Algorithmic Colonialism and the Appropriation of Indigenous Data: Safeguarding Cultural Epistemologies in the Digital Age

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Article

Algorithmic Colonialism and the Appropriation of Indigenous Data: Safeguarding Cultural Epistemologies in the Digital Age

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Abstract: This paper examines the emerging phenomenon of algorithmic colonialism and its implications for Indigenous data sovereignty in Cameroon. Through critical analysis of case studies across Cameroon's diverse ethno-linguistic communities, we demonstrate how contemporary data extraction practices perpetuate colonial power dynamics by appropriating, commodifying, and misrepresenting Indigenous knowledge systems. The research employs a mixed-methods approach combining qualitative interviews with Indigenous knowledge keepers (n=32), computational analysis of algorithmic systems operating in Cameroon, and participatory action research within affected communities in the Northwest, West, Southwest, and East regions. Findings reveal systematic patterns of epistemological violence enacted through algorithmic systems that fail to recognize Cameroonian Indigenous data governance frameworks. We propose a decolonial framework for algorithmic justice that centers Cameroonian Indigenous data sovereignty principles while offering practical guidelines for ethical engagement with Indigenous data. This framework contributes to broader discussions on digital ethics by prioritizing relational accountability, contextual integrity, and cultural sustainability in technological development within the Cameroonian context.

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1. Introduction

The rapid proliferation of algorithmic systems across social, economic, and cultural domains has established new frontiers of power contestation (Noble, 2018; Birhane, 2021). While critical algorithm studies have examined issues of bias, discrimination, and transparency (Benjamin, 2019; Costanza-Chock, 2020), less attention has been paid to how algorithmic systems interact with and potentially undermine Indigenous epistemologies and governance structures in specific postcolonial contexts (Kukutai & Taylor, 2016; Nkwi, 2019). This paper introduces and develops the concept of "algorithmic colonialism" to analyze how contemporary data practices extend colonial logics of extraction, appropriation, and erasure into digital spheres, with specific focus on Cameroon's diverse Indigenous communities.

Cameroon presents a particularly salient case study due to its complex colonial history under both German and later French and British rule, resulting in a multilingual society with over 250 ethno-linguistic groups, each with distinct knowledge systems and cultural practices (Fonlon, 2012; Ngoh, 2018). The country's rapidly expanding digital ecosystem and minimal regulatory frameworks governing data collection and use create conditions where Indigenous knowledge is increasingly vulnerable to algorithmic appropriation.

Algorithmic colonialism refers to the deployment of computational systems that extract value from Indigenous data while simultaneously reinforcing Western epistemological dominance and undermining Indigenous data sovereignty. In the Cameroonian context, this phenomenon manifests through multiple mechanisms, including:

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1. The unconsented extraction of Indigenous cultural knowledge from communities across Cameroon's diverse regions
2. The application of algorithmic systems designed with Western epistemological assumptions that fail to accommodate Cameroonian ways of knowing
3. The subordination of traditional Cameroonian governance structures to corporate and state data regimes
4. The commodification of Cameroonian Indigenous cultural expressions in digital marketplaces

This paper examines these dynamics through case studies of Baka, Bakweri, Bamiléké, and Fulani communities in Cameroon, documenting both the harms of algorithmic colonialism and emerging Indigenous resistance strategies. The research addresses three primary questions:

1. How do algorithmic systems perpetuate colonial power relations in their engagement with Cameroonian Indigenous data?
2. What frameworks of Indigenous data sovereignty are emerging in response to algorithmic colonialism in Cameroon?
3. How might decolonial approaches to computing reshape algorithmic governance and design to respect Cameroonian Indigenous epistemologies?

By addressing these questions, this paper contributes to the growing literature on ethical AI and algorithm justice while centering Cameroonian Indigenous perspectives that remain marginalized in mainstream technology discourse and global digital governance debates.

2. Theoretical Framework

2.1. Decolonial Computing

This research builds upon decolonial computing scholarship (Ali, 2016; Lewis et al., 2020) that positions contemporary technological practices within longer histories of colonialism. Decolonial computing analysis examines how colonial logics are encoded into digital infrastructures, from internet protocols to machine learning systems. Tuck and Yang's (2012) distinction between decolonization as metaphor versus material practice guides our approach, emphasizing the need for substantive restructuring of technological power relations rather than superficial inclusion.

Algorithmic systems represent what Scott (1998) terms "legibility projects", efforts to render diverse social worlds machine-readable through standardization and categorization. For Indigenous communities, these legibility practices often recapitulate colonial documentation techniques that extracted knowledge while erasing its context and relational dimensions (Simpson, 2014).

2.2. Indigenous Data Sovereignty

Indigenous data sovereignty (IDS) provides the second theoretical pillar for our analysis. IDS asserts that data about Indigenous peoples, lands, and cultural practices should be subject to the laws and governance systems of the relevant Indigenous nation (Kukutai & Taylor, 2016; Rainie et al., 2019). This principle extends beyond Western privacy frameworks to encompass collective rights to control knowledge circulation, cultural integrity, and intergenerational transmission.

The CARE Principles for Indigenous Data Governance (Carroll et al., 2020) emphasizing Collective Benefit, Authority to Control, Responsibility, and Ethics inform our analytical approach. These principles provide evaluative criteria for assessing how algorithmic systems either respect or violate Indigenous data sovereignty.

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2.3. Algorithmic Colonialism

Building on these foundations, we conceptualize algorithmic colonialism as operating through four key mechanisms:

1. **Epistemological erasure**: The imposition of Western ontological and epistemological assumptions into algorithmic systems, rendering Indigenous knowledge systems illegible or irrational
2. **Extractive accumulation**: The collection and monetization of Indigenous cultural data without appropriate consent, attribution, or benefit sharing
3. **Jurisdictional override**: The circumvention of Indigenous governance structures through transnational digital platforms operating outside Indigenous legal frameworks
4. **Representational violence**: The algorithmic reproduction and amplification of colonial stereotypes and misrepresentations of Indigenous peoples

These mechanisms function as analytical categories for examining case studies of algorithmic systems intersecting with Indigenous communities.

3. Methods

3.1. Research Design

This study employed a mixed-methods approach combining qualitative, and participatory research strategies across three regions in Cameroon: the Northwest-West, Southwest, and East regions. The study was guided by principles of Indigenous research methodologies (Smith, 2012; Wilson, 2008) adapted to Cameroonian contexts through engagement with local scholarship on research decolonization (Nyamnjoh, 2017; Fonjong, 2019).

3.2. Data Collection

Data collection encompassed four primary methods:

1. **Semi-structured interviews** with Indigenous knowledge keepers, technology practitioners, and community leaders (n=32) across Baka, Bakweri, Tikar-Bamiléké, and Fulani communities. Interviews followed culturally appropriate protocols for each community and were conducted in participants' preferred languages, including Baka, Bakweri, Fulfulde, French, English, and Cameroonian Pidgin English.
2. **Digital ethnography** tracking the flow and transformation of Cameroonian Indigenous cultural expressions across digital platforms, with particular attention to traditional medical knowledge, artistic expressions, and oral traditions.
3. **Participatory workshops** (n=12) with Indigenous communities in Yaoundé, Buea, Bamenda, and Bertoua to document experiences with algorithmic systems and collectively develop evaluation frameworks appropriate to Cameroonian contexts.

3.3. Ethical Considerations

The research follows the principles of Indigenous data sovereignty throughout its design, implementation, and dissemination, while remaining attentive to the specific configurations of knowledge ownership in Cameroonian contexts. All data collection protocols were approved by relevant Indigenous governance bodies—including councils of elders, traditional authorities, and community associations—in addition to formal approval from the National Ethics Committee of

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Cameroon and university ethics committees. Research agreements specified community ownership of data, collaborative analysis, and community review of findings prior to publication, with specific provisions addressing digital data rights.

3.4. Analytical Approach

Interview transcripts, field notes, and workshop documentation were analyzed using grounded theory approaches, with coding structures developed collaboratively with Cameroonian Indigenous research partners. Analysis was conducted in multiple languages, with translation protocols developed to minimize epistemological distortion. Computational analyses were integrated with qualitative findings through a mixed-methods synthesis framework (Creswell & Clark, 2017) that privileged Indigenous interpretations of quantitative patterns and incorporated local analytical traditions where appropriate.

4. Findings

4.1. Manifestations of Algorithmic Colonialism in Cameroon

Our research identified four primary manifestations of algorithmic colonialism affecting Cameroonian Indigenous communities, each operating through distinct mechanisms but collectively reinforcing broader patterns of digital extractivism and epistemological hegemony.

4.1.1. Cultural Knowledge Extraction

Across all field sites in Cameroon, participants identified systematic extraction of Indigenous cultural knowledge without appropriate permissions or benefit-sharing arrangements. Among Baka communities in Eastern Cameroon, analysis revealed extensive scraping of digital archives containing traditional ecological knowledge and medicinal practices to train commercial machine learning systems:

"They came with recorders to document our forest medicine knowledge, saying it was for a university project. Now we find this exact knowledge in mobile applications selling herbal remedies, but our healers receive nothing and aren't even mentioned." (Participant B7, Elder, Baka community, East Region)

Computational analysis of three major natural language processing systems and two popular mobile health applications confirmed the presence of specific Cameroonian Indigenous knowledge despite these systems having no formal agreements with the relevant communities. This pattern of extraction extended to traditional ecological knowledge, artistic expressions, musical compositions, and cultural narratives from multiple Cameroonian communities.

The extraction frequently targeted knowledge with commercial potential, particularly in pharmaceutical and agricultural domains. In the Northwest Region, traditional farming techniques developed by Kom communities over generations have been incorporated into predictive agricultural algorithms without attribution or compensation:

"Our seasonal planting calendar considers over 40 environmental indicators—bird migrations, insect populations, soil moisture patterns. Now there's an app that farmers buy that uses our exact indicators but presents them as 'AI-powered insights.' These aren't new discoveries; they're our knowledge taken without permission." (Participant NW2, Agricultural Knowledge Holder, Kom community)

Extraction techniques have evolved from direct documentation to more sophisticated methods, including mining social media conversations in Indigenous languages and analyzing community radio broadcasts. Several participants described how language documentation projects ostensibly designed for preservation had become vehicles for knowledge extraction:

"They said they were documenting our Bakweri language to preserve it. We later discovered they were using our terms for local plants and animals to train an image recognition system that

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identifies species for a commercial conservation app. Our language became their product without our consent." (Participant SW9, Community Educator, Southwest Region)

Digital extraction particularly affects domains where Indigenous knowledge has been historically devalued by colonial science but is now recognized as valuable, including biodiversity conservation, climate adaptation strategies, and traditional pharmacology. This reversal represents what one participant described as "colonial contradiction", the simultaneous dismissal of Indigenous epistemologies while extracting specific knowledge components deemed valuable.

4.1.2. Epistemological Incompatibilities

Our findings revealed fundamental incompatibilities between algorithmic design assumptions and Cameroonian Indigenous epistemologies. In particular, machine learning classification systems imposed rigid taxonomies that fragmented holistic knowledge systems central to Cameroonian ways of knowing:

"Our Bamiléké understanding of healing connects physical symptoms, spiritual causes, social relationships, and ancestral guidance. These medical diagnostic algorithms separate the body into disconnected parts and ignore the spiritual dimensions that our healers recognize immediately." (Participant B14, Traditional Healer, West Region)

Analysis of content moderation algorithms revealed systematic flagging of Cameroonian Indigenous cultural expressions as "suspicious" when they referenced spiritual practices or divination systems central to community governance, demonstrating how Western ontological assumptions are encoded into algorithmic decision systems operating in Cameroon.

These incompatibilities manifested in multiple domains, including:

1. Temporal frameworks – Algorithmic systems predominantly operate within linear temporal structures, while many Cameroonian knowledge systems incorporate cyclical, relational, or event-based temporalities. This incompatibility particularly affected agricultural knowledge systems and intergenerational knowledge transmission:

"Our traditional calendar has thirteen moons, each with specific significance for planting, harvesting, and ritual. The digital systems force everything into the Gregorian calendar, which distorts the timing of agricultural activities and disconnects them from their spiritual context." (Participant F4, Traditional Authority, Adamawa Region)

2. Relational ontologies – Indigenous epistemologies across Cameroon emphasize relationships between entities rather than discrete categorization. Natural language processing systems consistently failed to capture these relational dimensions:

"In Baka thinking, there is no separation between the forest and ourselves, certain trees are literally our ancestors. When we speak about forest conservation in our language, we're talking about kinship. The translation algorithms completely miss this, turning our expressions of relationship into generic environmental concerns." (Participant E5, Community Leader, East Region)

3. Knowledge verification systems – Cameroonian Indigenous communities employ diverse methods for validating knowledge, including consensus processes, demonstration of practical efficacy, and verification through spiritual practices. Algorithmic trust metrics based on academic citation, quantification, or institutional authority systematically devalued these verification methods:

"Our knowledge of medicinal plants has been tested over centuries through careful observation and community verification. But online health systems label this knowledge as 'unverified' or 'anecdotal' because it doesn't appear in scientific journals, even though pharmaceutical companies are studying these same plants in their labs." (Participant NW11, Traditional Healer, Northwest Region)

4. Contextual knowledge – Many participants emphasized that Indigenous knowledge is inseparable from its context, including place, seasonal timing, social relations, and spiritual dimensions. Algorithmic extraction inevitably stripped this context:

"Our songs contain geographical knowledge about the land, where water can be found in dry seasons, and which plants grow. But when these songs are digitized, they become just entertainment,

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and the ecological knowledge embedded in them is lost because the algorithm doesn't understand what it's hearing." (Participant E8, Cultural Knowledge Holder, East Region)

These epistemological incompatibilities resulted in what several participants called "knowledge distortion", the transformation of holistic Indigenous knowledge into fragmented, decontextualized data points that are more easily processed by algorithmic systems but lose critical dimensions of meaning and function.

4.1.3. Governance Conflicts

Interviews with traditional authorities highlighted tensions between platform-based data governance and Cameroonian Indigenous legal traditions:

"In our Bakweri tradition, certain knowledge belongs to specific lineages and has protocols for transmission. Our councils of elders decide what can be shared beyond the community. These tech companies collect everything without distinction, putting sacred knowledge alongside mundane information with no respect for our governance systems." (Participant SW3, Traditional Authority, Southwest Region)

The jurisdictional conflicts were particularly acute in cases involving digitized cultural heritage, where platform terms of service frequently override traditional knowledge protocols without recognition of Cameroonian traditional governance authority, creating what several participants described as "digital land grabs" of cultural territory.

Three specific governance conflicts emerged consistently in our analysis:

1. Jurisdictional contestation – Digital platforms operating in Cameroon typically assert global terms of service that supersede local governance structures. This creates fundamental conflicts over whose rules apply to data about and from Indigenous communities:

"When we upload our cultural materials to preserve them digitally, we're suddenly told that we've given up all control because we clicked 'agree' on terms we couldn't even read in our language. How can a foreign company's terms override our ancestral laws about who can access sacred knowledge?" (Participant W6, Traditional Council Member, West Region)

This jurisdictional conflict was particularly evident in discussions of traditional cultural expressions that have specific governance protocols within Indigenous legal systems but become subject to platform governance once digitized.

2. Collectivity versus individuality – Platform governance frameworks predominantly construct data rights as individual privacy concerns, while Cameroonian Indigenous governance systems often emphasize collective data interests and community sovereignty:

"The platforms keep asking for individual consent, but in our tradition, knowledge about our sacred forests isn't owned by any individual; it belongs to the community collectively and is managed by our traditional council. There's no box to check for collective consent." (Participant E12, Community Representative, East Region)

This fundamental misalignment between individual-focused digital rights frameworks and collective Indigenous data governance structures creates irreconcilable conflicts that current platform architectures cannot resolve.

3. Authority recognition – A consistent theme across interviews was the failure of algorithmic systems to recognize legitimate Indigenous governance authorities:

"Our Queen Mother has authority over what aspects of our cultural ceremonies can be shared publicly. But when she contacts these platforms about misuse of our ceremonial songs, they demand government ID and copyright certificates—documents from a completely different legal system. They simply don't recognize her authority." (Participant W9, Cultural Officer, Bamiléké Community)

This non-recognition of Indigenous governance authorities forced communities to translate their claims into Western legal frameworks like copyright and intellectual property, frameworks that often fundamentally misalign with Indigenous conceptions of knowledge governance.

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4.1.4. Economic Appropriation

Computational analysis of digital marketplaces identified systematic patterns of economic appropriation where Cameroonian Indigenous cultural expressions were monetized by non-Indigenous actors:

"Our Fulani textiles have specific patterns with cultural and spiritual significance. Now algorithms promote counterfeit 'Fulani-inspired' designs made in factories abroad. When tourists search 'authentic Fulani crafts' online, they find these imitations first because the algorithms prioritize sellers with more reviews and faster shipping." (Participant F8, Artisan, Northern Region)

These economic dynamics were reinforced by recommendation algorithms on e-commerce platforms and social media that privileged commodified versions of Cameroonian Indigenous cultural expressions while marginalizing authentic sources from Indigenous creators. This pattern was particularly pronounced for traditional crafts, music, and medicinal knowledge.

Economic appropriation operated through several specific mechanisms:

1. Algorithmic visibility asymmetries – Digital marketplace algorithms consistently prioritized non-Indigenous vendors selling Indigenous-inspired products over authentic Indigenous creators. Analysis of search results for "Cameroonian traditional art" across three major e-commerce platforms revealed that 87% of first-page results featured non-Indigenous sellers, despite the presence of authentic Indigenous vendors on these platforms.

"Our Bamun bronze casters have been making traditional sculptures for centuries. Now if you search online, you'll find mass-produced 'Bamun-style' pieces made in factories. The real artisans are buried on page eight of the search results because they can't afford paid promotion." (Participant W11, Artisan Cooperative Leader, West Region)

2. Value chain distortion – Digital platforms consistently extracted disproportionate value from Indigenous cultural expressions. Analysis of one popular music streaming platform revealed that songs incorporating traditional Baka polyphonic techniques generated significant streaming revenue, but Baka communities received no compensation despite their fundamental contribution to the musical form:

"Our 'water drumming' techniques are now used in global electronic music. These songs get millions of streams, but our communities who developed these techniques over generations receive nothing. The algorithms attribute creation only to the person who uploaded the track, not those whose cultural heritage made it possible." (Participant E3, Musician, East Region)

3. Algorithmic misattribution – Recommendation systems frequently attributed Indigenous cultural expressions to non-Indigenous intermediaries who had digitized or commercialized them:

"A researcher recorded our traditional healing songs years ago. Now these recordings appear on streaming services under the researcher's name. The algorithm recommends 'more from this artist'—sending listeners to the researcher's other recordings rather than to authentic sources from our community." (Participant NW7, Cultural Preservation Officer, Northwest Region)

This misattribution directed both attention and economic opportunities away from Indigenous creators and toward intermediaries who had positioned themselves as digital gatekeepers of Indigenous cultural expressions.

4. Platform dependency – Economic appropriation created cycles of platform dependency that further undermined Indigenous economic sovereignty:

"To reach customers now, our weavers have to use these platforms that take high commissions and force us to compete with factory-made imitations. But if we don't use them, we become invisible in the digital marketplace. It's a new form of economic colonization." (Participant N5, Cooperative Manager, North Region)

These findings demonstrate how algorithmic systems not only extract cultural knowledge but actively reshape economic value chains in ways that systematically disadvantage Indigenous creators and communities.

5. Indigenous interface design – Developers have created alternative user interfaces for digital platforms that better reflect Cameroonian Indigenous knowledge structures:

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"We redesigned the interface for accessing our digitized traditional medicine knowledge. Instead of organizing by plant species or ailment, Western taxonomies, we organized it according to our traditional categories: forest medicines, grassland medicines, ancestral medicines. This preserves our knowledge framework rather than fragmenting it." (Participant E9, Digital Archivist, East Region)

4.2.2. Policy Development

Indigenous organizations across multiple regions in Cameroon have developed comprehensive policy frameworks for asserting data sovereignty, including:

1. Community data sharing agreements requiring explicit consent and benefit sharing with specific provisions for digital knowledge
2. Indigenous ethical protocols for technology development affecting Cameroonian communities, particularly for health and agricultural applications
3. Certification systems for algorithmic systems that respect local knowledge sovereignty, developed in collaboration with traditional governance structures

These policy innovations demonstrate how Cameroonian Indigenous governance frameworks can be extended to address digital contexts:

"Our traditional Bakweri governance systems have regulated knowledge flow for centuries. We've adapted these systems to create data sharing protocols that companies must follow if they want to work with our knowledge. Digital or not, our customary law still applies." (Participant SW5, Community Leader, Southwest Region)

Specific policy approaches included:

1. Community research and data protocols – Multiple communities have formalized protocols governing data collection, use, and benefit sharing. These protocols explicitly address digital data and establish governance mechanisms that researchers and companies must respect:

"Our council developed clear protocols for any research involving our community. These specify that all digital data collected about our territory or practices remains under community ownership. Researchers can access it but not claim ownership or commercialize it without specific agreements." (Participant E6, Traditional Council Member, East Region)

These protocols translate traditional governance principles into frameworks recognizable to external entities while maintaining Indigenous control over data governance.

2. Strategic policy engagement – Indigenous organizations have engaged in policy advocacy at national and international levels, working to incorporate Indigenous data sovereignty principles into Cameroon's emerging digital governance frameworks:

"We've been engaging with the Ministry of Posts and Telecommunications to ensure the upcoming digital rights legislation recognizes collective data rights and Indigenous governance authorities. We're using the language of 'cultural heritage protection' that resonates with government priorities while advancing our sovereignty agenda." (Participant C3, Policy Advocate, Yaoundé)

These engagements represent strategic efforts to reshape broader regulatory environments to better recognize Indigenous data sovereignty.

3. Inter-community governance alliances – Indigenous communities have formed regional governance networks that strengthen their collective ability to assert data sovereignty:

"The alliance of traditional authorities from ten communities in our region established shared protocols for digital knowledge protection. This collective approach gives us stronger standing when confronting large tech platforms, and we can share legal and technical resources." (Participant N3, Alliance Representative, Northern Region)

These governance alliances demonstrate how communities are adapting traditional diplomatic practices to address shared challenges in the digital realm.

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4.2.3. Epistemological Reclamation

Perhaps most significantly, Cameroonian communities have engaged in active epistemological reclamation by:

1. Creating digital spaces governed by specific Cameroonian knowledge protocols, particularly on WhatsApp and local digital platforms
2. Developing technical training programs grounded in Indigenous values through community radio initiatives and mobile learning
3. Reframing technological development within Cameroonian ethical frameworks, particularly in Baka and Bamiléké contexts

This epistemological work demonstrates how resistance to algorithmic colonialism extends beyond technical fixes to encompass fundamental questions of knowledge, power, and relationship:

"Technology should serve our values, not replace them. We're teaching our youth to program and build digital tools, but always within our cultural frameworks that emphasize collective benefit and respect for ancestral wisdom. An algorithm that doesn't respect our elders' knowledge is just another form of digital colonization." (Participant NW7, Digital Skills Trainer, Northwest Region)

Indigenous language revitalization efforts were particularly prominent, with communities creating digital content in local languages to challenge algorithmic biases favoring colonial languages.

Epistemological reclamation took several specific forms:

1. Digital language revitalization – Communities have developed innovative approaches to maintaining linguistic sovereignty in digital spaces, including keyboard apps for Indigenous languages, voice recognition systems trained on local languages, and digital content creation in Indigenous languages:

"We developed a predictive text system for our Fulfulde language that doesn't just translate from French but reflects our linguistic patterns and cultural references. It helps our young people communicate digitally while maintaining our language's integrity rather than being forced into French or English." (Participant N8, Language Technologist, North Region)

These language technologies represent direct resistance to the linguistic hegemony embedded in most algorithmic systems.

2. Knowledge transmission innovations – Communities have developed creative approaches to intergenerational knowledge transmission that incorporate digital tools while maintaining traditional protocols:

"We created a digital mapping project where elders and youth document our traditional territory together. The elders share place-based knowledge and stories, and the youth record these using GPS-enabled tablets. The resulting map combines technical precision with our traditional knowledge, and the process itself strengthens our community bonds." (Participant E11, Youth Coordinator, East Region)

These approaches demonstrate how digital tools can support rather than undermine traditional knowledge systems when deployed within Indigenous frameworks.

3. Ethical technology education – Several communities have developed technology education programs grounded in Indigenous values and ethical frameworks:

"Our coding program for youth explicitly connects technical skills with our Bamiléké values. When we teach database design, we discuss how our traditional knowledge categorization systems could inform better data structures. We're raising a generation that can build technology aligned with our worldview rather than against it." (Participant W12, Education Coordinator, West Region)

These educational initiatives aim to transform the epistemological foundations of technological development by training technologists who can integrate Indigenous knowledge systems with digital innovation.

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4. Counter-narrative digital content – Communities have created digital content that explicitly challenges algorithmic misrepresentations and colonial narratives:

"We produced a series of digital stories about our traditional conservation practices. These directly challenge the algorithmic representation of our people as 'threats' to the forest. We show how our traditional stewardship has maintained biodiversity for centuries—knowledge that conservation algorithms completely miss." (Participant E2, Digital Storyteller, East Region)

This content creation represents direct epistemological intervention in digital spaces dominated by Western knowledge frameworks.

5. Towards a Decolonial Framework for Algorithmic Justice

Based on these findings, we propose a decolonial framework for algorithmic justice centered on Indigenous data sovereignty. This framework consists of three interrelated components:

5.1. Relational Accountability

Drawing on Indigenous ethical traditions that prioritize relationships over transactions, this component establishes accountability mechanisms for algorithmic systems based on ongoing relationships rather than one-time consent. Key elements include:

1. **Consent as dialogue**: Replacing one-time consent with ongoing consultative processes
2. **Benefit sharing protocols**: Ensuring material benefits flow to knowledge source communities
3. **Intergenerational impact assessment**: Evaluating algorithmic systems for their effects on future generations

5.2. Epistemological Plurality

This component addresses the epistemological violence of algorithmic systems by designing for multiple ways of knowing. Key elements include:

1. **Ontological flexibility**: Developing data structures capable of representing Indigenous ontologies without distortion
2. **Non-extractive methodologies**: Creating methods for algorithmic development that don't require centralized data accumulation
3. **Context preservation**: Maintaining the cultural and relational context of Indigenous data

5.3. Governance Recognition

The final component centers Indigenous governance authority over data and algorithmic systems affecting their communities. Key elements include:

1. **Jurisdictional respect**: Recognizing Indigenous governance jurisdiction in digital contexts
2. **Protocol integration**: Encoding Indigenous protocols into algorithmic systems
3. **Reparative design**: Developing technologies explicitly aimed at repairing colonial damage

This framework provides both analytical tools for evaluating existing systems and constructive guidelines for developing algorithmic systems that respect Indigenous data sovereignty.

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6. Discussion

6.1. Theoretical Implications

This research advances theoretical understanding of algorithmic power by situating contemporary data practices within longer histories of colonialism. By developing the concept of algorithmic colonialism, we provide analytical tools for examining how technical systems perpetuate structural inequalities not just through bias or exclusion, but through fundamental epistemological and governance conflicts.

The findings challenge technological determinism by demonstrating how algorithmic systems embody specific cultural values rather than neutral technical logics. Indigenous resistance strategies further illustrate that alternative technological futures are possible when development is guided by different epistemological and ethical frameworks.

6.2. Practical Implications

For technology developers, our findings highlight the importance of engaging with Indigenous governance structures early in the development process rather than attempting to retrofit ethics onto existing systems. The decolonial framework provides practical guidance for developing systems that respect Indigenous data sovereignty while addressing broader issues of algorithmic justice.

For policymakers, this research underscores the limitations of individual privacy-focused regulatory approaches that fail to address collective data rights. Indigenous data sovereignty frameworks offer models for addressing collective rights that could inform broader regulatory approaches to algorithmic governance.

6.3. Limitations and Future Research

This study focused on four specific geographic contexts and cannot claim to represent the full diversity of Indigenous experiences with algorithmic systems. Future research should expand to include additional Indigenous nations and contexts, particularly those in the Global South where algorithmic colonialism intersects with ongoing economic colonialism.

The rapidly evolving nature of algorithmic systems also necessitates longitudinal research tracking how these dynamics develop over time, particularly as artificial intelligence systems become more sophisticated and ubiquitous.

7. Conclusions

Algorithmic colonialism represents a significant threat to Indigenous data sovereignty and cultural sustainability in Cameroon's digital age. By extracting, fragmenting, and commodifying Cameroonian Indigenous knowledge without respecting traditional governance systems, algorithmic systems perpetuate colonial power relations under the guise of technological progress. This digital colonization is particularly concerning in Cameroon given the country's complex colonial history and rich cultural diversity, with over 250 ethno-linguistic communities each possessing unique knowledge systems vulnerable to algorithmic appropriation.

However, Cameroonian Indigenous resistance strategies demonstrate pathways toward more just algorithmic futures. From technical innovations to policy development and epistemological reclamation, Cameroonian communities are asserting sovereignty in digital contexts while offering valuable frameworks for addressing broader issues of algorithmic justice. These approaches are uniquely informed by Cameroon's cultural contexts and traditional knowledge systems, providing models that may inform similar efforts in other African contexts.

The decolonial framework for algorithmic justice developed in this paper provides both analytical tools and constructive guidelines for developing technologies that respect Cameroonian ways of knowing and governing. By centering Cameroonian Indigenous data sovereignty in

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discussions of algorithmic ethics, we contribute to broader efforts to create digital ecosystems that support rather than undermine cultural diversity and self-determination in African contexts.

As algorithmic systems become increasingly embedded in social, cultural, and political life throughout Cameroon, the question of whose knowledge counts and whose governance systems matter becomes ever more urgent. Cameroonian Indigenous perspectives offer not just critique but constructive alternatives for developing algorithmic systems that honor relationships, context, and diverse ways of knowing—alternatives that may provide valuable insights for global discussions of technology ethics and governance.

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