

Fusion Panel

Benefits and Challenges of Using Artificial
Intelligence (AI) Technologies Throughout the
Phases of the Decision Cycle
Canadian Perspective

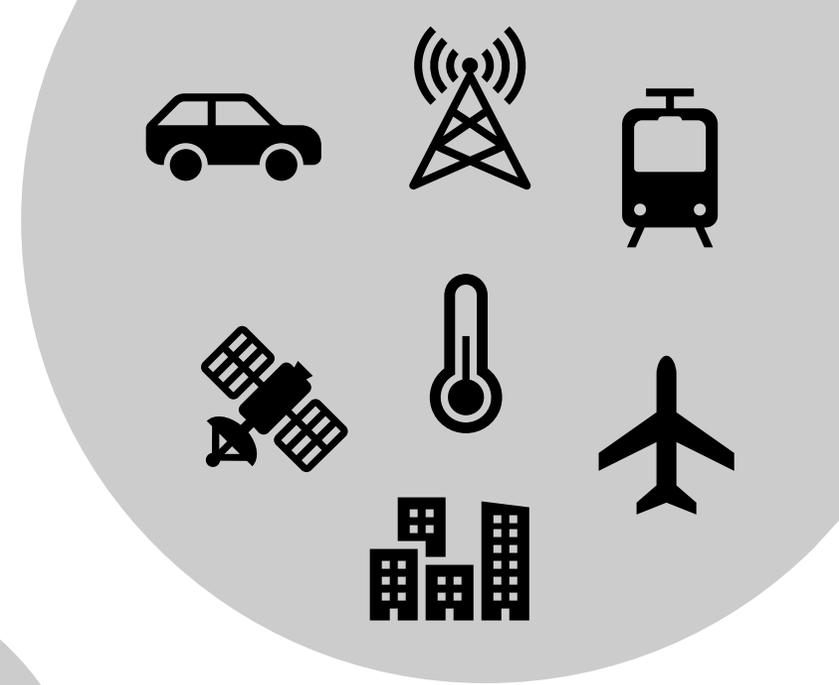
Kelly Lyons

July 5, 2019

Ottawa, Ontario

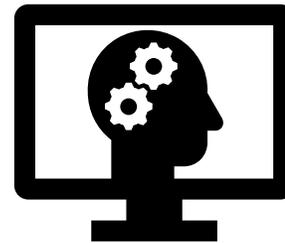
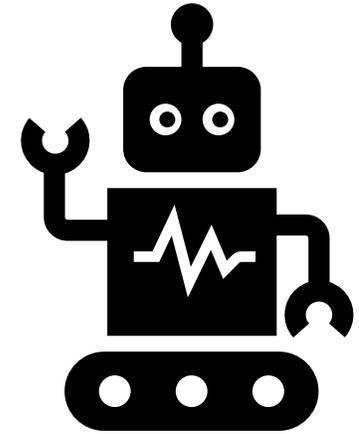
Data Science

- Interdisciplinary approach to making sense out of data



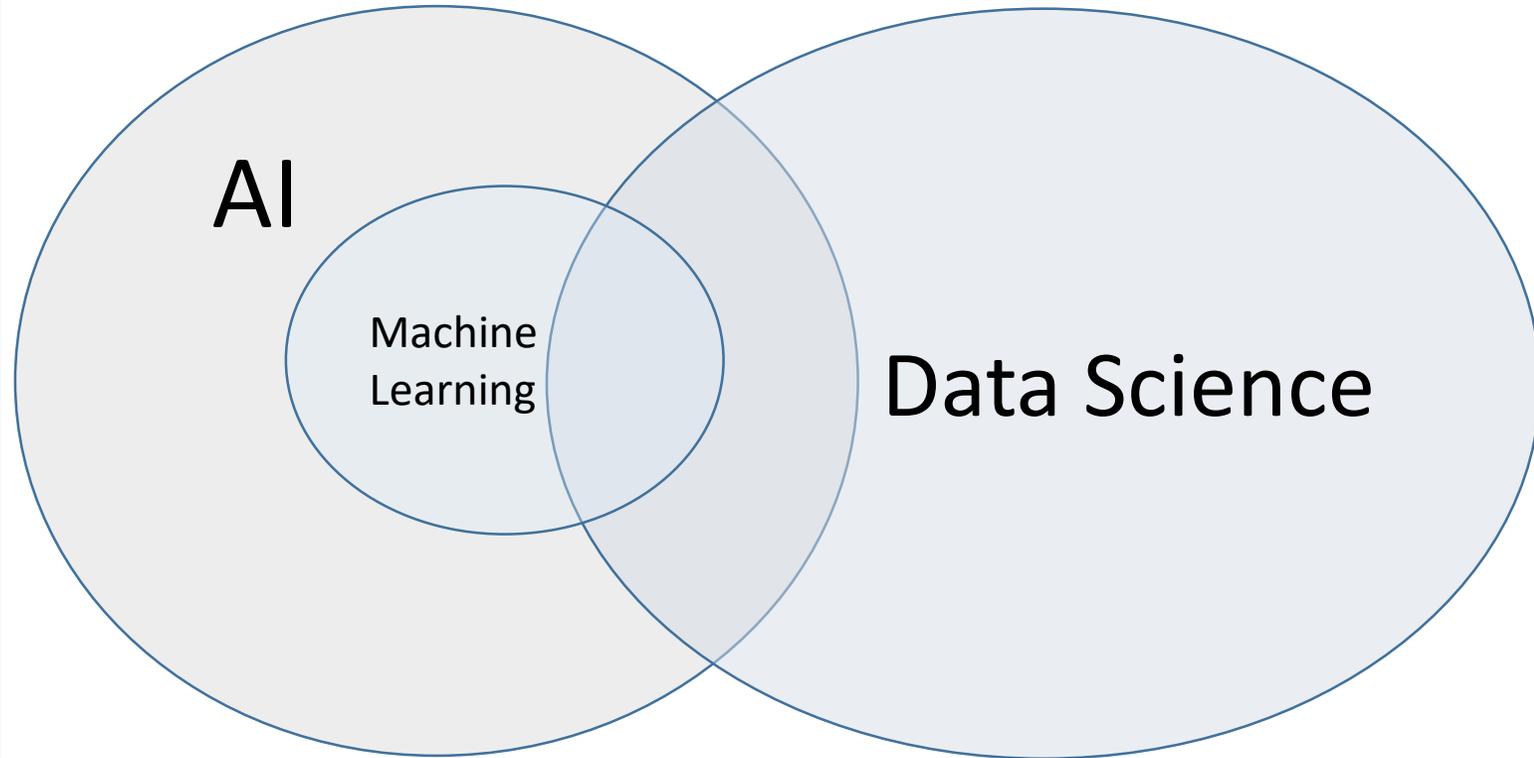
Artificial Intelligence

- Machines with human capabilities
 - Analyzing text, speaking, translating
 - Identifying sounds and sights
 - Making decisions
 - Executing transactions
 - Engaging in social activities
 - Driving cars, flying planes
 - etc.



Machine Learning

- Statistical method for data analysis based on learning from data
- Branch of AI or an enabling technology for AI
- An approach used to make sense out of data



“Data is the New Oil”



<https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>

Clive Humby, UK Mathematician, architect of Tesco’s Clubcard, 2006: “**Data is the new oil**. It’s valuable, but if unrefined it cannot be used.”

Virginia Rometty, IBM CEO, 2013: “... think about **data as the next natural resource**.”

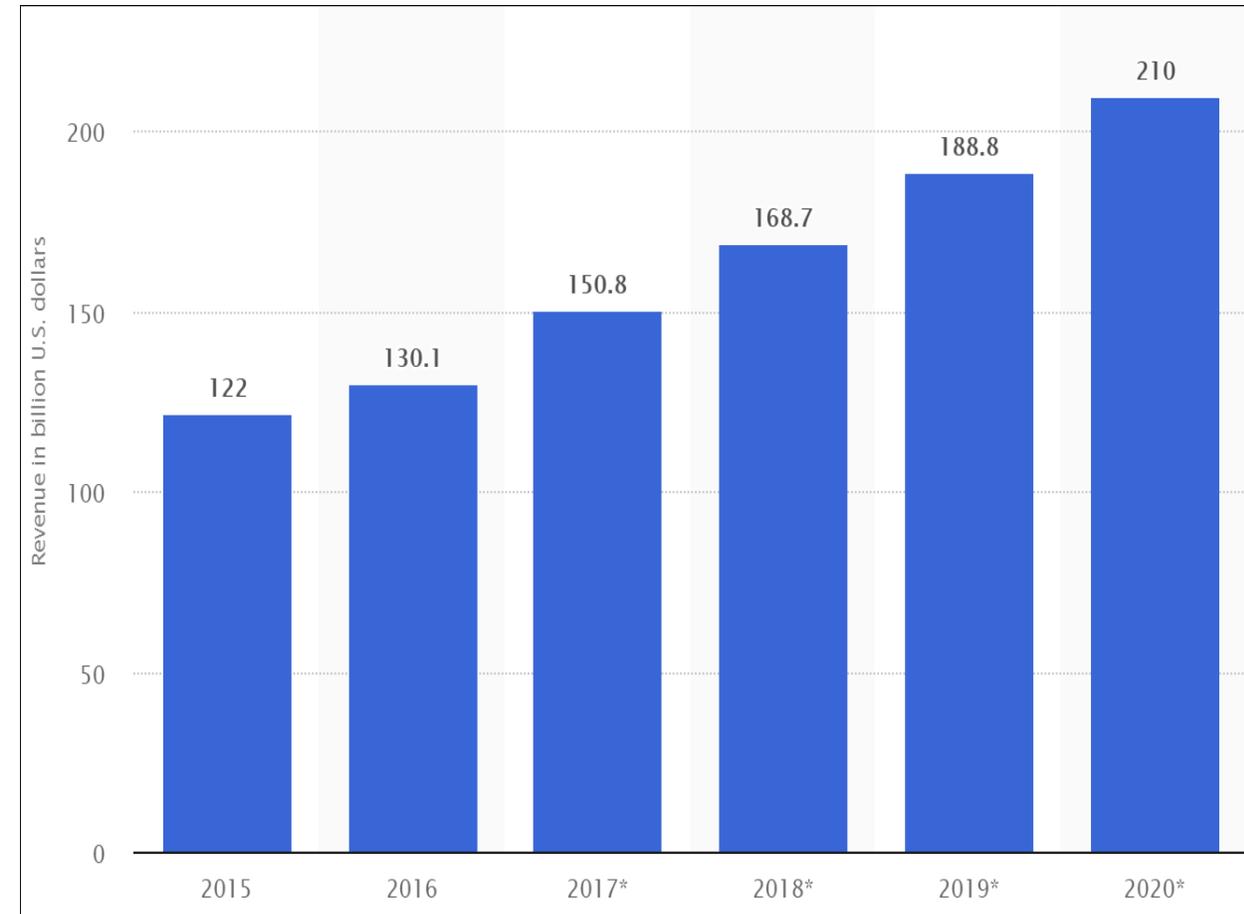
Joe Kaeser, Siemens CEO, 2018: “**Data is the oil, some say the gold**, of the 21st century — the raw material that our economies, societies and democracies are increasingly being built on.”

Lisa Austin, Law Professor, University of Toronto, 2018: “**This is a 20th-century approach to 21st-century topics**. A better framing recognizes that data is not a natural resource but a new informational dimension to individual and community life.”

Data Science Opportunities

- Companies' data asset volume grows an average 40% per year (MIT, 2017)
- AI could contribute up to \$15.7T to the global economy in 2030 (PwC, 2017)
- AI is creating new industries and lowering barriers to participation and access (G7, 2018)

Revenue from big data and business analytics worldwide from 2015 to 2020



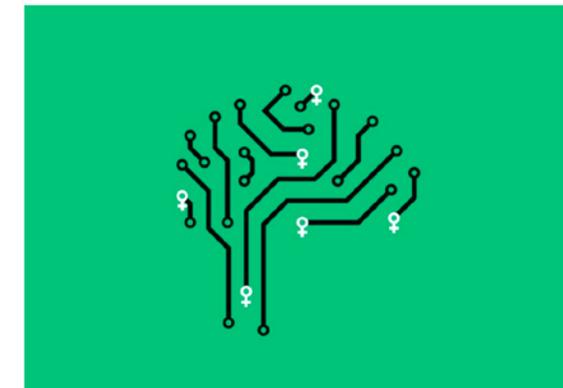
(Statistica, 2018)

Increasing Concerns



- Inclusion and equity of access
- Ownership, quality, security, resilience of data
- Ethical uses of technology
- Transparency, openness, and interoperability
- Privacy regulations and standards
- Digital / data divide, wage gaps
- Diversity in contributors to innovation

AI IS THE FUTURE—BUT WHERE
ARE THE WOMEN?



G7 Academies of Science, 2018

Wired, 2018

Challenges and Barriers



- Only 48% of large Canadian firms are **adopting big data** compared to 76% in world (Canada's Innovation Agenda, 2016)
- Canadian firms are **not prepared for disruption** (Deloitte, 2015)
- 75-375 million people globally may need to **switch job categories and learn new skills** by 2030 (McKinsey, 2017)
- 42% of Canadian labour at **high risk of being affected by automation** (Brookfield Institute, 2016)
- Canada's data and analytical literacy **talent gap** estimated at up to 150,000 professionals (The Big Data Consortium, 2015)

Strengths and Opportunities



- Canada is a **recognized leader in deep learning and machine learning**
- **Third largest number of AI experts in the world** (Element AI, 2018)
- Significant **investments** in AI research institutes and industry-led Innovation Superclusters

Canadian Industry Challenges

Increasing amounts of data and challenges in exploiting its value

- generating data **increases two hundred percent** annually
- companies **do not have the people and resources** to know where to begin
- a critical issue is **data integration and sharing**

Lack of skills, talent and cross-sectoral expertise

- need **collaboration among statisticians, and computer scientists and sector or domain experts** to understand and solve the issues faced by industry
- need **to attract top talent otherwise so industries can grow** or Canada will lose out on the significant opportunities

Need for collaboration opportunities now

- there is a need to **expand sector-specific research collaborations to areas of data science and machine learning** to harness value from large datasets and complex issues
- **intense business competition** means there is little time to take advantage of these technologies

Research and Collaboration Opportunities



Accelerate data-science adoption by:

Creating reference architectures and reusable software implementations
Developing accountable and ethical technologies
Innovating within and across sectors



Foster the systematic digitization of operational and decision-making processes by:

Digitizing and systematizing future data acquisition and analysis
Developing and adopting best practices
Mining historical structured and unstructured data



Lower the cost of data-science adoption for organizations of all sizes by:

Making data and services developed through research discoverable, shareable, and reusable



Deliver methods and tools that support decision-making by:

Exploring alternatives based on simulations of data-driven models
Developing classifiers that categorize scenarios and enable the reuse of knowledge and experience associated with these categories



Build capacity focused on diversity and equity by:

Studying the process of translating results across sectors
Understanding innovation processes, effects of disruption, job-transition needs

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