Decolonizing Technologies for Preserving Cultural and Societal Diversity

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Abstract

Digital implementations of colonialism have resulted in the further marginalization of under-represented social, cultural, and racial communities in the West as well as indigenous cultures of the Global South. We propose that ethno-mathematics and ethno-computing principles can be applied to mitigate issues of systemic bias in technology development and integration by promoting social and cultural diversity that centers broader communities of impact worldwide. This paper posits guidelines for the development of "Decolonizing Technologies" to counter digital colonialism and preserve cultural diversity among marginalized and indigenous communities. This will lead to a production of technologies that better enrich our planet and mitigate the need to provide racial and cultural amendments to current technologies that perpetuate racial and cultural disparity in our world.

Author Keywords

Design justice; Intersectionality; Critical Race Theory; Black feminism; Culturally-Relevant Technology; HCI.

Introduction

The world is flattening, and it is problematic.
In 2005, Thomas Friedman coined the phrase "The World is Flat" which was inspired by Christopher Columbus confiding in his wife, "I think the world is flat" upon his 'discovery' of America [8]. Rather than this 'flattening' of the world that Friedman speaks of, referencing the physical dimensions of the planet, it references something even more challenging. Flattening of the world encapsulates the globalization of

our commerce and increasing interconnectedness in political, social, and economic arenas.

Digital Colonialism
With global infusion of accessible and available technology, primarily in the mobile markets, digital colonialism gains ground as a means of flattening the world toward a culture that centers the global north, and more specifically the expansion and priorities of the United States of America. Through control of the digital ecosystem and computer mediated experiences, technology companies are obtaining power to control our political, economic and cultural domains of life [14].

Many technological decisions are not singularly made on the basis of the characteristic effects of the technologies alone. Political, economic, ideological and cultural motives drive these developments [25]. Computational artifacts are influenced by their creators' values, affiliations, ideologies, beliefs or aesthetics. This can limit their application across multiple cultural domains. Global integration of permeating technologies, that are quickly becoming the necessity for engagement in local society, can create a unidirectional influence of cultural appropriations that can endanger the perpetuation of local cultural values, norms or methods of interaction that are key to the preservation of knowledge and products of many indigenous and vernacular communities.

Cultural Assimilation and Extinction
Globalization is reshaping our world to promote western cultures and ideals and to exterminate those of smaller communities. The adoption of western languages is impacting how the global south educates their children. As a result, many low population ethnic groups are facing an extinction of their mother tongue languages [11]. When we lose our human cultural heritage, we lose access to the wisdom found in oral history, poetry, proverbs, stories, jokes, riddles, and games. In losing these artifacts, we also lose access to even more robust

metadata about human cognition across cultures [6]. Who would know how these themes could be used to create future technologies to serve others in the global landscape?
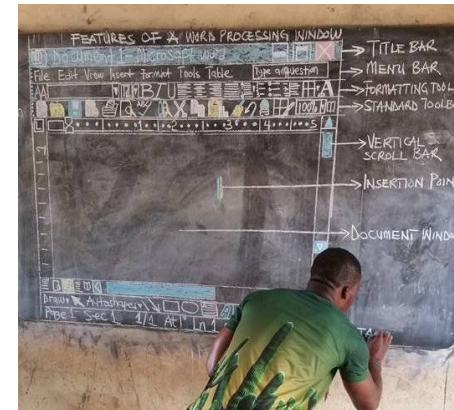

Figure 1. Richad Akoto teaches Microsoft Word to Students in a Ghanian school with no computers [27]

Background
There are many factors that promote the colonization of our world through technology but none as prevalent as the impacts of Eurocentrism as promotion of barriers to diversity and inclusion in design. Past researchers have cited several examples of tools that have demonstrated the detrimental impacts of singularly focused design methods and the horrible impacts on non-white use cases [9, 10, 21]. Decolonizing technologies will need to address the prevalence of racism, sexism and cultural bias and its impact on our technology design and development.

Critical Race Theory

Advancing the work of critical legal studies, antiracist social theory, and radical feminism and womanism, critical race theory (CRT) as a framework developed to combat the subtle forms of racism that became prominent in America after the civil rights movement of the 1960s [3]. The foundational theoreticians, sociologists, and legal scholars of CRT include Derrick Bell, Alan Freeman, Kimberlé Crenshaw (who coined intersectionality), and Richard Delgado [3]. CRT acknowledges racism as well as other modes of oppression not as aberrations, but as fundamentally part of the fabric of our society. It posits that racism is difficult to eliminate because empowered groups (and those seduced by the possibility of power regardless of current access to it) materially benefit from its perpetuation [3]. Delgado and Stefancic identify four "large themes" of CRT: interest convergence or material determinism, revisionist interpretations of history, the critique of liberalism, and structural determinism. Additionally, having Marxist roots, CRT additionally interrogates how racialization functions in conjunction with economic forces. As with Black feminist theory, essentialism is rejected in favor of the concept that we all have complex, multitudal and intersecting identities and experiences [3].

Black feminist theory
Intersectionality, as coined and theorized by Kimberlé Crenshaw, involves being multiply burdened by oppressive systems (i.e. cisheteropatriarchy, racism, ableism, classism, homo- and queerphobia, transphobia, etc.) and the interaction of multiple oppressive systems to shape the lived experiences of multiply oppressed peoples [20]. Intersectionality is in opposition to single identity analysis, as all parts of one's identity impact their lived experience [20]. Notably, Black feminism theorizes oppression as structural, systemic, and institutional rather than individual or happenstance. Black feminist scholar Patricia Hill Collins proposes the idea of the matrix of domination: white supremacy, heteropatriarchy,

capitalism, and settler colonialism [13]. These systems are interconnected, working in conjunction to perpetuate oppression.

Ethnocomputing
Ethnomathematics researchers address the imbalance of perspectives that center Western and modern sciences as principle and indigenous tools and concepts as primitive [25]. As a result of ethnomathematical explorations through technology, the concept of ethnocomputing tools derived. These highly computational artifacts purposefully center communities and cultures of users [5, 6, 25]. The principles of enthnocomputing are inherently decolonial as they seek to counteract the imposition of the Eurocentric philosophy of science on non-western cultures. The goal is to address cultural imperialism in computer science and to allow room for less technologically advanced societies to contribute to the study of computer science in meaningful ways.

Racist and Sexist Technologies
Algorithmic Injustice
Recently, work has been done to highlight the ways in which artificial intelligence systems are discriminatory against marginalized people [19, 26]. It should be noted that these works have approached the problem from the perspective that the algorithm is unfair or unjust. The conclusion is that the introduction of balancing factors, such as diverse training data for machine learning algorithms, will remedy these digitized biases. However, the human-computer interaction perspective has largely been neglected, especially analyses of the design of these systems by humans.

Feminine as the new servant
The latest in ubiquitous technology is found in the form of a virtual conversational agent that serves as a voice-based assistant. Many of these digital assistants' default to 'feminine' sounding voices. According to one

article [12], users are offended that the choice to use a woman-like voice reinforces concepts that assistants who are more likely female will exhibit characteristics that are more submissive.

Technologies are designed that perpetuate racism and sexism. For instance, systems are trained to predict recidivism with data biased by the mass incarceration of Black and Brown people [15]. In this case, the designers did not understand the impact of such a technology on disenfranchised people. Another example of racism and sexism in technology is the output of the Google Search Engine, including categorizing Black people as apes [19]. These technologies reflect manifestations of a racist and sexist society.

We propose that the design of these systems is biased and sexist due to a) having consciously and unconsciously biased designers and b) a lack of people of color and women of color in the participatory design of the system. We assert that artificial intelligence systems reproduce structural oppression because of design injustice in addition to unjust algorithms.

Design Justice
The matrix of domination manifests among varying levels of the design process, including designers, intended users, and the design process itself [23]. According to Sasha Costanza-Chock, "Design justice focuses on the ways that design reproduces, is reproduced by, and/or challenges the matrix of domination. Design justice is also a growing social movement that aims to ensure a more equitable distribution of design's benefits and burdens; fair and meaningful participation in design decisions; and recognition of community based design traditions, knowledge, and practices" [23].

The manifestation of systemic, structural, and institutional oppression in artificial intelligence systems is harmful to and even dangerous for oppressed people.

In such a case, the burden of the system is not fairly distributed across races, violating the principles of design justice and furthering systemic oppression.

Decolonizing Technologies as Design Justice
For this paper we propose a disruptive approach to technology design that is grounded users' culture, ethnicity and societal citizenship prior to technology development across cultures. When technologies are designed for diverse users, often current interfaces most often designed for the global north are later adapted or appropriated to suit new users or environments (see Fig. 2). Once technologies have been developed their interaction design methods are imposed and deployed to users. In our approach, communities of use share knowledge sources and artifacts that inform the design of technologies that can be appropriately situated within their environments.
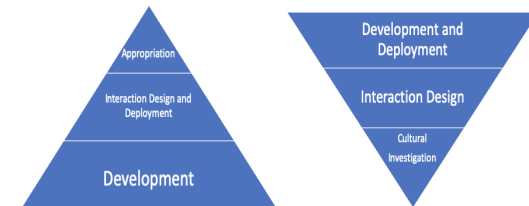

Figure 2: Traditional Appropriation as a Bottom Up Approach (a) and Decolonizing Technology Development Approach

Toward A Process for Decolonizing Technology Design
Employs Computational Ethnography
Computational Ethnography is the intersection of quantitative formal modeling with traditional ethnographic approaches [6]. This research methodology centers the users' natural interactions with their world, and more specifically with computing technologies, through observation and limited

engagement. The term ethnography is used to refer to a variety of approaches and its position in scientific inquiry is highly debated. Abramson et al. argue that thoughtful use of analytical rigor and transparency, scalability, replicability and validity will address the critiques of ethnographic tools for scientific inquiry [1]. Ethnographic research that supports the persistence of culture and identity include many artifacts in the Culturally Relevant Technology Domain [5, 17], along with enthnographic studies that embrace digital communities across the globe [16, 24] and others that implement non-traditional ethnographic methods as means for culture mining [2, 4, 7, 18].

Figure 3. Culture Bot: A Humanoid Robotic Agent that employs African American Vernacular Dialect to code switch with users.

Intersectional Design
Intersectionality seeks to provide dimension to the structures of oppression that perpetuate racial, cultural and social biases. When engaging in the development of Decolonizing Technologies, it is important to consider multiple avenues of bias. Employing anti-oppression frameworks [22], diversification of use-cases and considerations of subcultural contexts are methods for employing intersectional design. In Figure 3 we show the implementation of a humanoid robot that will code

switch with African American student interactions. Many users may not wish to employ only one type of dialect and may see technology that is not fluid as mocking or mischaracterizing.

Culturally Preserving
Employing cultural preservation techniques naturally expands the opportunity for designers and developers to include cultural objects to augment the users' experiences during their engagements. Technologies can be employed and designed to preserve and promote cultural, social and racial pride among use groups. Figure 4 shows a storytelling robot for African-American 2nd grade students that engages in African based folk tales.
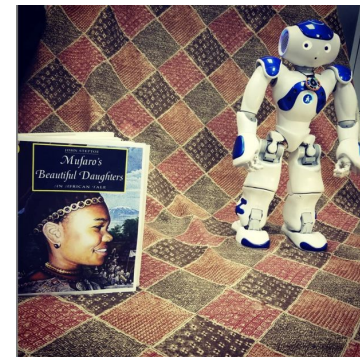

Figure 4. A storytelling robot that features culturally relevant engagements

Value Sensitive
Cultures and communities are often linked by a core set of values. As communities evolve, so their values, beliefs, lexicon and policies. It is paramount that communities and sub-communities of use continually engage in the development processes. It is not enough to sterilize technologies to mitigate cultural bias as this

will further segregate communities of use from necessary representations in technology domains.

Early users of Google search engines noticed that there were racist and stereotypical suggestions embedded into the application algorithms (see Fig. 4) [28]. Later Google removed any suggestions from culturally and racially motivated searches about black people. The latest version of the Google search engine has greatly reduced the culturally insensitive content and allows for users to report inappropriate content predictions (see Fig. 6).
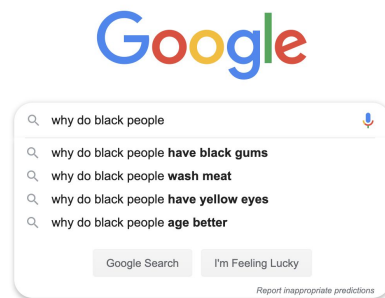

Figure 5. Early google search suggestions [28]

Figure 6. Current Google Search Results feature a link to report inappropriate predictions.

Conclusion

It is evident that the impact of computational resources on global communities will only increase over time. As many of these technologies are ideated and developed within eurocentric and colonialist structures, it is important to employ liberationist attitudes in the development of new technologies and computational artifacts. Evidence has shown that it is not enough to simply appropriate current tools developed in a monolithic community to fit into our very diverse worlds as an afterthought. And while it is a more racially, socially and culturally sensitive to employ user-centered and thoughtful design techniques when developing for global usage, it is equally important to center indigenous, community and socially marginalized groups in technologies that promote and celebrate their individual values, cultures and knowledge sources. Intentional creation of technologies that serve the preservation and propagation of diverse communities through decolonializing technologies is a challenge that may face many internal and external barriers to inclusion but will ultimately serve the broader computing community by extending the diversity of thought, ideas and innovation that could ultimately benefit all.

Acknowledgements

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