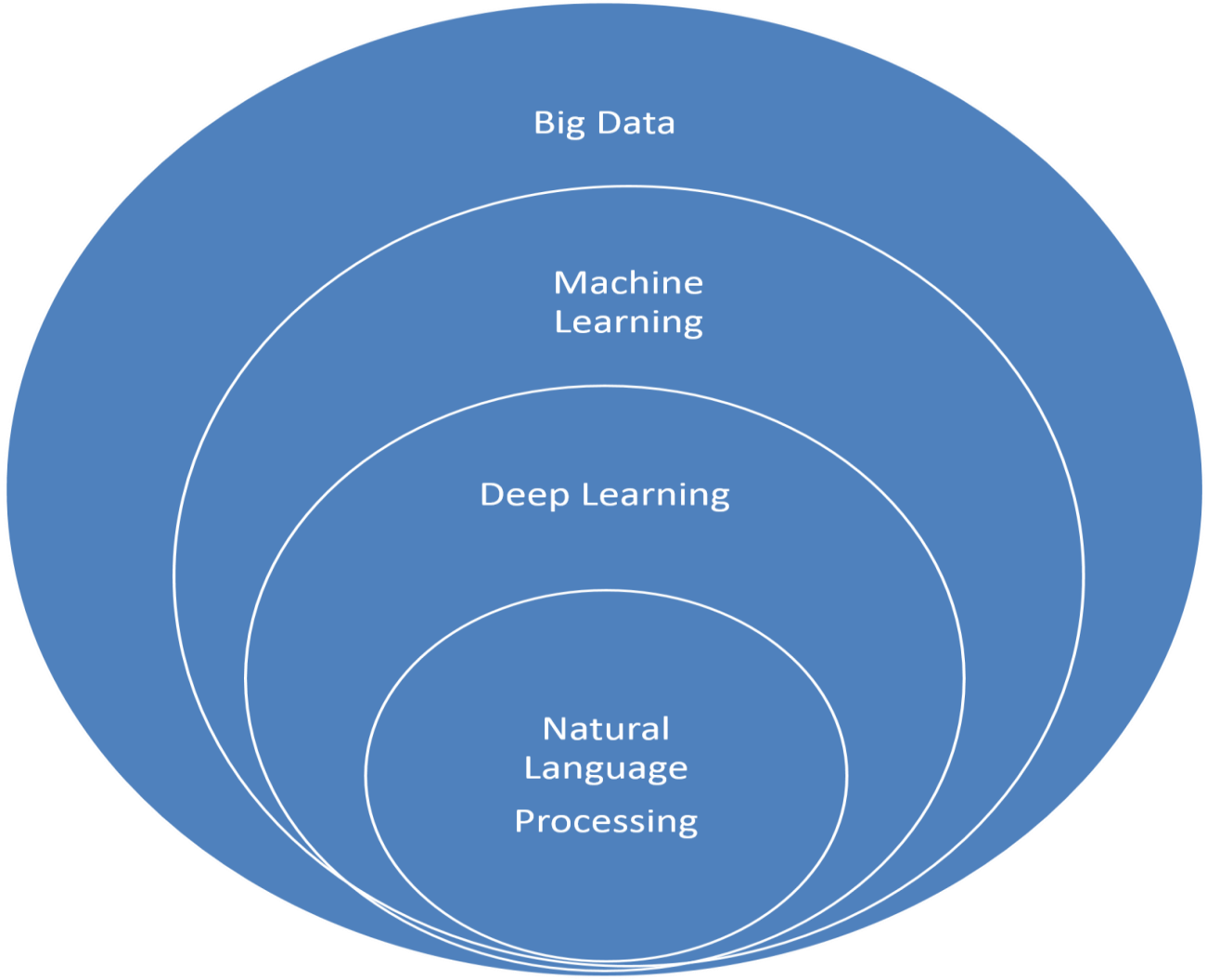
Artificial Intelligence, Subsets, and More I

- Artificial Intelligence—Computer systems performing tasks typically of intelligent humans
- Machine Learning—Using statistical techniques that give computers the ability to improve tasks with experience and data without being programmed (Arthur Samuel 1959)
- Deep Learning –A subset of Machine Learning composed of networks capable of learning from data unsupervised; algorithms (a specification or set of rules to be followed in calculations or problem solving) permit software to train itself to perform tasks, e.g., speech and image recognition, by exposing multilayered neural networks to vast amounts of data

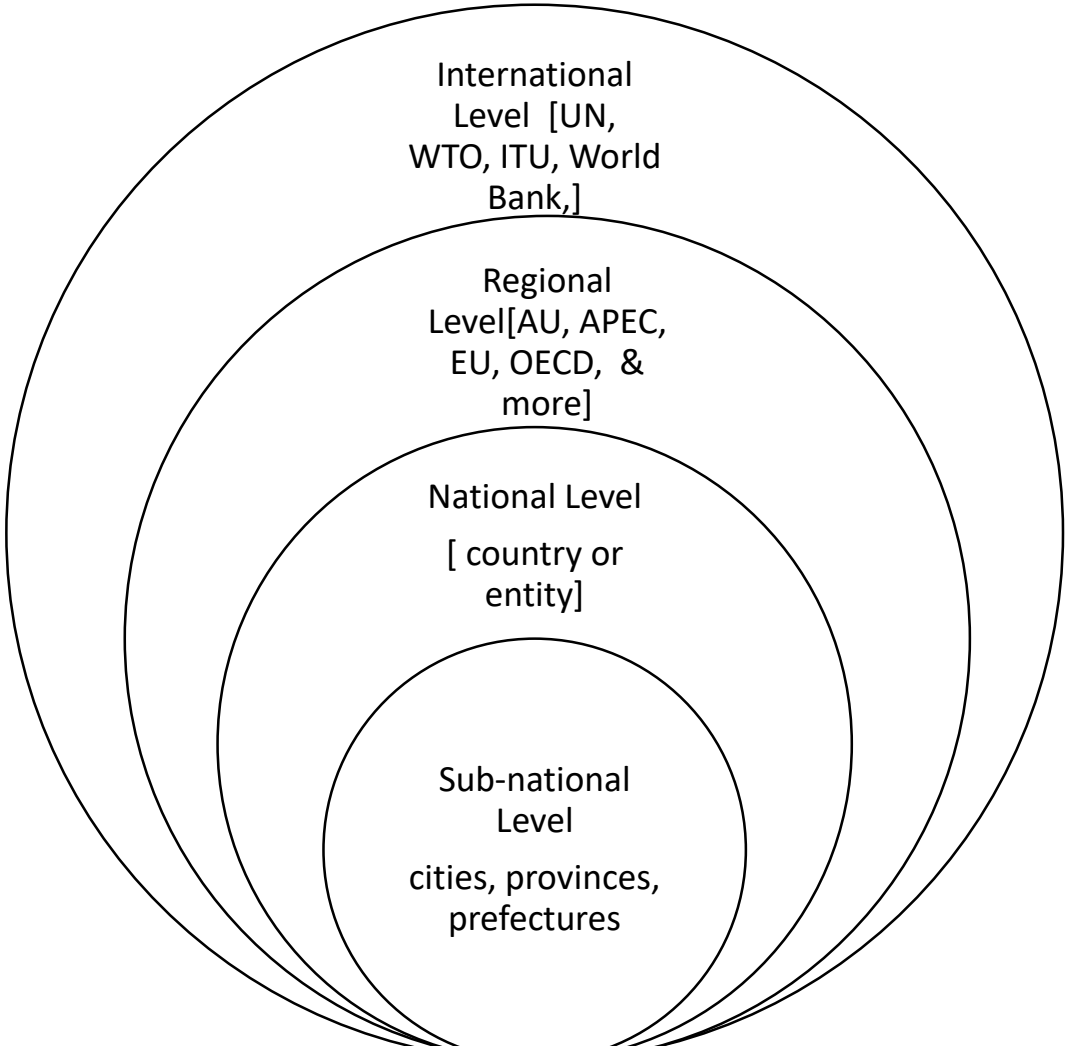
Artificial Intelligence, Subsets, and More II

- Neural Networks or Neural Nets—Software constructions modeled after the ways neurons work in the brain
- Big Data—Large data sets with a number of v's (e.g., volume, variety, veracity, variety, and value) used for computational analysis; it is the key element or feature. Massive troves of data--health data, public data, education J. Berman ("Big data vs. small data)
- Natural-Language Processing—The computer processing that occurs in speech-recognition technology, in which the software can recognize spoken sentences and is able to re-create spoken language into text.
- Singularity– The hypothesized time/state when superintelligent machines began improving themselves without human involvement. In 2018, Jürgen Schmidhuber, often called "the father of Artificial Intelligence" anticipates singularity occurring in 30 years.

Major Subsets of Artificial Intelligence



Multi-level Analysis



Artificial Intelligence at the International Level

- United Nations —International Telecommunication Union (ITU) has taken the lead on dialogue; WHO in healthcare domain
- G7 (Canada, France, Germany, Italy, Japan, UK, US)—Global Partnership on Artificial Intelligence (GPAI), U.S. views the plan as restrictive, concerned about overregulation
- France and Canada leading Expert Council on managing AI growth for humanity… acknowledging a daunting task
- More than 83 organizations around the world have proposed ethical guidelines for AI

Artificial Intelligence at the Regional Level

- Organisation for Economic Co-operation and Development (OECD)—May 2019, OECD Principles on Artificial Intelligence:
- 1. Principles of stewardship on trustworthy AI—transparency, fairness, humanity, sustainability, security, and safety
- 2. National policies and international cooperation for trustworthy AI – investment interdisciplinary research and development, free of bias, improve standards and interoperability
- EU Trustworthy AI and General Data Protection regulation (GDPR)
- Association of Southeast Asian Nations (ASEAN)—addressed it with some plans with dialogue partner of China
- Asia-Pacific Economic Cooperation (APEC) forum—Big Data and AI Business Forum sessions, 2018, 2019—21 member economies in APEC

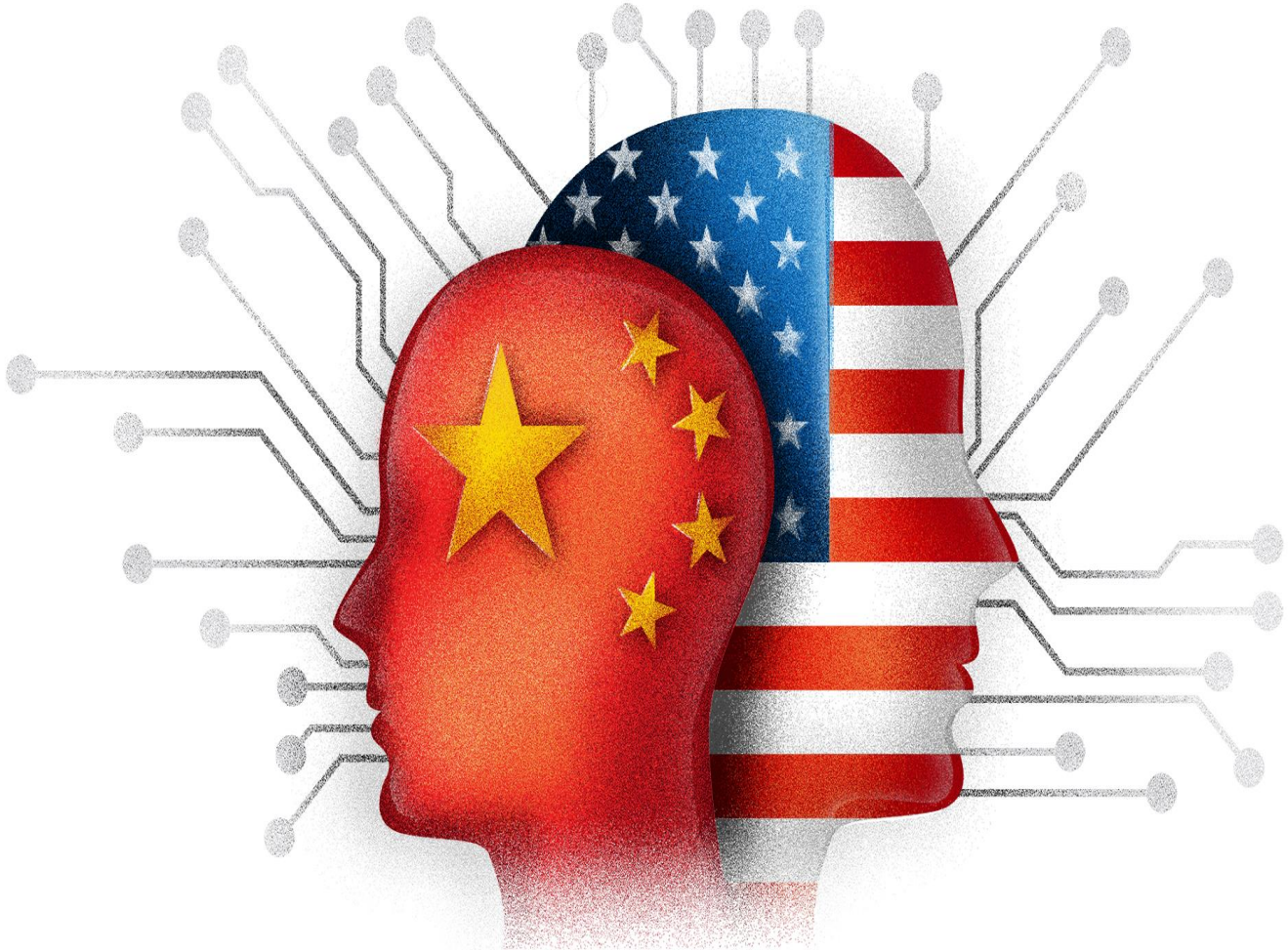
Artificial Intelligence at the National Level

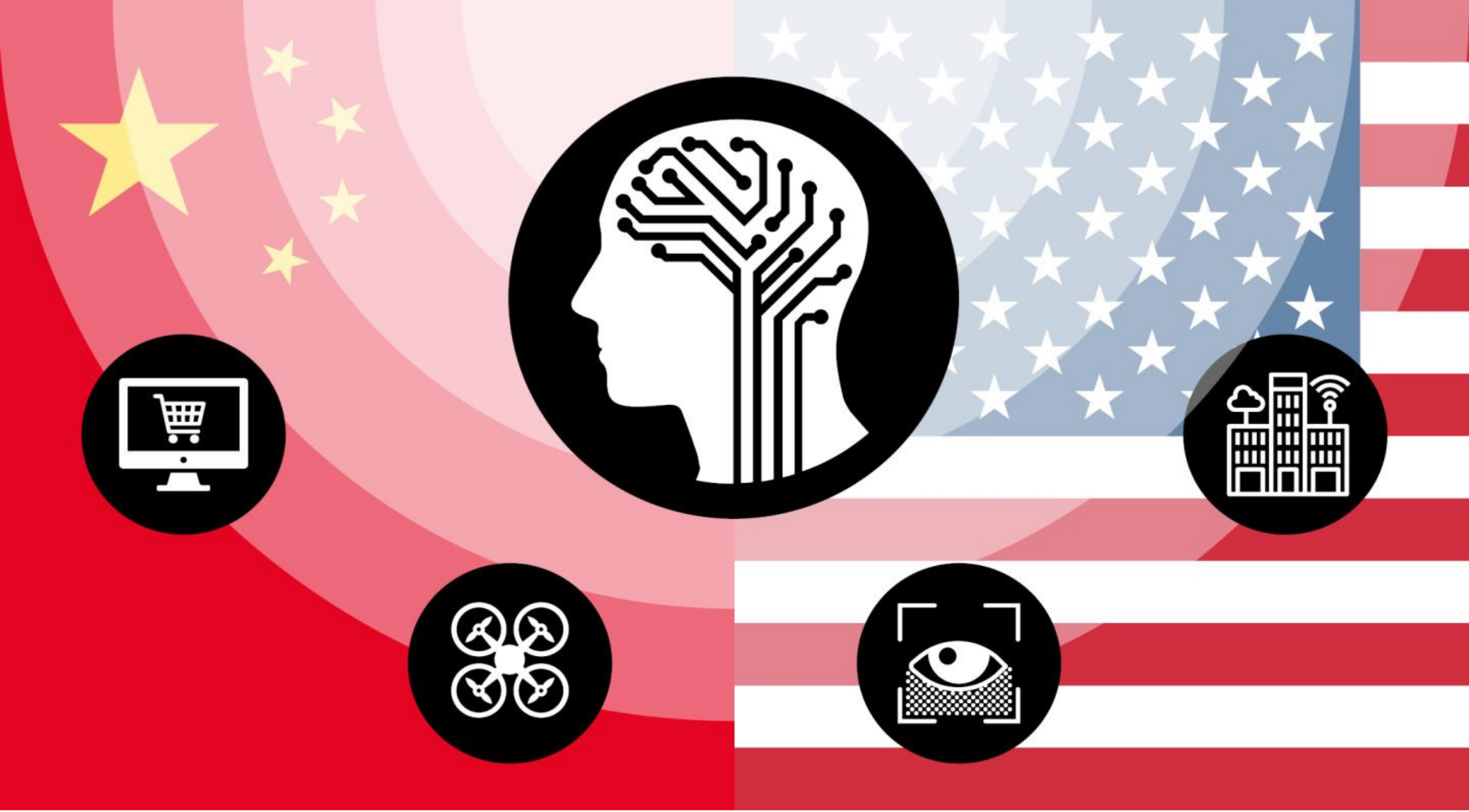
- Brazil, outside country to sign OECD Principles, introduced its strategy in 2019: Emphasis on qualified digital future; workforce; research, development, innovation, and entrepreneurship; government application of AI; use in productive sectors and safety.
- China (national Level) is calling for ethical guidelines in AI—government official attended the Alan Turing Conference in Chengdu, Sichuan, China in May 2019, to announce a new AI park, Tianfu New Area, for industry and society.
- Leading AI African countries of Ghana, Nigeria,, Kenya, and South Africa –integration with STEM education rather than government agencies.

Artificial Intelligence at the Sub-national Level

- California Consumer Privacy Act of 2018 (CCPA)
- AI for smart cities: Shanghai; Chengdu; Kansas City; San Francisco; Montreal; Columbus, OH
- Special projects: Montreal, Samuel De Champlain Bridge
- Kansas City: algorithm to help predict pothole formation in the streets
- AI for city-states: Singapore, Dubai ("AI city-state of the future")

Global Competition, Technological Arms Race, or Unspoken Collaboration…What's in a Name? Or, "A Picture is Worth a Thousand Words."





AI, Data, with a Focus on Algorithms

- A set of instructions to perform a task –inputs and outputs
- Embedded in the cognitive intelligence of computers today with access to massive datasets
- Process making predictions about our lives
- Machine learning algorithms—Set of repetitive instructions that has the ability to make major decisions based on the repetitive instructions without transparency
- A media focus enhanced

The New Jim Crow/Jim Code

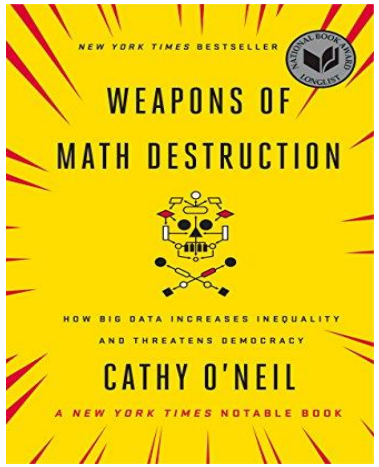
- What happens after collecting data? How are algorithms used? Who is involved on the front end?

- "Algorithmic Jim Crow," Margaret Hu, 86 Fordham Law Review, 2017. Available at https://ir.lawnet.fordham.edu/flr/vol86/iss2/13/ --"equal but separate discrimination" Allows for "vetting and screening of all citizens and non-citizens on the front end" and it seems equal and fair but there is the risk of individuals will be at risk of disparate treatment on the basis of suspicious algorithmic results and anomalous data."

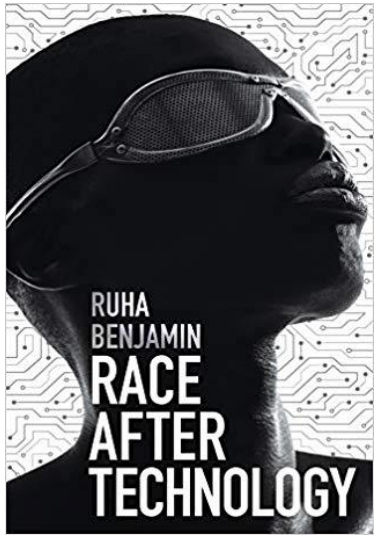
Jim Crow Laws

- Jim Crow laws-- state and local laws in the United States that enforced racial segregation in the South.
- The laws were enacted in the late 19th and early 20th centuries by white Democratic-dominated state legislatures after the Reconstruction period.
- Laws allowed for separate but equal treatment
- The laws ended about 1965

- Photos: Wikimedia Commons and Levine Museum of the New South

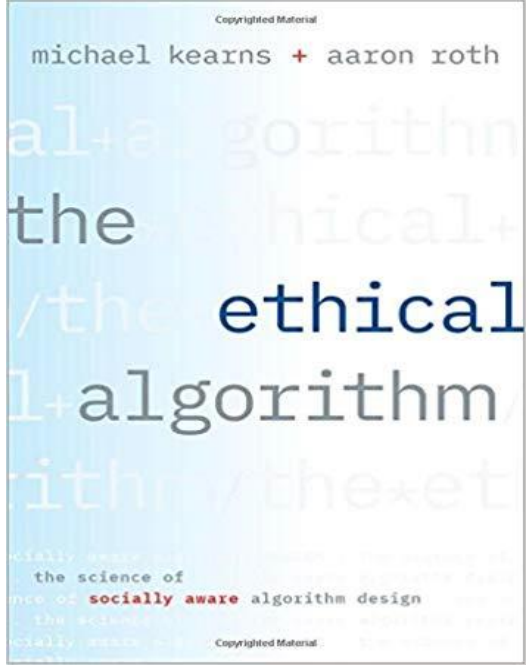


"The New Jim Code"



- Cathy O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. Race after Technology: Abolitionist Tools for the New Jim Code*, 2016.

- Ruha Benjamin, *Race after Technology: Abolitionist Tools for the New Jim Code*, 2019.



Ethical Algorithms

- Michael Kearns and Aaron Roth, *The Ethical Algorithm: The Science of Socially Aware Algorithm Design,* Oxford University Press: NY, NY, 2020.

- "Algorithms have made our lives more efficient, more entertaining, and, sometimes, better informed. At the same time, complex algorithms are increasingly violating the basic rights of individual citizens. Allegedly anonymized datasets routinely leak our most sensitive personal information; statistical models for everything from mortgages to college admissions reflect racial and gender bias."

Algorithm Bias Hits the News

Dr. Ziad Obermeyer, acting associate professor of health policy and management at UC Berkeley and lead author of the paper stated:

"The algorithms encode racial bias by using healthcare costs to determine patient 'risk,' or who was mostly likely to benefit from care management programs.“

"Because of the structural inequalities in our healthcare system, blacks at a given level of health end up generating lower costs than whites," Obermeyer says. "As a result, black patients were much sicker at a given level of the algorithm's predicted risk."

Algorithmic Bias and Implicit Bias Meet the Media…

- **“Racial bias in a medical algorithm favors white patients over sicker black patients**,” Washington Post, October 24, 2019
- “**Millions of black people affected by racial bias in health-care algorithms**,” Nature, October 26, 2019
- “**Bias in a common health care algorithm disproportionately hurts black patients**,” Science News, October 24, 2019
- “**When computers make biased health decisions, black patients pay the price, study says**,” Los Angeles Times, October 24, 2019.
- “**Researchers Find Racial Bias in Hospital Algorithm,**” Wall Street Journal, October 25, 2019.

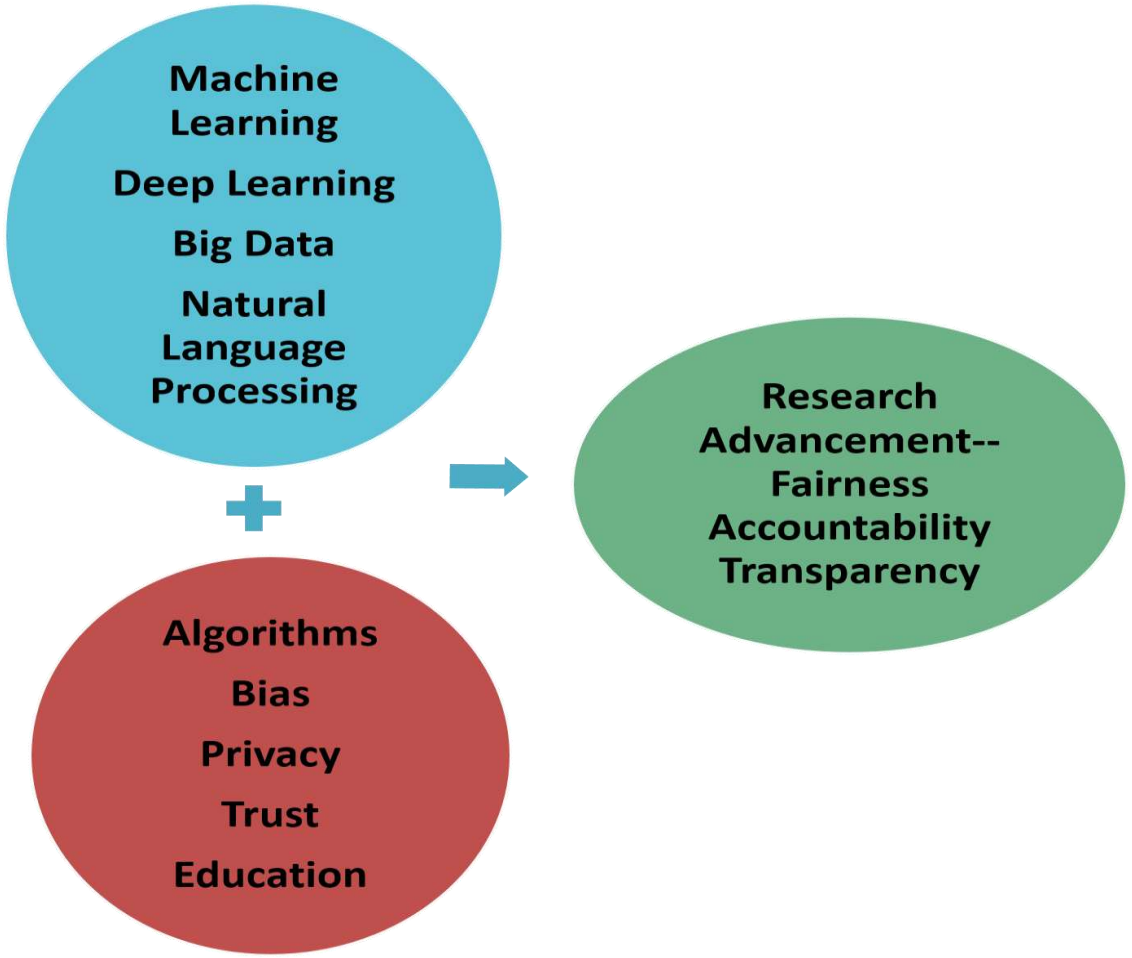
And Politics

- **“Senators Want to Know How FTC, CMS Will Prevent Bias in Health Care Algorithms,”** NextGov, December 4, 2019
- **“Sens. Wyden, Booker urge agencies and companies to address algorithm bias in health care,”** Portland Business Journal, December 3, 2019
- Growing number of legislative bills on Artificial Intelligence

Algorithmic Bias—Mitigating Factors to Consider

- Open the proprietary black box of software
- Theoretical approach
- Interdisciplinary approach up front and not an add-on
- Quantitative and qualitative data (Ethnography, oral histories)
- University centers, institutes, and research team that are representative
- Lack of diversity among diverse technical elite (Duke University's Artificial Intelligence Bias in an Age of a Technical Elite –2019-2020)
- Address ethical strain and implementation tension—for example in healthcare domain in medical circles among cultures--Designers vs. Care Team --Eric Topol, *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again, 2019)*

Necessary Developments for Advancement



Algorithmic Bias—Mitigating Factors to Consider II

- Algorithmic Impact Assessments (AIA--NY)
  - Provide the public with information about the systems that use predictive power in deciding their lives
  - Open review and audit systems to external researchers
  - Work with public agencies in skills to assess fairness, disparate impact, and due process
  - Allow public engagement with the AIA throughout the process
- S.1558 - Artificial Intelligence Initiative Act
- S.1558 — 116th Congress (2019-2020)
- Introduced in Senate (05/21/2019)
- Executive Order on Maintaining American Leadership in Artificial Intelligence, February 11, 2019

Overlapping Resources on AI and Data and Mitigating Factors to Consider

- Privacy Law Scholars Conference
- Future of Privacy Forum
- AI Now
- Data & Society
- ACM Fairness, Accountability, and Transparency (FAT*)
- ACM Computer Education (May 2019)
- Interdisciplinary Societies/Organizations
- Black in AI
- LatinX in AI
- Women in Data
- Government, Industry, Non-profits, Education—with transparency--all hands on deck!

Questions & Discussion

- Thank you!