

From algorithms to empowerment: teaching algorithmic literacy (AL) in university libraries

Presented by:

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“I wish to acknowledge the land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.”



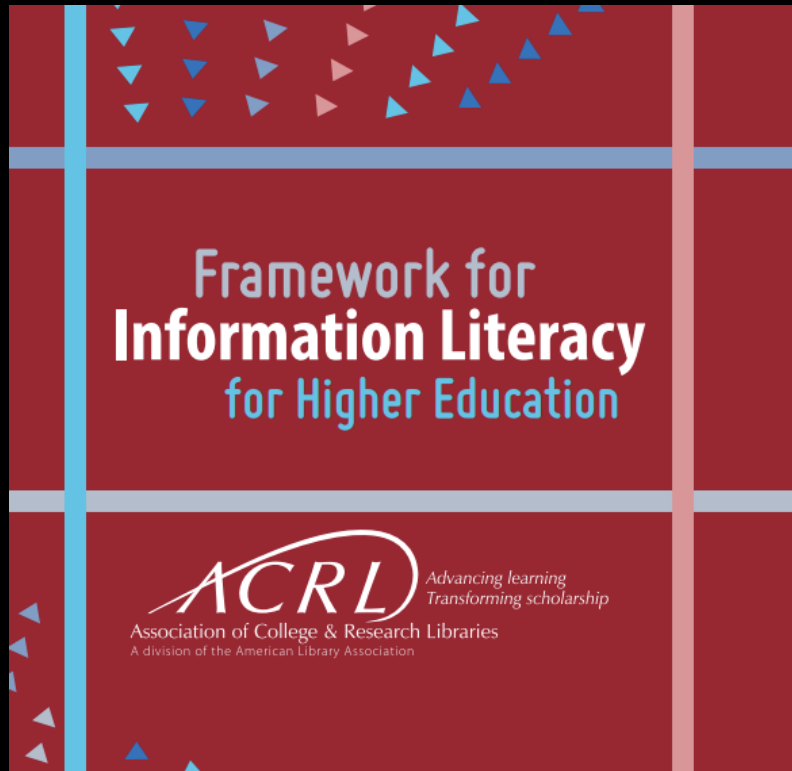
- 12,500 undergraduate students; 900 graduate students
- Programs in core sciences, as well as communication, sociology, psychology, etc.
- Library has excellent information literacy program

Overview

1. Information literacy (IL) > Digital literacy (DL) > Algorithmic literacy (AL)
2. The place of AL in university libraries
3. Pedagogical tools to teach AL
4. Co-learning and co-using algorithms

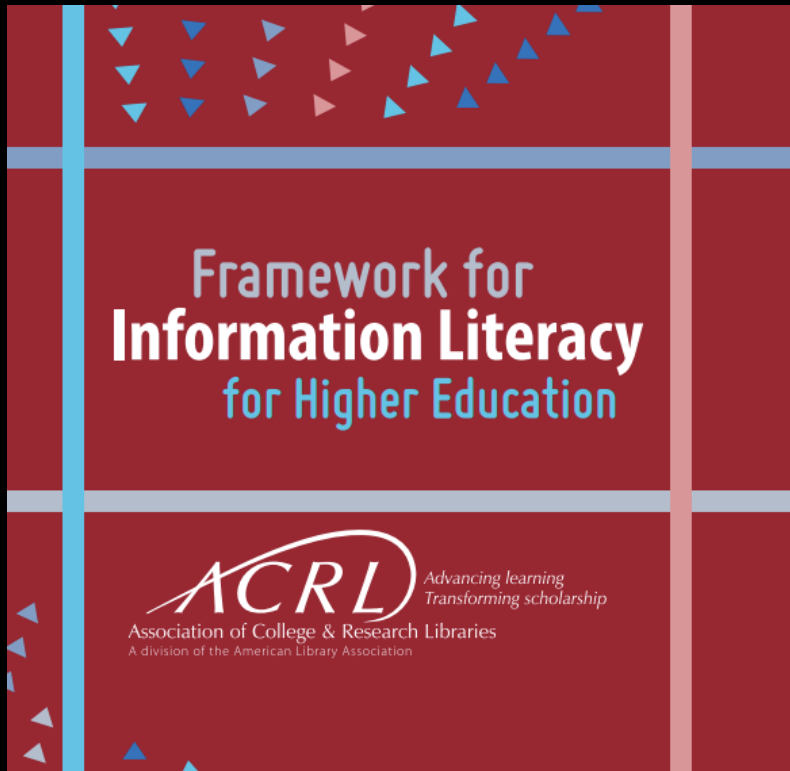
1. Digital and algorithmic literacies

Breaking the framework down



- Critical thinking
- Ethical use of information
- Ability to navigate complex information environments

Breaking the framework down



- Critical thinking
- Ethical use of information
- Ability to navigate complex information environments
- Information literacy > digital literacy

"Framework for Information Literacy for Higher Education." American Library Association - ACRL, 2016.
<https://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/infolit/framework1.pdf>.

Some current digital literacy schemes

Projects

British Library Labs



British Library Labs supports and inspires the use of the British Library's digital collections and data in exciting and innovative ways, through competitions, events and collaborative projects for its staff and the public.

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Library
UNIVERSITY OF TORONTO
MISSISSAUGA

Li Koon Chun Finance

University of Toronto Mississauga Finance Learning Centre / FLC Events Calendar / Li Koon Chun Finance Learning Centre (FLC) Events Calendar

Introduction to Artificial Intelligence/Machine Learning

Introduction to Artificial Intelligence/Machine Learning

In-Person



Machine learning (ML) is a technology grown out of the AI field. ML algorithms are computer programs that are able to “learn” how to complete tasks, improving their performance over time with experience. In this workshop, we'll introduce machine learning, and will cover supervised and unsupervised learning using the JupyterHub platform.

Date:

Wednesday, April 26, 2023

Time:

2:00pm - 5:00pm

Time Zone:

Eastern Time - US & Canada [\(change\)](#)

Location:

FLC, L1245, Lower Level, Innovation Complex

Registration is required. There are 31 seats available.


Begin Registration

[Browse/Search for more events](#)

MCMASTER UNIVERSITY LIBRARY






LibCal

LibCal / Sherman Centre for Digital Scholarship Events



Sensitive Data Management

Online



Are you working with environmental, commercial, health, personal, or other sensitive data? Are you unsure whether your data is sensitive and unclear on your responsibilities for managing it?

In this workshop, we will discuss the foundations of working with sensitive data including how to protect your data, your research participants, and yourself. We'll take about how and when to de-identify sensitive data, and how to share sensitive data.

Details: This workshop is virtual and will be recorded. The recording will be posted to the Sherman Centre's [Online Learning Catalogue](#).

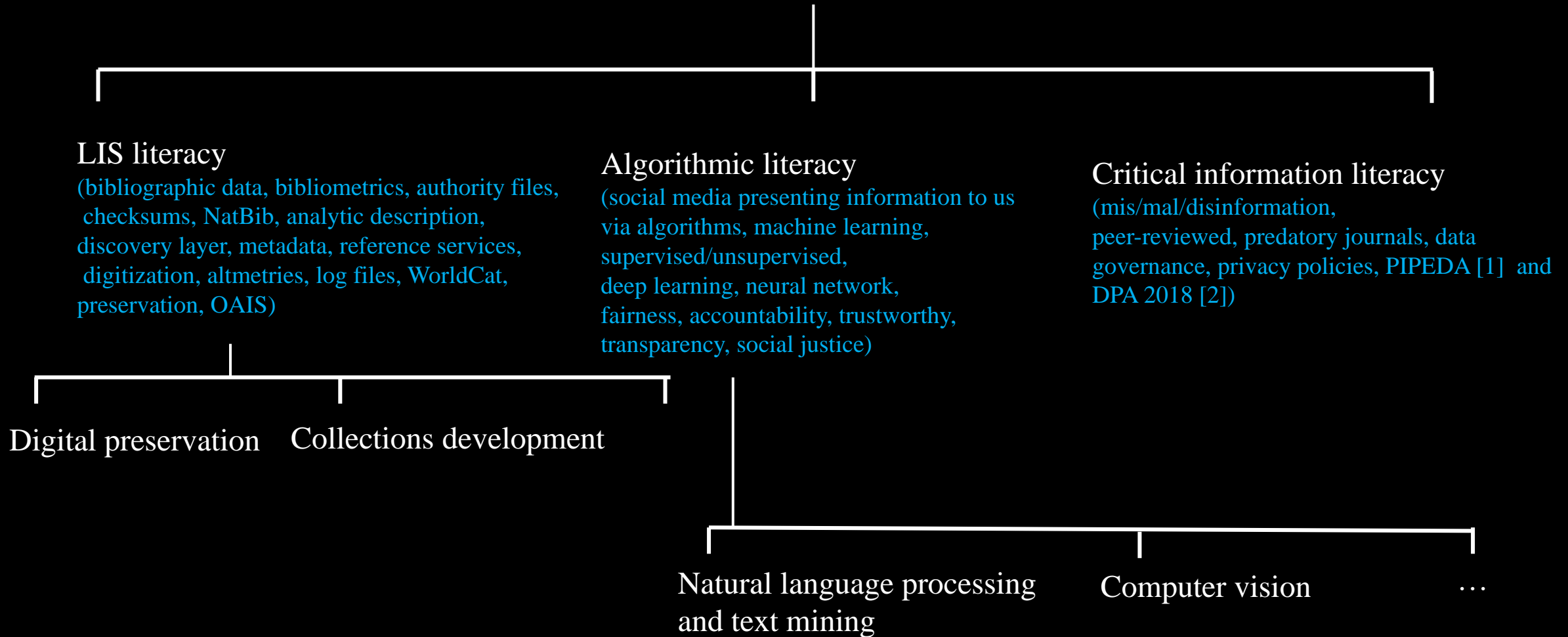
Facilitator Bio: Isaac Pratt (he/him) is McMaster's Research Data Management Specialist. A research scientist by training, he has a PhD in Anatomy & Cell Biology. He leverages nearly a decade of interdisciplinary research experience to help support students, staff, and faculty. His expertise lies in questions surrounding data storage, security, planning, archival, and sharing. Isaac also provides support and curation services for McMaster Dataverse. His other interests include reproducible research methods, open science, and data science. Email Isaac at pratti@mcmaster.ca.

“BL Labs.” British Library Labs. Accessed March 27, 2024. <https://labs.biblios.tech/>.

“Li Koon Chun Finance Learning Centre Events Calendar.” Workshops | University of Toronto Mississauga Library. Accessed March 27, 2024. <https://utm.library.utoronto.ca/flc/workshops>.

“Sensitive Data Management.” McMaster University Library LibCal. Accessed March 27, 2024. <https://libcal.mcmaster.ca/event/3738755>.

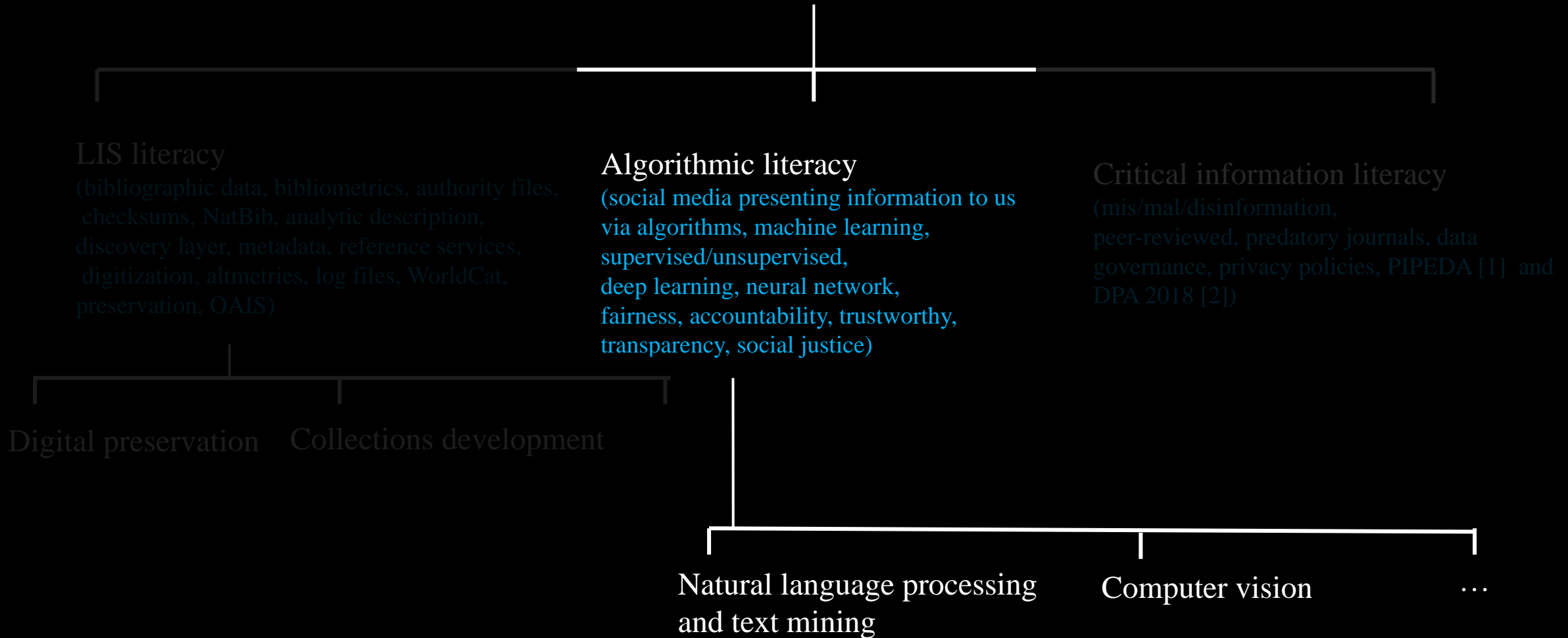
Digital literacies



[1] Canadian Personal Information Protection and Electronic Documents Act

[2] UK Data Protection Act 2018

Digital literacies





<https://tinyurl.com/algoliteracy>

“Question 1: What specific skills do you identify as something students need to have, under the branch of algorithmic literacy?”

Why and what algorithmic literacy?

- “the danger is not so much in delegating cognitive tasks, but in [...] not knowing about the nature and precise mechanisms of that delegation.” [1]
- A population that is well-informed and algorithmically literate is better equipped to understand and *use* the complexity of AI.
- It is as fundamental as reading, writing, and arithmetic.
- Algorithms are “socio-technical systems” implemented by institutions, people, intersecting contexts, and cultural life
- ∴ a recognized problem and need -> a pedagogical strategy -> unique contribution libraries can provide.

[1] de Mul, Jos & van den Berg, Bibi (2011). Remote control : human autonomy in the age of computer-mediated agency. In Mireille Hildebrandt & Antoinette Rouvroy (eds.), Law, human agency, and autonomic computing: the philosophy of law meets the philosophy of technology. New York, NY: Routledge.

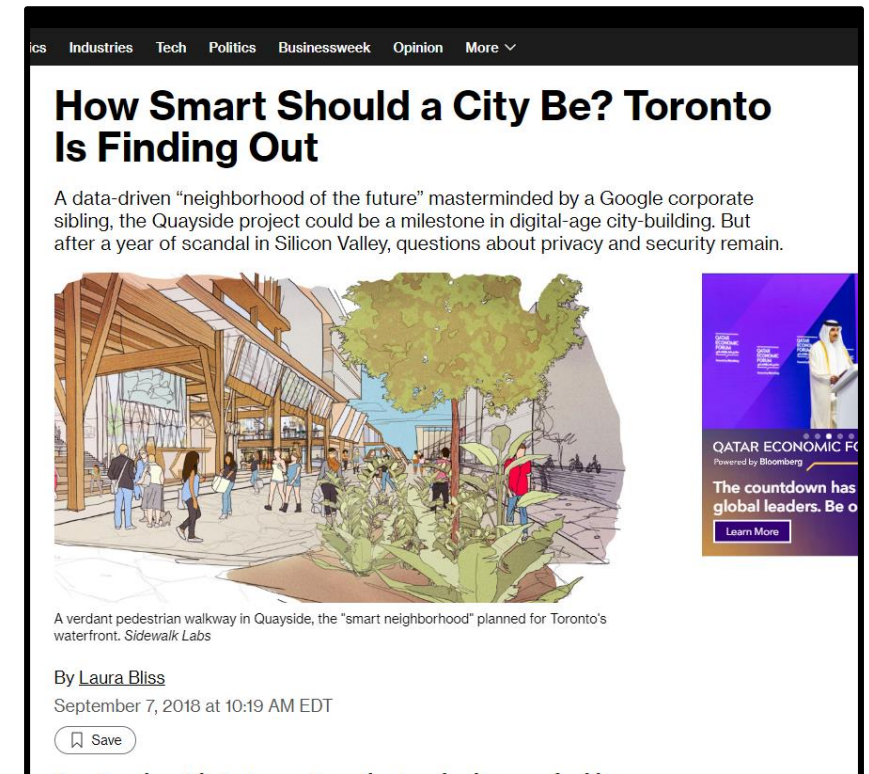
2. But why the library?

Central dogmas of algorithmic literacy.

- Recognise and evaluate the workings of algorithms
- Recognise and evaluate their application in systems
- Create and use algorithmic methods and tools to solve issues across a range of fields.
- Analyse how algorithms affect social, cultural, economic, and political environments.
- Position the individual as an active actor in algorithmic decision-making.

Why? Both in research and in practice

- Algorithms in predictive policing
- Facebook's news feed algorithm
- Amazon's hiring algorithm
- Automated grading of exams (#ibscandal) [1]
- Biased word embeddings in language models (gender, disability, etc.) [2] [3]
- Toronto's Sidewalk Labs plan for a data-driven neighbourhood: surveillance, data privacy, and data collection



[1] Fitzgerald, S. (2022). Covid-19 and the International Baccalaureate: a computer-assisted discourse analysis of the #ibscandal. <https://doi.org/10.1080/00071005.2022.2056575>, 71(2), 129–148. <https://doi.org/10.1080/00071005.2022.2056575>

[2] Bolukbasi, T., Chang, K. W., Zou, J., Saligrama, V., & Kalai, A. (2016). Man is to Computer Programmer as Woman is to Homemaker? Debiasing Word Embeddings. *Advances in Neural Information Processing Systems*, 4356–4364. <https://arxiv.org/abs/1607.06520v1>

[3] Hutchinson, B., Prabhakaran, V., Denton, E., Webster, K., Zhong, Y., & Denuyl Google, S. (2020). Social Biases in NLP Models as Barriers for Persons with Disabilities. *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, 5491–5501. <https://aclanthology.org/2020.acl-main.487.pdf>

Why (cont.)? Funding shows the future.

- Horizon Europe and Digital Europe programmes will invest 1 billion Euro/year in AI futures of Europe, including building trustworthy AIs. [1]
- The UK government released a white policy paper in March 2023 to implement a pro-innovation approach to AI regulation. It recognizes that UK's AI industry contributed £3.7 billion to the economy in 2022. [2]
- Canadian government released the Pan-Canadian Artificial Intelligence Strategy, phase 2, in 2021 – 2022, with an investment of \$443 million for that fiscal year to mobilize AI research within Canada. [3]

[1] “Coordinated Plan on Artificial Intelligence.” Shaping Europe’s digital future. Accessed April 4, 2024. <https://digital-strategy.ec.europa.eu/en/policies/plan-ai>.

[2] “A Pro-Innovation Approach to AI Regulation.” GOV.UK. Accessed April 4, 2024. <https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper>.

[3] *Government of Canada launches second phase of the Pan-Canadian Artificial Intelligence Strategy - Canada.ca.* (2022). <https://www.canada.ca/en/innovation-science-economic-development/news/2022/06/government-of-canada-launches-second-phase-of-the-pan-canadian-artificial-intelligence-strategy.html>

The *university* library: think about your academic mission.

1. Support for academic research: Academic libraries are uniquely positioned to promote ethical considerations in algorithmic decision-making.
2. Preparation for future careers: in industry.
3. Speaking of ties to industry, research grants that run parallel to industry work.
4. Integration with academic curriculum.
5. Development of critical thinking skills



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“Question 2: Tell me about your academic library’s mission, staffing, and goals for teaching algorithmic literacy.
How will you engage with faculty? How will AL be integrated into their courses?”

3. Practical pedagogy

Practical pedagogical methods and tools

Small-to-medium scale	Large scale, long-term approaches
Interactive one-off workshops – e.g. text and data mining UKSG 2023 breakout session from U. Birmingham, 'A TDM journey'	Provide access to tools and resources (e.g. datasets) ProQuest TDM Studio , JSTOR Constellate , Gale Digital Scholar Lab , Canada Open Data and APIs
Collaborative projects algorithmicliteracy.org has useful resources on how to teach AL to young adults through projects	Host events and discussions (colloquiums, expert talks) Digital humanities lighting talks , digital humanities praxis workshops
Hackathons Ethics4NextGen AI Hackathon , Helsinki Digital Humanities hackathon (has distinct inclusive goal of teaching algorithmic skills even to non-technical participants)	Financial support for undergraduate skill development – library collaborates with other departments and university initiatives Digital humanities skills development funds for undergraduates
Embedding required concepts in courses/modules	Advocate for data protection and privacy practices Not just on social media, but in the research data students create during their studies, e.g. institutional research repositories and intellectual licenses
Scaffolding (e.g. certificate) workshops Allows you to target a wider base of students and bring them into the library	Asynchronous/reusable online learning resources to use those tools and resources Map and Data Library at University of Toronto hosts: Using JSTOR Constellate, Managing your data using version control in GitHub. University of Toronto's SciNet hosts: writing bash scripts, intro to neural network programming McMaster University's Sherman Centre for Digital Scholarship hosts: Computational text analyses bootcamp, scraping Twitter tweets using your own algorithm

Practical topics

- Sensitive data management
- Preserving digital scholarship projects in algorithmically fair ways
- Creating data management plans for your software and code (algorithms)
- Recognizing how academic databases present information to you
- Using social media ethically and/or being an ethical influencer on social media
- How to balance your digital news consumption and be aware of algorithms around information consumption e.g. tools like AllSides Media Bias Chart (<https://www.allsides.com/media-bias/media-bias-chart>), PolitiFact, FactCheck.org, BBC Verify, MediaBias ratings.

Use humour.



Use ethics.

Philosophical: the essence of being human

The power of conceptualization is the greatest human superpower.

1. Highest concepts:: the good, the beautiful, the true
2. Wisdom: knowing what is truly good
3. Prudence: knowing how to implement the good
4. Right desire: willing to implement the good

Humans are also *social* animals

Will the good of the other for the sake of the other = peak human capacity

Three levels of AI-induced moral damage

1. Vicious cycle (“self confirming equilibrium”)
2. Subconscious manipulation (“nudging”)
3. Coercion (“social credit scoring”)

Teaching resources to take home now.

[Lesson plan: Introduction to AI for the GLAM \(Galleries, Libraries, Archives, and Museums\) Sector](#)

[UK: OFCOM Research Working Group on Media Literacy](#) ← ---- → [Canada: Government of Canada's media literacy programs to combat online disinformation](#)

[Lesson plans for the digital humanities and creating your own algorithms: Programming Historian](#)

[CILIP ILG's call for algorithmic literacy and AI literacy programmes](#)

[What should digital literacy look like in an age of algorithms and AI?](#)

[Digital literacy, information literacy, democracy, and political science](#) *in* Informed Societies

[CILIP Report: The impact of AI, ML, automation and robotics on the information professions.](#)

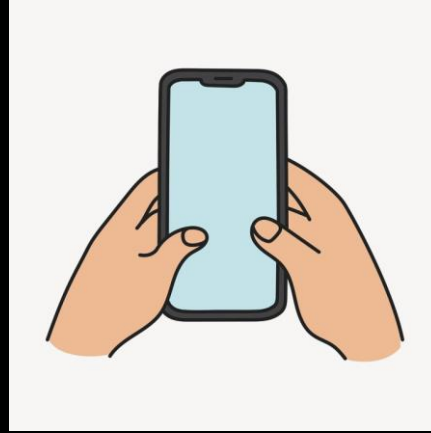
[Barbara Fister's report on IL in the age of algorithms](#)

4. Co-learning and co-using

Co-learning and co-using for librarians

Algorithmic challenges	Library expertise
“When we talk about AI, getting really clear about what we mean is step one” – Genevieve Bell	in-house data analytics and data science skills
“Formidable female tech critics – Jane Abbate, Lillian Edwards, Maria Farrel...” – John Naughton	generalist analytics positions
“It’s going to take people coming together driving for justice” – Joy Buolamwini	In house data analytics and data science skills
Uncleaned datasets with bias, error, and ‘dirty’ data. “Error-riddled datasets are warping our sense of how good AI really it.” – Karen Hao	Data and informatics specialists

Annemaree Llyod describes the opacity and ubiquity of algorithms as “a wicked problem for librarians and archivists who have a vested interest in **equitable access, informed citizenry, and the maintenance of public memory.**”



<https://tinyurl.com/algoliteracy>

“Question 3: How has your library embraced co-learning to enhance algorithmic literacy among staff, considering the unique challenges and opportunities within your specific library context? What resources have you used?”

Thank you. Questions?

Contact me at: christinadinh.nguyen@utoronto.ca

Slides and notes shared here: <https://github.com/TorontoYYZ/uksg2024>

P.S., thank you, UKSG, for sponsoring my place in 2023!