International Federation of
Library Associations and Institutions

IFLA Statement on Libraries and Artificial Intelligence

The adoption of Artificial Intelligence (hereafter "AI") and machine learning in private and public spheres is rapidly growing. This policy statement aims to outline key considerations for the use of these technologies in the library sector and suggest the roles which libraries should strive to take on in a society with growing AI integration.

AI technologies can have deeply transformative capabilities, and their power can be put to the service of public welfare and innovation. With necessary preparations – and regard for ethical concerns and current limitations – libraries can responsibly use AI technologies to advance their social mission.

AI in the Library: integrating AI and machine learning technologies into everyday work.

As AI technology develops, several AI and machine learning (ML) applications may be able to introduce new services and functions to libraries. For example, AI and ML technologies could allow libraries to improve optical character recognition of texts, or make new uses of their machine-readable library collections (e.g. categorisation or discovery) – whether for libraries themselves, patrons, or researchers.

Similarly, AI and ML could have the potential to add new dimensions and approaches to knowledge management processes in libraries – particularly knowledge organisation, storage and integration. AI may be able to offer new dimensions to service provision when coupled with robotics. While there are cases where AI might be used to automate some of the existing library services (in such AI applications as chatbots or search and discovery tools), care should be taken to prevent negative impacts on quality of service and staffing (as described in Annexure i).

Libraries and library associations can, for example, interact with AI researchers and developers to create applications specifically for library use and/or in response to user needs, including by creating accessible services which have not been possible before.

The use of AI technologies in libraries should be subject to clear ethical standards, such as those spelled out in the IFLA Code of Ethics for Librarians and other Information Workers. For instance, AI applications which rely on extensive data collection – such as behaviour analytics software for performance evaluation - must not override patron privacy choices or equity considerations (further detailed in Annexure i)

Libraries can educate users about AI, and help them thrive in a society which uses AI more extensively.

A growing number of initiatives from governments and civil society organisations aim to educate the public at large about AI and the social implications of its use. Libraries

are a trusted and credible source of knowledge, and they can help extend these efforts to their communities.

Today, many libraries work to help their patrons develop digital literacy competencies – the abilities to make meaningful use of technology, from basic IT skills to creative abilities - safely, ethically and legally. These efforts can be expanded to promote algorithmic literacy – the understanding of how algorithms and other digital processes impact the way users access and receive information.

Public libraries, for example, can be well-positioned to deliver such training to the wider public (Annexure ii), but this can require significant time and resource investment, as well as upskilling on the part of librarians. Librarians therefore need to be supported in these efforts – and they could also partner with other organisations or sectors to help deliver algorithmic and digital literacy education (further described in Annexure ii).

By helping their patrons understand AI, libraries could also enable them to participate in policy discussions on what it means for AI to be used "for good", and which use cases are ethical and desirable for the public.

More broadly, libraries could play a role in helping their users adapt to some of the possible changes in the labour market caused by AI. Lifelong learning is likely to play a vital role in helping people navigate changing skill demands or career transitions. The tools and services libraries offer can provide equitable lifelong learning opportunities, particularly for vulnerable or marginalised populations. For example, the free digital literacy and IT skills classes many libraries offer may become increasingly important as these skills affect employability more than ever before.

Libraries can support high-quality, ethical AI research.

Many current ethical and inclusivity concerns linked to AI research and applications stem from incomplete, incorrect or biased training data ('garbage in, garbage out'). Trained librarians can lend their expertise in data storage and licensing, data quality assessment, and safe and ethical information storage to help researchers address some of the concerns around data.

Libraries can also support ethical AI research and development by their procurement choices: purchasing AI technologies which abide by ethical standards of privacy and inclusivity. This would both reaffirm the trust of users in libraries, and send a message to the AI research field by increasing the demand for ethical AI technologies.

What do libraries need to adapt successfully?

The transformative nature of AI means that libraries need to be in a position to make use of the new resources as the technology landscape changes, adjusting their services as appropriate to meet changing societal needs.

To this end, librarians may benefit from a greater awareness of the technology landscape. Since AI can significantly reshape employment in the sector, they might also require training to adjust to the possible shifts in their workplace roles. Notably, libraries in different sectors could be affected differently – for example, government, legal and other special libraries could experience a greater emphasis on knowledge-based service delivery.

Libraries will need to have the laws, infrastructure and technologies necessary to be able to adopt and make use of AI. Text and Data Mining exceptions in copyright frameworks are crucial to allow libraries to continue carrying out their mission, and actively participate in AI communities.

Recommendations

Based on the above, IFLA makes the following recommendations to governments, libraries and library associations:

Governments (and intergovernmental organisations, where appropriate) should:

- Include Text and Data Mining exceptions in copyright frameworks
- Ensure that libraries or library networks have the required infrastructure and technologies to be able to adopt and make use of AI technologies.
- Ensure that any regulation of AI protects privacy or equity principles, while also enabling efforts that support innovation and public interest goals.
- Ensure that libraries are included in development and implementation of cross-sectoral AI programs and strategies.

Library associations and library training providers should:

- Support library professionals to understand the impact of AI as well as its intersections with privacy and ethical principles. Library training providers should ensure that librarians are able to develop relevant digital skills and competencies.
- Advocate for libraries to play a bigger role in changing education systems as they adapt to the labour market changes which AI might bring.
- Engage with AI researchers and developers to create applications for library use, which meet ethical and privacy standards and respond specifically to the needs of libraries and library patrons.
- Act as forums for exchanging best practices on ethical use of AI technologies in libraries.

Libraries should, where possible and appropriate:

- Help their patrons develop digital literacies that include an understanding of how AI and algorithms work, and corresponding privacy and ethics questions.
- Continue to focus their efforts to enable lifelong learning and, where possible, provide services for the unemployed.
- Ensure that any use of AI technologies in libraries should be subject to clear ethical standards and safeguard the rights of their users.
- Procure technologies that adhere to legal and ethical privacy and accessibility requirements.

Agreed by the IFLA Governing Board, 17 September 2020

Annexure i: Artificial Intelligence and Intellectual Freedom

At the heart of many discussions around Artificial Intelligence (AI) are questions about its impact on intellectual freedom. These can span multiple dimensions - freedom to form and hold opinions without interference, freedom of expression, access to information, as well as broader individual self-determination, agency and autonomy. A 2018 report by the UN Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression provides a good overview of the potential impacts of AI technologies on the information environment.[1]

Naturally, there are ways in which AI can promote access to information and intellectual freedom. The Special Rapporteur's report cites, for example, the ability of AI to facilitate "broader and quicker sharing of information and ideas", and AI-powered translation methods can help individuals access information in more languages.

Similarly, an IFLA Trend Report chapter on Artificial Intelligence states that the Semantic Web – closely associated with AI – can positively impact access to information by improving search efficiency (while noting the potential adverse implications for privacy and censorship) and discusses the potential of AI-enabled multilingual voice translation to removing language barriers and improving accessibility online.

Conversely, there are also emerging concerns about the potential negative effects of AI on the information environment. In light of libraries' commitment to promoting intellectual freedom,[2] taking stock of these concerns can allow them to reflect on the role our institutions can play in mitigating potential downsides of AI.

Personalisation

One of the key AI applications that can impact the information environment is personalisation of individual online experiences. This point is often raised in relation to search engines and social media platforms, since both act as gatekeepers to large amounts of online information today.[3] Based on personal and non-personal data, AI embedded in such platforms chooses, ranks and organises the information an individual is exposed to.

As such, personalised content curation could have an effect on an individual's ability to seek and receive information and form opinions freely. A 2019 study by UNESCO highlights two concepts which are at times evoked to describe the potential adverse effects of AI-powered content personalisation. *Filter bubbles* limit the scope of information a user is exposed to by delivering content tailored to their interests, based on user characteristics and past engagement. Meanwhile, *echo chamber* refers to a

[1] Report of the United Nations Special Rapporteur to the General Assembly on AI and its impact on freedom of opinion and expression, 2018, https://undocs.org/A/73/348.

[2] As detailed, for example, in the IFLA Statement on Libraries and Intellectual Freedom, https://www.ifla.org/publications/ifla-statement-on-libraries-and-intellectual-freedom.

[3] For example, the 2017 "Study on the Human Rights Dimensions of Automated Data Processing Techniques (in Particular Algorithms) and Possible Regulatory Implications" by the Council of Europe Committee of Experts on Internet Intermediaries points out a crucial role search engines play in shaping how an individual seeks, imparts and received information (https://rm.coe.int/algorithms-and-human-rights-en-rev/16807956b5). Similarly, reports by Access Now ("Human Rights in the Age of Artificial Intelligence," https://www.accessnow.org /cms/assets/ uploads/2018/11/AI-and-Human-Rights.pdf) discusses AI in the contexts of both search engines and social media platforms.

phenomenon where exposure to a similar or repeated information can reinforce and strengthens a users' views or beliefs.[4]

Algorithmic curation can also lead to some users missing – or being shielded from – important social and political information.[5] For instance, the Special Rapporteur's 2018 report points out that AI-based targeting can have discriminatory effects and exclude people from information or opportunities – such as job or housing advertisements that exclude people on the basis of age, gender or ethnic background.

A 2019 Declaration by the Council of Europe Committee of Ministers specifically raises concerns about the 'manipulative capabilities of algorithmic processes'. The declaration highlights, for example, concerns about micro-targeting and algorithms' ability to influence a person's emotions, thought and decisions.[6] Concerns about potential impacts at a broader societal level have also been raised: for example, a 2019 study by the Council of Europe points out that such practices could interfere with the goal of enabling an inclusive and pluralistic public debate.[7]

As a result, the algorithms behind such curation could potentially impact freedom of opinion and expression with greater efficiency and on a larger scale than traditional media, yet are often opaque and non-transparent.[8]

Content moderation

Another AI application that could impact intellectual freedom is automated content moderation. Online platforms today are facing increasing pressure to address concerns about illegal or objectionable/harmful content. AI-powered moderation can take many forms: from deleting or blocking uploads of content identified as illegal or harmful, to de-prioritising such content, to automatic implementation of the right to be forgotten.[9]

The appeal of AI and algorithmic moderation here lies in its ability to work at a much larger scale and speed (as well as protecting human moderators from the psychological toll of the work).[10] Yet despite the advantages it offers, doubts are frequently expressed in relation to AI moderation. Many actors underline concerns over the current limitations of AI systems in recognising nuance, satire or irony, critical analysis, fair use, as well as broader cultural contexts in efforts to distinguish between legitimate speech and illegal or infringing activities.[11] These could lead to over-blocking and removal of

[4] Hu, X. et al., 2019, "Steering AI and Advanced ICTs for Knowledge Societies A Rights, Openness, Access, and Multi-stakeholder Perspective", UNESCO, https://unesdoc.unesco.org/ark:/48223/pf0000372132. Notably, both concepts are currently examined in the academic field, and at present the evidence documenting the presence of such phenomena is mixed. Further academic inquiry into the suggested phenomena is needed.

[5] For example, an experiment by the Web Foundation in 2018 set up six identical Facebook profiles to examine the curatorial function of the algorithms. One of the findings showed that posts containing certain keywords – i.e. those pertaining to femicide and rape – did not surface for the six experimental user profiles, even when some of the posts had more "shares" and reactions than the stories that were displayed (http://webfoundation.org/docs/2018/04/WF_InvisibleCurationContent_Screen_AW.pdf).

[6] Council of Europe Committee of Ministers, 2019, "Declaration by the Committee of Ministers on the manipulative capabilities of algorithmic processes", https://search.coe.int/cm/pages/result_details.aspx?objectid=090000168092dd4b.

[7] Yeung, K., 2019, "Responsibility and AI", the Council of Europe Expert Committee on human rights dimensions of automated data processing and different forms of artificial intelligence (MSI-AUT), https://rm.coe.int/responsability-and-ai-en/168097d9c5

[8] Report of the United Nations Special Rapporteur, "Promotion and protection of the right to freedom of opinion and expression".

[9] Brkan, M., "Freedom of Expression and Artificial Intelligence: On Personalisation, Disinformation and (Lack Of) Horizontal Effect of the Charter", 2019, https://ssrn.com/abstract=3354180.

[10] Hu, X., "Steering AI and Advanced ICTs".

[11] As mentioned, for example, in the "Study on the Human Rights Dimensions of Automated Data Processing Techniques", 2017, "Human Rights in the Age of Artificial Intelligence", 2018, or "Steering AI and advanced ICT", 2019.

legal content, potentially infringing on the principles of legality, legitimacy and proportionality of freedom of expression limitations.[12]

A related issue is the lack of transparency and oversight, the opacity of removal criteria, and the implied shift towards private companies determining what speech is permitted – which could also lead to over-blocking, since private companies might prefer to err on the side of caution (and indeed, may be incentivised to do so by legislation).[13]

Facts and evidence

An interesting aspect of AI's influence on the information environment is its potential impact on users' understanding of truth, facts and evidence. As the World Commission on the Ethics of Scientific Knowledge and Technology's "Preliminary Study on the Ethics of Artificial Intelligence" puts it,

"…AI brings specifically new challenges that are related to its interaction with human cognitive capacities. AI-based systems have implications for human understanding and expertise. Algorithms of social media and news sites can help to spread disinformation and have implications for the perceived meaning of 'facts' and 'truth', as well as for political interaction and engagement"[14]

A particular AI application that has received a lot of attention over the last years and was argued to have the ability to change people's relationship to 'truth' and evidence is deepfakes. These "synthetic' media files created with the help of neural networks and machine learning create depictions of people or events which are not real – but appear to be – and are argued to be able to 'challenge our sense of reality'.[15]

Crucially, the phenomenon of altered media is far from new. Deepfakes were preceded by Photoshop alterations, recontextualization, video speed alterations and other methods of audiovisual manipulation.[16] However, it is the use of AI to create deepfakes – potentially faster and in a way that is accessible to more groups than ever before – that has attracted significant amounts of attention and sensationalist coverage.

The heightened public awareness and concern that media can be altered by AI could be seen as one of the crucial impacts of deepfakes, as it can prompt people to call into question all the evidence they encounter, whether real or not.[17]

AI and Intellectual Freedom: literacy is key

Importantly, academic inquiry into the impacts of AI on access to information and freedom of opinion and expression is ongoing, and further research is needed to fully

[12] Further on the implications of AI solutions to online disinformation on freedom of expression: Marsden, C., and Meyer, T., 2019, "Regulating disinformation with artificial intelligence", Panel for the Future of Science and Technology European Science-Media Hub/European Parliamentary Research Service, https://www.europarl.europa.eu/RegData/etudes/STUD/2019/624279/EPRS_STU(2019)624279_EN.pdf.

[13] "Responsibility and AI".

[14] World Commission on the Ethics of Scientific Knowledge and Technology, 2019, "Preliminary study on the Ethics of Artificial Intelligence", https://unesdoc.unesco.org/ark:/48223/pf0000367823.

[15] Harper, C., 2018, "Machine Learning and the Library or: How I Learned to Stop Worrying and Love My Robot Overlords", Code4Lib Journal, https://www.academia.edu/37287826/Machine_Learning_and_the_Library_or_How_I_Learned_to_Stop_Worrying_and_Love_My_Robot_Overlords.

[16] Paris, B., Donovan, J., 2019, "Deepfakes and Cheap fakes: the manipulation of audio and visual evidence", Data & Society, https://datasociety.net/wp-content/uploads/2019/09/DS_Deepfakes_Cheap_FakesFinal-1.pdf.

[17] Hao, K., 2019, "The biggest threat of deepfakes isn't the deepfakes themselves", MIT Technology Review, https://www.technologyreview.com/ s/614526/the-biggest-threat-of-deepfakes-isnt-the-deepfakes-themselves.

understand these phenomena. In the meantime, the example of deepfakes highlights the importance of efforts raising the public's media and information literacy.[18]

To consider critically whether a given piece of media is genuine, to know how algorithms influence the information one sees in search engines and social media platforms, to be more confident in an increasingly AI-mitigated information flow – digital, media and information literacy is an important part of the solution.[19] Literacy efforts offer a way to tackle such concerns without compromising freedom of expression,[20] or intellectual freedom at large.

As further discussed in Annexure ii, libraries are inclusive spaces that specialise in information literacy – as such, they can be well-positioned to deliver such training to help people navigate the new information landscape. This could, in fact, be of the key roles libraries can play in ensuring that AI benefits society at large.[21]

Artificial Intelligence in the Library: Privacy Considerations

Privacy considerations

Another key ethical consideration to keep in mind with regard to implementation and use of AI is privacy. The training of AI systems can require large amounts of data, as can AI decision-making, the calibration of systems or the refinement or creation of feedback mechanisms.[22] This can range from non-personal data to sensitive or personally identifiable information; with most use-cases falling somewhere in the middle of the continuum (e.g. relying on information inferred from personal data).[23] Such uses already imply data protection issues, given the principle that people should have a say over how their information is used.

Moreover, outputs of AI-driven analysis can also reveal personal or sensitive information through crossing data sources, or through making it possible to de-anonymise personal data. This raises questions about an individual's right to privacy and data protection.

This can also concern AI applications in a library setting. For instance, possible user-facing AI use-cases are numerous: "Due to algorithmization many possibilities arise to connect (potential) users to collections, to personalise user interactions and to optimise various aspects ranging from space usage (for physical parts of the collection) to advanced retrieval methods based on complex user demands."[24]

Some of these interactions can entail important privacy implications for a library user. A 2019 study on use-cases and implications of AI in academic libraries, for example, saw a number of interviewed participants mention the possible privacy implications.[25]

[18] Wagner, T., Blewer, A., 2019, "The Word Real Is No Longer Real": Deepfakes, Gender, and the Challenges of AI-Altered Video", Open Information Science 2019; 3: 32–46, https://www.degruyter.com/downloadpdf/j/opis.2019.3.issue-1/ opis-2019-0003/opis-2019-0003.pdf
[19] For example, literacy is highlighted as an important way to tackle the potential challenges of AI for freedom of opinion and individual autonomy in the "Declaration by the Committee of Ministers on the manipulative capabilities of algorithmic processes".
[20] Marsden, Meyer, "Regulating disinformation with artificial intelligence".
[21] For instance, the idea of libraries teaching algorithmic/information literacy had been expressed by several participants at the 2018 CFLA-FCAB National Forum discussion on Artificial Intelligence: http://cfla-fcab.ca/wp-content/uploads/2018/05/AI_table_notes.pdf
[22] "Human Rights in the Age of Artificial Intelligence". See also Campolo, A. et al., 2017, "AI Now 2017 Report", AI Now, https://ainowinstitute.org/AI_Now_2017_Report.pdf.
[23] Report of the United Nations Special Rapporteur, "Promotion and protection of the right to freedom of opinion and expression".
[24] Van Otterlo, M., 2018, "Gatekeeping Algorithms with Human Ethical Bias: the ethics of algorithms in archives, libraries and society", https://arxiv.org/abs/1801.01705.
[25] Cox, A.M., Pinfield, S. and Rutter, S, 2019, "The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries", Library Hi Tech, 37 (3). pp. 418-435.

These can include, for instance, the collection of data about activity in the physical library space, or a user's borrowing and reading behaviour in order to feed AI systems.

In such cases, it is important to ensure both basic data privacy/security and the intellectual privacy of library users.[26] In fact, privacy considerations are fundamentally related to intellectual freedom matters discussed in the earlier section. Privacy violations can have a chilling effect on freedom of expression,[27] and the knowledge that collected data could be re-used by AI systems in other contexts (without awareness and/or control by the data subject) can prompt people to refrain from participating in some activities that entail data collection.[28]

What libraries can do

As the 2015 IFLA Statement on Privacy in the Library Environment discusses, there are measures libraries can and should take to protect patrons' data.[29] In the context of AI, this can include ensuring that any experiments with AI applications which modify or nudge library user behaviour are carried out on an informed opt-in basis,[30] or carefully reviewing library choices of third-party AI applications to see how they impact users' privacy.[31] More broadly, AI applications should not unduly compromise user privacy.

The concept of consent for personal data processing is also important here. As a report by a Council of Europe Consultative Committee highlights, the obscurity and complexity of AI algorithms can make it challenging to have a user's informed consent for data processing. Suggested remedies include increased transparency and carrying out risk assessments, as well as considering the merits of introducing flexible forms of consent (e.g. dynamic consent).[32]

Artificial Intelligence in the Library: Bias, Transparency and Explainability

Addressing AI bias concerns

A key ethical consideration most frequently raised in the context of AI development and use is the possibility of AI bias leading to unfair or discriminatory outcomes.[33] In the information environment, for instance, an often-cited example is the autocomplete search engine function that returned suggestions laden with harmful stereotypes.[34]

Such bias can be introduced in many ways and at different phases of AI development and use. This can occur when framing and formalising the problem an AI model is intended to address, or when labelling examples or defining and selecting the attributes

[26] Van Otterlo, M., and Warnaar, M., 2017, "Towards Optimizing the Public Library: Indoor Localization in Semi-Open Spaces and Beyond", http://martijnvanotterlo.nl/benelearn2017-vOtterlo-Warnaar-CR.pdf.
[27] "Human Rights in the Age of Artificial Intelligence".
[28] "A study of the implications of advanced digital technologies".
[29] "IFLA Statement on Privacy in the Library Environment", 2015, https://www.ifla.org/files/assets/hq/news/documents/ifla-statement-on-privacy-in-the-library-environment.pdf.
[30] Van Otterlo, M., 2016, "Project BLIIPS: Making the Physical Public Library More Intelligent through Artificial Intelligence", Qualitative and Quantitative Methods in Libraries (QQML) 5: 287-300, http://www.qqml.net/papers/June_2016_Issue/522QQML_Journal_2016_Van_Otterlo_287-300.pdf.
[31] Harper, C., 2018, "Machine Learning and the Library".
[32] Mantelero, A., 2019, "Artificial Intelligence and Data Protection: Challenges and Possible Remedies", Council of Europe Consultative Committee of the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data, https://rm.coe.int/artificial-intelligence-and-data-protection-challenges-and-possible-re/168091f8a6.
[33] E.g. as explained in Laterono, M., 2018, "Governing Artificial Intelligence: Upholding Human Rights & Dignity", Data and Society, https://datasociety.net/wp-content/uploads/2018/10/DataSociety_Governing_Artificial_Intelligence_Upholding_Human_Rights.pdf;
[34] As described in Dr. Safyia Umoja Noble's book "Algorithms of Oppression", 2018.

an AI system should consider.[35] Biases can arise as a result of the training data an AI was exposed to: datasets reflecting historic or existing societal inequalities, or datasets that under- or over- represent disadvantaged groups may lead to decisions that replicate these inequalities. Even when a dataset does not include protected characteristics like gender or race, these could be inferred from other data in the set, and lead to discriminatory results.[36]

These concerns can be relevant for AI applications in the library sector as well. Contributors to a 2019 OCLC Primer expressed concerns that the growing use of algorithms in the library setting could reinforce biases that negatively impact library staff, patrons, or society at large. The Primer offers a range of recommendations to manage potential bias and commit to responsible options for AI use in cultural heritage institutions. These include, for example, initiating "practice exchanges" and holding symposia on approaches to managing bias when adopting machine learning (ML) and AI technologies; developing auditing approaches; and forming committees to guide responsible engagement with AI and ML.[37]

For externally-sourced tools, this means that it is crucial for libraries to know how an outside vendor has carried out the training of the AI.[38] For AI projects originating in the library, this means carefully reflecting on the potential ethical implications: for example, for a project aiming to use ML to generate subject headings, it would be important to consider existing biases in subject headings developed by cataloguers.[39]

Finally, a greater focus on explainability and transparency in library ML-powered systems (despite significant technological challenges and possible performance trade-offs) can offer important benefits to detecting and addressing bias.[40]

Librarians helping develop ethical AI

Finally, it has been suggested that librarians – in particular research and data librarians – can help shape AI development "for good". The Association of Research Libraries 2019 issue on the ethics of AI, for example, mentions that research librarians' expertise in knowledge management and research support can help them participate in public policy debates on AI governance towards the public good.[41]

They could help researchers manage and work with their data in replicable and consistent ways, taking account of data quality and curation issues; as well as offer guidance on privacy and ethical use of personal information policies; and help students develop such research skills.[42]

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[35] Hao, K., 2019, "This is how AI bias really happens—and why it's so hard to fix", MIT Technology Review, https://www.technologyreview.com/s/612876/this-is-how-ai-bias-really-happensand-why-its-so-hard-to-fix/;
[36] Borgesius, F. Z., 2018, "Discrimination, artificial intelligence, and algorithmic decision-making", Directorate General of Democracy - Council of Europe, https://rm.coe.int/discrimination-artificial-intelligence-and-algorithmic-decision-making/1680925d73.
[37] Padilla, T., 2019, "Responsible Operations: Data Science, Machine Learning, and AI in Libraries", OCLC Position Paper, https://www.oclc.org/content/dam/research/publications/2019/oclcresearch-responsible-operations-data-science-machine-learning-ai.pdf.
[38] Griffey, J., 2019, "Chapter 1: Introduction," Library Technology Reports 55, no. 1: 5–9, https://journals.ala.org/index.php/ltr/article/view/6908/9300. Notably, the author expressed doubt that such scrutiny will occur in practice, therefore encouraging libraries to be involved in development of their own tools.
[39] Boman, C., 2019., "Chapter 4. An Exploration of Machine Learning in Libraries", Library Technology Reports 55, no. 1: 21-25, https://journals.ala.org/index.php/ltr/article/view/6911/9303.
[40] Koene, A., et al., 2019, "governance framework for algorithmic accountability and transparency", European Parliament Panel for the Future of Science and Technology, https://www.europarl.europa.eu/RegData/etudes/STUD/2019/624262/EPRS_STU(2019)624262_EN.pdf.
[41] Ridley, M., 2019, "Explainable Artificial Intelligence." *Research Library Issues*, no. 299 (2019): 28–46, https://doi.org/10.29242/rli.299.3.
[42] Henry, G., 2019, "Research Librarians as Guides and Navigators for AI Policies at Universities." *Research Library Issues*, no. 299 (2019): 47–65, https://doi.org/10.29242/rli.299.4.

Annexure ii: AI Literacy

To leverage the potential of AI to promote inclusive development, it is important to ensure that everyone has the skills and competencies needed to make meaningful choices regarding AI use, and to benefit from (and not be harmed by) AI applications in both public and private spheres.

That is why several AI governance frameworks and policy documents – particularly those focusing on ethics and human rights – point out the need for public awareness and capacity-building. For example, clauses on AI literacy and awareness are included in both the Council of Europe's recommendations on *'Unboxing Artificial Intelligence: 10 steps to protecting Human Rights'*[43] and in a standard-setting instrument suggested by the UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) Extended Working Group on Ethics of Artificial Intelligence.[44]

The importance of public awareness is also highlighted in the G7 Innovation Ministers' *Statement on Artificial Intelligence*;[45] and the *OECD Council Recommendation on Artificial Intelligence* includes a recommendation for governments to help equip people with the skills necessary to interact, use and work with AI.[46] Similarly, the IEEE Position Statement on Artificial Intelligence points out the importance of AI literacy for the general population, as well as informing and engaging the public in AI policy discourse and decision-making.[47]

What does 'AI literacy" entail? Alongside basic digital literacy and ICT skills,[48] 'AI literacy' usually begins with an **elementary understanding of how Artificial Intelligence and Machine Learning work**, what they can and cannot do. For an example of what this can cover, one could look at 'Elements of AI', a massive open online course developed by a tech consultancy Reaktor and the University of Helsinki.

The purpose of the MOOC is to help non-experts get a basic understanding of AI. The course covers such topics as: defining AI, search and problem solving, the Bayes theorem, probabilities and their application in AI, types of machine learning, classification and regression in ML, the basics of neural networks, and societal implications of AI.

The last point highlights a second key element of AI literacy – **understanding the potential impacts of AI**, especially in the area of human rights.[49] This can include, for example, knowing the risks of discriminatory AI.[50] More broadly, it includes

[43] https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64
[44] https://unesdoc.unesco.org/ark:/48223/pf0000367823
[45] http://www.g8.utoronto.ca/employment/2018-labour-annex-b-en.html
[46] https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449
[47] https://globalpolicy.ieee.org/wp-content/uploads/2019/06/IEEE18029.pdf
[48] For example, "Artificial Intelligence for Europe" – a 2018 communication from the European Commission – highlights that preparing the population for socioeconomic changes caused by AI includes helping everyone develop basic ICT skills – as well as "complementary" competencies, such as "critical thinking, creativity or management" (https://ec.europa.eu/transparency/regdoc/rep/1/2018/EN/COM-2018-237-F1-EN-MAIN-PART-1.PDF).
[49] Recommendations to foster general public's understanding of the potential societal impacts of AI are included, for example, in draft "Ethics Guidelines for Trustworthy AI", prepared by the AI HLEG set up by the European Commission (https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai). Similarly, the IEEE Position Statement on AI includes a recommendation to forester public understanding of potential benefits and risks of AI (https://globalpolicy.ieee.org/wp-content/uploads/2019/06/IEEE18029.pdf); and Council of Europe's recommendations in "Unboxing Artificial Intelligence" also highlight the importance of such measures.
[50] E.g. as mentioned in "Discrimination, Artificial Intelligence and Algorithmic Decision-making" - https://rm.coe.int/discrimination-artificial-intelligence-and-algorithmic-decision-making/1680925d73

understanding how such principles as transparency, explainability and fairness apply in the context of AI, and why they are important.[51]

Third, the general public could benefit from education on **personal data management.** This includes both awareness and literacy in relation to privacy matters,[52] as well as understanding of how personal data can be used in AI decision-making processes.[53]

Finally, the growing embeddedness of AI in society makes **Media and Information literacy (MIL)** an increasingly important competency for the general public. AI can have a significant impact on how people access information – from personalised search results and content curation, to content generated by (or with the help of) AI, to AI-enabled content moderation.[54] Media and Information literacy can help ensure that people are able to navigate and critically reflect on the information field mediated by AI – and, more broadly, understand their engagement with AI at large.[55]

This competency is referenced in several other frameworks, even if they make use of different terminology. For example, the COMEST preliminary study describes AI literacy in education and knowledge contexts as a skill which enables critical reflection on the role that intelligent computer systems play in "the recognition of information needs, selection, interpretation, storage and representation of data" [information].[56] Similarly, a working paper on AI in education by UNESCO identifies information and data literacy as important digital competencies that learners may need to acquire to be 'AI-ready'. The two competencies entail "browsing, searching, filtering, [...] evaluating, [and] managing data, information and digital content".[57]

In short, AI literacy can be conceptualised as entailing the following elements:

- A basic understanding of how AI and ML work, their underlying logic and their limitations;
- Understanding the potential societal impacts of AI, especially in the area of human rights;
- Personal data management skills;
- Media and Information literacy.

Why is it important for the general public to be AI-literate? To begin with, AI literacy and awareness are crucial to foster informed public participation in policy dialogue and decision-making regarding AI.[58] Second, it can encourage transparency, create demand for accountability, and critical engagement with AI decisions – including the ability to challenge them when necessary.[59] Finally, some documents emphasise the competencies and re-skilling needed to help prepare workers for the possible transitions in the labour market.[60] As an area of likely growth in future, developing a level of AI literacy may be a stepping stone towards jobs for some at least.

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[51] See, for example, the "Policy and Investment Recommendations for Trustworthy AI" by the AI HLEG set up by the European Commission - https://ec.europa.eu/digital-single-market/en/news/policy-and-investment-recommendations-trustworthy-artificial-intelligence

[52] See, for example, Hu et al "Steering AI and advanced ICTs for knowledge societies: a Rights, Openness, Access, and Multi-stakeholder Perspective" (UNESCO) - https://unesdoc.unesco.org/ark:/48223/pf0000372132

[53] "Policy and Investment Recommendations for Trustworthy AI", AI HLEG

[54] Hu et al, "Steering AI and Advanced ICTs".

[55] Ibid.

[56] https://unesdoc.unesco.org/ark:/48223/pf0000367823

[57] https://unesdoc.unesco.org/ark:/48223/pf0000366994

[58] E.g. as highlighted in the IEEE Position Statement, the "Ethics Guidelines for Trustworthy AI", or "Discrimination, Artificial Intelligence and algorithmic decision-making"

[59] As explained, for example, in "A governance framework for algorithmic accountability and transparency" by the European Parliamentary Research Service - http://www.europarl.europa.eu/RegData/etudes/STUD/2019/624262/EPRS_STU(2019)624262_EN.pdf.

[60] E.g. as emphasised in the discussion of AI literacy enabling people to work with and alongside AI in "Artificial intelligence: a game changer for the world of work", a Brief by the European Trade Union Institute (https://www.etui.org/Publications2/Foresight-briefs/Artificial-intelligence-a-game-changer-for-the-world-of-work).

Fostering AI literacy among the general population calls for concerted training and awareness-raising efforts, and several policy documents point out the role of formal education institutions and programs. However, as emphasised in "Policy and Investment Recommendations for Trustworthy AI", it is crucial that AI literacy initiatives are accessible to all. Digital divides or other possible barriers like age, skills or income should not prevent the more vulnerable or less advantaged groups from benefitting from such initiatives.

Libraries have extensive experience in providing informal and non-formal learning opportunities. From ICT skills to STEM to literacy, they have demonstrated a training delivery model that can reach the more vulnerable, disadvantaged or marginalised groups. They can extend this model to offer capacity-building opportunities for the key elements of AI literacy outlined above.

A recent study by Project Information Literacy, for example, examined how college students navigated and assessed their algorithm-driven information landscapes, particularly from the angle of information and algorithmic literacy. The study suggests a series of recommendation for libraries, among other key stakeholders, on how to promote awareness and literacy and build on existing information literacy efforts. These include, for example, making use of peer-to-peer learning approaches, forming campus faculty interest communities and expert groups, helping integrate algorithmic literacy into existing courses and curricula, and others.[61]

Some libraries are already beginning to explore this role and offer AI learning opportunities, as further detailed in Annexure iii. Building on these examples and more, libraries can play an important role in making sure that AI literacy initiatives are fundamentally inclusive and available to all.

[61] https://www.projectinfolit.org/uploads/2/7/5/4/27541717/algoreport.pdf

Annexure iii: Artificial Intelligence - Libraries at the Forefront

AI has transformative potential on many aspects of society, including the way people work and access information. It is important for libraries to adjust to be able to make use of the new technological solutions and adapt their services to meet the changing societal needs.

The IFLA Statement has outlined the key roles libraries can take on in a society that employs AI; and throughout the world, some libraries and library organisations are already engaged in raising awareness and AI literacy, developing and working with AI, and taking part in debates around its impact on the library sector and beyond. The aim of this Annexure is to highlight some of the library efforts carried out to date.

Part 1 – Reflecting on the role of libraries in an AI world

The 2018 National Forum organised by the Canadian Federation of Library Associations (CFLA-FCAB) examined the implications of AI for the library sector and beyond. Participants discussed how libraries can help ensure that AI has a positive impact on society, and how CFLA-FCAB can support them and work with partners to achieve this. The working table discussions during the Forum pointed out, for example, the importance of equipping library staff and Library and Information Science students with a basic understanding of AI, and pointed out the role libraries can play in educating the general public about AI.

Similar considerations have guided the Urban Libraries Council's initiative to advance the role of libraries in North America in promoting digital citizenship and equitable data governance in the age of AI. As a first step, a working group was assembled to explore how libraries can collaborate to maximise the potential societal benefits and minimise the risks of AI.

The next steps outlined by the ULC include developing AI definitions and frameworks that advance the role of libraries in promoting equitable access to information and education on AI, facilitating an exchange of good practices and insights, and more. Recent ULC activities include, for example, hosting a webinar which focuses on the role of public libraries as educators in the face of AI, "Artificial Intelligence, Algorithmic Literacy and Roles for Libraries"; and hosting a forum on AI and digital citizenship.

Part 2 – Libraries and AI literacy

In the Netherlands, public libraries have an opportunity to raise AI literacy by supporting the *National AI Course* initiative. Dutch organisations *AI for Good Netherlands*, *Elephant Road* and *Innovation Center for Artificial Intelligence* have developed a massive open online course to help the general public get a better understanding of AI, with libraries getting involved, promoting the course and helping more people to take part. For example, when the Junior version of the MOOC was introduced in September 2019, 16 libraries throughout the country took part in the launch and organised classes for people to take the online course.

The Canadian Federation of Library Associations, Ryerson University Library and Toronto Public Library have recently launched *AI for All Canada* – a project aiming to

develop an AI and algorithmic literacy programme that can be implemented in public libraries throughout Canada.

Individual libraries also implement literacy and awareness-raising initiatives. The Toronto Public Library, for example, is offering a learning circle for people following the international version of the Finnish *Elements of AI* MOOC. A brief by the Urban Libraries Council highlights other learning initiatives focusing on AI in public libraries in North America. These include, for example, discussion programmes on AI awareness and digital citizenship in the Miami-Dade Public Library and the DC Public Library.

Alongside courses on AI, the Frisco Public Library in the United States offers take-home Artificial Intelligence maker kits. Based on a Google AIY Voice Project kit, a library AI maker kit contains a "smart" speaker (a box with a Raspberry Pie entry-level computer and a small speaker) and an instructional book. Library users can check out the kit and learn how to code the device to understand voice commands, making use of the Python programming language.

Part 3 – AI in the library

From 'petting zoos' that allow users to get acquainted with new technologies to everyday service delivery, AI technologies are being adopted in libraries throughout the world for a wide array of purposes. Some of these technologies – particularly those operating in the area of knowledge management - are developed by libraries themselves.[62]

The National Library of Norway, for example, has experimented with applying Machine Learning to automate Dewey Decimal classification. Notably, the library has noted the importance of not introducing bias when introducing additional documents in its datasets.

There are also examples of academic libraries launching or collaborating with other units on AI initiatives. The Stanford University Library AI studio is developing projects exploring AI application in libraries for internal information processing and library collection discovery and analysis. The University of Rhode Island launched an AI Lab in the university library, emphasising its openness for both staff and students, as well as the broader Rhode Island research community. Hamlet, a neural-net powered system, is an experimental library discovery interface for the MIT thesis collection.[63]

The University of Cincinnati Libraries' Digital Scholarship Center specialises in Machine Learning (ML) applications. Examples of their work include, for instance, a Twitter Social Justice Movements Network Analysis.

The Helsinki Central Library Oodi has introduced an AI-powered mobile application for library users, designed to make reading suggestions and assist with library collection discovery. Importantly, at the outset of the project in 2018, it was decided that personal user data will not be collected. Elsewhere around the world, libraries are beginning to make use of AI-powered robots for a variety of purposes, from answering directional questions to acting as reading companions.

[62] More use-cases of AI in libraries are listed on the website *AI for Libraries*, curated by P. Kangas, a scholar working on a research project on the subject: https://www.aiforlibrarians.com/ai-cases/

[63] A more in-depth look at AI in academic libraries is offered, for example, in Wheatley and Hervieux, 2019, "Artificial intelligence in academic libraries: An environmental scan".