



Toward Data Sovereignty: Justice-oriented and Community-based AI Education

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ABSTRACT

Just as food sovereignty is the innate right of all individuals, we argue that data sovereignty should also be treated similarly. We take a critical approach and have leaned on Indigenous scholarship that focuses on rights, control, and power related to data sovereignty. Peoples of the world should have access to, have ownership of, and be decision-making stewards of their own communities' data. We discuss the importance of data sovereignty, implications of a possible 'data apartheid', and ways to possibly achieve data sovereignty in this paper. We present examples of justice-oriented and community-based AI education to serve as starting points.

CCS CONCEPTS

• **Social and professional topics** → **Informal education.**

KEYWORDS

Data sovereignty, AI Education, Informal Education, Justice-oriented, Community-based

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1 INTRODUCTION

We find that data access, governance, and stewardship are central themes to discourse on equity, justice, and the rights of diverse communities. This paper engages with the multifaceted concept of data sovereignty, particularly focusing on Indigenous scholarship while also considering its broader socio-political and economic impacts. We examine data sovereignty in terms of who controls or accesses data and, more importantly, how data practices align with the rights, histories, and aspirations of diverse and often marginalized populations.

The issue gains particular significance against the backdrop of the prevalent capitalistic use of data, which frequently clashes with the interests and values of various global communities. The advancement of technologies like ChatGPT and other large AI models adds

a layer of complexity to this discussion, often perpetuating existing biases and widening the gap for vulnerable groups. This conflict is especially pronounced in the context of Indigenous communities, who, due to their history of disenfranchisement and misrepresentation, have been at the forefront of advocating for a reimagined approach to data. Through this paper, we explore the call by Indigenous scholars for a transformative approach to data—one that is empowering, value-aligned, and ensures respectful governance.

Our exploration of data sovereignty is focused on understanding its critical role in various aspects of life and its parallels to food sovereignty and other public rights. We argue that data sovereignty should be considered a fundamental right, crucial for maintaining dignity and the basic necessities of life. We also explore the notion of 'data apartheid' and emphasize the dire consequences of neglecting data sovereignty, particularly in the context of proprietary AI/ML models.

To address these challenges, we propose a justice-oriented and community-based approach to AI education and exploration. We share some quotes from a case study involving urban farming communities, highlighting the hopes and desires of the farmers that align with the notion of data sovereignty and data stewardship.

In summary, our paper aims to contribute to the ongoing conversation about data sovereignty, emphasizing the need for community-centric approaches and policy considerations that prioritize the rights and values of all communities, especially those most affected by data inequities. Through our reflections, we hope to influence future AI policies and practices, ensuring they are aligned with the principles of justice and community empowerment.

2 WHAT IS DATA SOVEREIGNTY?

The current capitalistic use of data in the 'information age' is discordant and misaligned with the histories, rights, customs, community wealth, and desires of many populations across the world. Although there have been some variations in definitions of data sovereignty, we turn to the scholarship of Indigenous communities. Due to current and historic atrocities, disenfranchisement, and external control/narratives, it is perhaps not surprising that most conversations about data sovereignty have been led by Indigenous scholar-activists [12]. For instance, most 'official' data on Australian Indigenous communities come from a deficit perspective that focuses on disparity, deprivation, disadvantage, dysfunction, and difference [25]. The Indigenous scholars contend that such lenses add to the 'deficit data-problematic people' correlation where the artificial invisibility of Indigenous communities is exacerbated by disingenuous and disparaging statistical narratives [25]. To combat such narratives, they developed the concept of data sovereignty. Indigenous research and teachings highlight that policies around Indigenous data sovereignty should include aspects such as

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- Indigenous empowerment to decide who is Indigenous and from whom data should be collected to inform policies
- Data collection that is aligned with Indigenous values, interests, and priorities
- Freedom to decide who has access to data collected appropriately
- Advocating for respectful data governance, storage, security, and decision-making powers [13, 23]

Here, we see that any data about Indigenous communities should benefit them most. Unfortunately, the current systems of proprietary data management, including the new and gaining popularity of ChatGPT and other large-language models/AI systems, continue to be detrimental to most communities. Many scholars and researchers have spoken out against capitalistic approaches to data systems. For instance, other scholars (not necessarily Indigenous) have also added to the discourse on data sovereignty from a socio-political and economic perspective. Fraser said that “data sovereignty requires that actors in civil society, or in cooperative economic associations, develop principles and practices that explore whether the emergent value of data should be held in common, rather than privatized; destroyed, rather than analyzed and brought to market; or stored nearby, rather than exported” [8, pg. 11]. One can observe here the criticism of money-driven ventures, especially if they are related to technology-intensive approaches. Now that we have described how we conceptualize data sovereignty, we turn to why it is so important.

3 WHY IS DATA SOVEREIGNTY IMPORTANT?

As we were exploring the concept of data sovereignty, we were simultaneously also exploring food sovereignty due to our local context. For one, we live in Knoxville, where the USDA reports at least 15 districts affected by food apartheid, with many falling in the racially segregated East Knoxville [11]. Secondly, sustaining Indigenous *food sovereignty* is also a crucial Indigenous movement to learn from. Promoting food sovereignty empowers Indigenous communities to manage their own food systems, enhancing access to ancestral, traditional, and nutritious foods while decreasing the influence of external, processed, commercial, and fast food options [3]. Although Indigenous scholars contend that food sovereignty could be operationalized differently in various Indigenous communities, some important common threads include self-governance and community involvement [3]. We will explore these two concepts through various ways in this paper.

Indigenous scholars have also pointed toward the *Declaration of Nyéléni* [21] to learn about food sovereignty. In 2007, a group of peasants/family farmers, artisanal fisherfolk, Indigenous peoples, landless peoples, rural workers, migrants, and more gathered in the village of Nyéléni in Sélingué, Mali to reinforce a worldwide initiative advocating for food sovereignty. The outcome was a declaration that stated “Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations.” [21, pg 1] This declaration not only accounts

for governance but also nods to combating the power structures in place, such as capitalism.

Just as food sovereignty is the innate right of all individuals, we contend that data sovereignty should also be treated similarly, especially with regard to self-governance and community involvement. But, many food rights and other public access rights such as shelter, education, health care, and justice systems currently depend on ‘data-driven’ decisions. The improper use and exploitation of data-driven decisions can significantly harm not only the access to but also the impact on self-governance rights.

For instance, it is likely some economically driven models (racial capitalism, as called by the authors) that cause grocery stores to be present more in rich, suburban, white communities rather than in inner cities with Black or Brown populations [15]. It is also these advertising/marketing models that perhaps zero in on using Indigenous iconography to sell ‘healthy whole foods’ while at the same time depriving those very communities of food justice [22]. Superficial attempts to solve this issue by randomly placing grocery stores in ‘food deserts’ have not worked well [7]. Apart from food justice, the criminal justice system has also been adversely affected. The COMPAS system reinforcing racial biases against Black and Brown men is now well documented [20]. Some other researchers have demonstrated that the way school data is presented significantly affects racial school segregation and school ‘choice’. All these examples highlight the detrimental effects of data-driven decisions and policies that are removed from the communities that they serve.

Now, we turn to aspects that have worked better due to community involvement and self-governance with data and related decision-making. When food and grocery store interventions in areas affected by food apartheid were performed *with* communities living there, there were positive improvements to the food-scape, diet-related health benefits, and no grocery-store closures [4]. Indeed, these interventions performed much better than commercially driven approaches (50% grocery store closure rate) and even government-based approaches (33% grocery store closure rate). This relative success was possible due to the communities’ access to data, engagement with data, and decision-making after data analysis. Thus, we argue that data and data sovereignty should be treated as a right as it now affects so many other basic necessities for life and dignity.

3.1 Data apartheid: implications of no data sovereignty

Certain scholars have addressed data-driven oppressive systems, in general, contributing to the scarcity of data points available in certain communities and have referred to them as ‘data deserts.’ Ranganathan [18], however, drew a parallel, suggesting that just as food apartheid corresponds to a food desert, *data apartheid* is perhaps a more apt term for data scarcity.

We reflected on this concept of data apartheid and have expanded its meaning based on the conversations around data sovereignty. First, we realized that as more and more models that use data-driven decision-making become proprietary and ‘closed’, attaining data sovereignty becomes more difficult. In addition, these data-driven decision-making systems have become closely embedded in Artificial Intelligence(AI)/Machine-Learning(ML) models, which

in turn exacerbate issues like racism [5, 28], sexism [5, 28], and ableism [10] already present in society among other dangers [1]. In computing communities, the criticisms of proprietary AI models have been over ethical oversights, exploitative labor practices, de-democratization, and ‘profit motives that incentivize generating hype over enabling careful scientific work’ [14]. Attempts to address these dangers include algorithmic auditing [17]. After reflecting on the implications of AI/ML models, we started speculating on a future where proprietary these models systematically remain inaccessible to disenfranchised residents, impeding their ability to willingly contribute data and participate in decision-making based on that data. Such systemic injustice made us question whether it would constitute a more intense form of data apartheid beyond mere data scarcity. Such a nefarious, and perhaps truer, form of data apartheid would cause even more heightened disparities than those that currently exist.

4 TOWARD REALIZING DATA SOVEREIGNTY

In computing communities at large, the issues mentioned above are often approached through the lens of open-source models of AI. Scholars have contented that open or open-source AI systems are more trustworthy, transparent, reproducible, and have a higher quality control [14]. But, they also agree that open-source AI systems are just a starting point for addressing the ethical implications of AI systems. Further, open-source and open-access sometimes may go *against* Indigenous communities, especially when knowledge is considered relational, seasonal, land-based, and sacred and not always for those outside their particular tribes and communities [19, 27]. We explore some of these aspects in the following sections.

4.1 Complicating the nuances, affordances, and drawbacks of open-source AI

Open-source computing systems are generally sought after due to their open-accessibility, transparency, and other qualities like repurposing and reproducing. Although these qualities may increase *data access* to communities, they may not be related to self-governance, especially for Indigenous communities. For instance, Indigenous researchers have pointed out the generational repercussions caused by mistranslation of the *Cree* language by outsiders [27]. This ‘open access’ to an Indigenous language has thus ended up causing direct harm. Similarly, recent research has also uncovered tensions in CS education due to the culture of open sharing, remixing, and repurposing that is central to the Scratch platform, but is often against Indigenous systems of knowledge sharing [19].

Apart from these concerns, the recent conversations on open-source AI systems have been taken over by the ‘billionaire tech bros’ in Silicon Valley [24]. Here, we need to unpack capitalist influences on future open-source AI systems. For instance, the CEO of OpenAI wants to develop a ‘median human’ who could be ‘hire[d] as a co-worker’ [16]. Even if OpenAI becomes open-source eventually, we can see here that it will not aid in achieving data sovereignty. How much, then, can open source alone solve the impending crisis of data apartheid? We need more radical solutions, some of which we discuss in the next section.

4.2 Justice-oriented and community-based AI education

As computing education scholars, we present here an additional element to work toward data sovereignty: justice-oriented and community-based AI education. We contend that AI education and development *must* happen in informal spaces and places that are already working toward sovereignty-related issues. First, this method will aid in contributing to communities getting involved in, or perhaps even leading, the design, development, and deployment of AI technologies in ways appropriate for their self-governance and other necessary needs. Second, we as a community of computing education researchers and developers must learn from these members to co-design anti-colonial AI systems. We cannot develop AI systems that promote data sovereignty sitting in academic ivory towers or Silicon Valley.

In this paper, we share our experiences of working in an informal place that already works toward food sovereignty: an urban farm. Much of the reflections we have presented and shared in this paper happened thanks to our interactions with an urban farming community in our city. Together, we explored and learned about the implications of AI systems if they creep into existing communities.

We started working with urban farmers after noticing the recent *Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence* and its recommendations and precautions for the use of Artificial Intelligence (AI) in food security and civil rights. We felt that the growing influence of AI poses new threats to the trust and safety of the communities that rely on various food security initiatives. For instance, industries could turn to AI to increase profits, which in turn could exacerbate the planning and construction of grocery stores away from communities of color, the creation of bus routes that increase travel time to food-secure areas, and the construction of urban highways that deepen food insecurity. We realized that the local communities that will be directly affected by AI initiatives require concrete means of preparing for the impact of AI in their everyday lives. We thus aimed to work with local urban farming communities to advocate for ethical AI policies, especially in locally and personally relevant contexts around food sovereignty, nutritional wellness, and overall empowerment. We present in this section preliminary insights from what we hope to be a sustaining collaboration.

We started collaborations at ‘Earthly Farm’, an urban farm in ‘Earhtown’. We used principles of culturally responsive AI education to engage a group of urban farmers in hands-on activities, including the use of sensor technology for data collection from Earthly Farm. Our goal was to provide farmers with concrete methods to gather, engage with, and contemplate their farm data. This activity was intended to lay the groundwork for discussions regarding the broader implications of AI, with a specific focus on AI systems within farming contexts. Through our interactions, we wanted to understand how urban farmers use their own farm data to reflect on predictive AI models, their hopes and desires regarding AI in farming, and their concerns about such technologies. The farmers had a preference for AI systems that respect community values, Indigenous knowledge, and environmental concerns. They also were very passionate about community ownership of data. We share some of their quotes below to highlight their belief in

such principles. Please note that the farmer names are pseudonyms. Here is brief information about three of them mentioned here: Sage (they/them, Asian American) is a food justice activist with a background in anti-colonial theory of praxis. Mace (she/they, white) is an artist and farmer with an interest in Indigenous farming techniques, such as Traditional Ecological Knowledge (TEK), and working with local African immigrant families so that they have access to land and culturally appropriate seeds. Dill (he/him, white) is interested in alleviating community food insecurity through various urban farming techniques and is interested in technologies like 3D printing.

We first noticed the farmers' passion for fighting food apartheid and working toward food sovereignty when we were better understanding their values. Mace, one of the farm workers and a permanent staff member shared the following

[a] part of our values is like fighting against food apartheid here in Earthtown. And the reason that we do serve the communities that we serve right now is because a lot of them are underprivileged and underserved communities that don't have access to grocery stores or fresh produce

We thought it was noteworthy that the farmers used terms like food apartheid and food sovereignty instead of food deserts. Apart from these perspectives, these farmers were also very intentional about respecting Indigenous knowledge. Yet again, Mace shared the following when explaining her concerns about technology and AI interfering with their farming practices

if folks are just like looking at an app, or not trusting their intuition ... like Indigenous knowledge is all about, like their connection ... So I don't want to like distract or discourage anyone from at least trying to develop those relationships with the ecology that they have access to.

Mace wanted any technology to foster relational knowledge to the environment instead of taking it away. In addition to respecting Indigenous knowledge, the other farmers also shared that serving their immigrant African community with culturally appropriate seeds and plants was extremely important to them. They also spoke about anti-capitalist perspectives of cost sharing, labor sharing, and food sharing. Mace, in particular, shared that

The thing that comes to mind for me about like, farming and growing, is the community aspect. Like you're doing it because we're sharing food. And we're providing food for a group of people. And if you have a community of like, people bring food, like you can share and trade... you can come together as a group together, and it's not gonna cost you any money

It is perhaps these culturally appropriate values of the farm that seeped into every aspect of their hopes, desires, and concerns about AI systems. After engaging in activities that mimicked an AI decision-making system, the farmers had more to share about their thoughts on AI in particular. Dill, another farmer, shared that it was crucial *who* got access to AI to truly discern if it is going to be of benefit. He shared,

I think also with AI, whether beneficial or not, also depends on the AI gets access to it, or and like who is doing the programming, or the AI? ... [people] don't

want to buy food that's been grown in a monoculture. They want to buy from local farmers actually growing their food. And so if it's accessible to those people that I think in the right hands, [AI] can do well, a lot.

Finally, we want to end with a quote that perfectly encapsulates the data ownership and data stewardship being reflected in their hopes for AI. Sage shared that

I think [AI technology] should be like relics of community. It is all of us who, you know, steward this land and, you know, create this technology... private companies [should not] be able to access, like, that kind of data because they would be making a profit on it. And that is not to the benefit of the community in any way.

Sage's thoughts again highlight the desire for data sovereignty relating to self-governance in communities as they call it 'relics of community'. They are also critical of for-profit communities making data-based decisions for the communities.

We learned a lot from this experience. As a particular example, Mace mentioned the importance of the Indigenous practice of Traditional Ecological Knowledge (TEK) in her farming practice. As AI education researchers and developers, such insight is important to present as examples in our computing classrooms or to develop appropriate AI farming systems. Overall, it was important for us to conduct a community-oriented AI education workshop because it gave us a chance to explore the perceptions of local communities already working toward emancipatory, anti-colonial, and justice-oriented approaches through their food initiatives. In this space, we brought the conversation of fast-growing AI models and how they fit in with their world. Together, we could dwell on how we can approach being prepared for an AI-imbued world. This, in turn, made us reflect on the implications of a possible 'data apartheid' and the importance of data sovereignty parallel to food sovereignty.

Although we as researchers and scholars in the ivory towers of academic institutions or research programs could feel strongly about data sovereignty, it is extremely important to reflect on what our local communities feel as well, and where the conversation of 'data sovereignty' started: from Indigenous scholarship. Finally, we feel that it is important to share these very real community voices and Indigenous scholarship, in addition to our own voices to inform future AI policies that might worsen data apartheid. We share some of our reflections on research informing policy and vice-versa in the next section.

5 REFLECTIONS FOR THE RESPECT COMMUNITY: RELATIONSHIP BETWEEN RESEARCH AND POLICY

Our research and reflection on data sovereignty was motivated by the *Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence* [2]. Thus, in short, the current policies of AI use in society motivated us to begin our scholarly work.

It is noteworthy that the executive order has sections that pertain to promoting equitable civil rights and public benefits when algorithmic systems are used. Some of these specific policies are

still to emerge. For instance, it says that ‘in consultation with relevant agencies’ the Secretary of HHS will soon write guidelines to ensure equitable distribution of public benefits. But, how can we ensure that those upcoming policies indeed benefit the communities they should be serving? Who are the ‘relevant agencies’? How can we ensure these policies provide space for self-governance of data as advocated by Indigenous communities? It is important for us as researchers to help inform these policymakers about the happenings on the ground and in various communities, especially various Black, Brown, and Indigenous communities. As one can recall from earlier, it was the ground-up community initiatives that had the most success, even when compared to government-led food security initiatives [4]. Any step toward informing policymakers would help immensely in taking a step toward data sovereignty.

Our preliminary collaborative study provided us with a starting point to conduct speculative co-design of community-led anti-colonial AI models that will work toward their values, self-advocacy, and data sovereignty. We hope to share these case studies in various forums to help policymakers come up with appropriate regulations for AI. We also hope to share our thoughts in various research, scholarship, and reflection forums such as the RESPECT conference. We hope the ideas of community engagement and conducting justice-oriented AI research will help us to create a strong shared narrative about the practices we need to work toward data sovereignty.

6 AUTHOR POSITIONALITY

First Author: I am a South Asian woman who grew up in a post-colonial country, India. My family and my country still feel the lasting effects of colonialism: the least exemplified by the ‘passport privilege’ to attend the very conferences where we wish to share our ideas. There are, of course, more intense examples! But given this background, I am very sensitive to structural inequities, now exacerbated by intense data availability, that affect so many communities around the world. The rights to basic necessities like water, shelter, and education are constantly in my mind whenever I reflect on my country. As I am now a scholar in the United States, I hope to use my voice and lived experiences to work toward data sovereignty, adding to the narrative on basic human rights. This paper is but a tiny step in that direction.

Second Author: My upbringing in India shaped by its colonial past has profoundly influenced my research in Data Sovereignty and Justice-oriented, Community-based AI Education. This background has equipped me to draw parallels between historical colonization, where a select few controlled essential resources like water and electricity, and today’s landscape of data control, where, similarly, a small group holds disproportionate power over crucial digital resources. A similar comparison underscores the stark divide that exists today between those who have access to data and those who do not. Furthermore, transitioning from a post-colonial country to an academic position in the United States has highlighted the urgency of critically examining data sovereignty amidst global disparities in knowledge and power.

Author Note: As South Asians, our thoughts on anti-colonialism are colored also by anti-capitalistic views. The East India Company was a highly capitalistic trading monopoly. Its over-taxation and commercialization of Indian agriculture led to many famines that

not only affected Indians in the past [6] but have sustained effects on the health of current generations of Indians [26] Although such is the case in India, we believe colonial capitalism has also affected many communities in Asia, Africa, and various other colonized Indigenous communities [9].

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