Artificially Intelligent Technology for the Margins: A Multidisciplinary Design Agenda

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ABSTRACT

There has been increasing interest in socially just use of Artificial Intelligence (AI) and Machine Learning (ML) in the development of technology that may be extended to marginalized people. However, the exploration of such technologies entails the development of an understanding of how they may increase and/or counter marginalization. The use of AI/ML algorithms can lead to several challenges, such as privacy and security concerns, biases, unfairness, and lack of cultural awareness, which especially affect marginalized people. This workshop will provide a forum to share experiences and challenges of developing AI/ML health and social wellbeing technologies with/for marginalized people and will work towards developing design methods to engage in the re-envisioning of AI/ML technologies for and with marginalized people. In doing so we will create cross-research area dialogues and collaborations. These discussions build a basis to (1) explore potential tools to support designing AI/ML systems with marginalized people, and (2) develop a design agenda for future research and AI/ML technology for and with marginalized people.

CCS CONCEPTS

• **Human-centered computing** → **Participatory design**; **User centered design**; • **Security and privacy** → **Human and societal aspects of security and privacy**; • **Computing methodologies** → **Machine learning**; **Artificial intelligence**.

KEYWORDS

AI, ML, Data, Privacy, Security, Marginalized people, Global South, HCI4D, ICT4D, Ethics

1 BACKGROUND

Artificial Intelligence (AI) is increasingly being promoted and developed for different areas such as the public sector, social care and public health. Indeed, such technologies are being applied and/or proposed as tools for addressing multiple factors that constitute the social determinants of health and not just clinical healthcare services. Especially in the context of marginalized communities,

the capability to navigate social and welfare services, such as housing, educational and rehabilitation services, are as important to promoting health and social wellbeing as navigating healthcare services [42, 43]. Researchers, management and strategy consulting companies argue for the potential of integrating AI technologies for the social good as they are projected to improve decision making and the effective management of public- and social-sector entities [9], catch fraud in the insurance system [32], enable automated diagnostic systems in remote areas [13] or help allocating homeless youth to housing services [4]. Furthermore, De-Artega et al. [12] introduced the term machine learning for the developing world (ML4D), where they highlight the potential for ML technologies, including applications and data, in addressing the societal challenges in developing countries. The authors present a road map for future work on ML4D, suggesting to improve data reliability, provide direct solutions and inform policy and decision makers.

However, despite the increasing interest in the design, development and deployment of AI/ML technologies, gaps still remain regarding its adoption by marginalized groups (e.g., the 'Global South', people of lower socio-economic status, refugees, asylum seekers, homeless people, prisoners and people with multiple disabilities). Recent works highlight that challenges around technology design for marginalized people have persisted and are more pressing than ever [40]. For instance, not taking into the account the specific needs of marginalized communities in the design of AI/ML health technologies lead to the widening of treatment gaps [31], and potential harms concerning data-injustice [11, 15]. There is a clear need for further efforts to design with and for the margins, especially when it comes to using artificially intelligent approaches [25]. The use of AI in the public social, welfare and health services leads to a vicious cycle of AI-based discrimination that may further marginalize people [8].

Therefore, we propose to use this one-day workshop as a space for HCI and AI researchers, designers and third and public sector support organisations to come together and discuss cases, experiences and challenges that relate to AI/ML technologies for and with marginalized people. In particular, we want to focus on exploring and developing novel design methods and approaches to engage with marginalized people in the design of AI/ML technologies as well as providing a set of overarching practice principles to guide our community's work.

This workshop is motivated by two main research gaps identified in the literature. First, knowledge and data obtained from studies with 'mainstream' groups cannot be directly applied to minorities. There is, therefore, a need to work with marginalized people to overcome challenges in obtaining data, related to lack of trust and transparency, to build more inclusive data sets and algorithms. Second, as a starting point to tackle this issue, there should be more efforts on the development of design tools to engage the wide variety of different marginalized people and take their diverse needs into account. We expand on these points in the following sections.

1.1 Moving from the Mainstream to the Margins

A successful deployment of AI/ML technologies requires the creation of relevant data sets based on data shared by end-user groups.

Ownership, data control and knowledge are also key elements in existing data-justice principles [22]. However, in a recent systematic review of HCI literature on ML systems for mental health technologies, the authors emphasize that challenges in the development of ML solutions have even bigger consequences for marginalized people. First, the accuracy of AI/ML solutions depends on where and with which populations the algorithms are developed and trained, which means that models created for one context cannot be transferred and deployed in another [40]. Such challenges may be extended to other health related domains and to those within social care and the public sector (e.g., housing). Given that mainstream efforts within AI applications are constrained to a select set of nations and groups, the results may further reinforce discrimination against minorities [46]. In addition, demographic disparities may be further magnified in the context of sensitive domains where stigma already hinders engagement in data collection processes [16, 36]. Therefore, it is an open challenge about how future initiatives should strive for more diversity and inclusion in order to mitigate the risk of bias.

Furthermore, designing for trust among marginalized people is essential, as shown by previous studies with, refugees, asylum seekers [16, 36], homeless youth [1], and prisoners [17]. One of our goals in this workshop is to develop a deeper understanding of whether and how vulnerable populations develop trust in AI-driven services and to work on a more differentiated picture of their trusting stance towards such technology. For instance, in line with work from McKnight et al. [29] on trust in technology, previous research on marginalized people suggests that one has to differentiate between the lack of *initial trust* as a barrier to starting engaging with AI-based technology (e.g., sharing data) and the lack of *knowledge-based trust* [29], which builds on previous trustor-trustee interactions (e.g., distrust while already using AI-based technology). In addition to the different types of trust, contextual factors also seem to be an essential factor when building trust. A recent study suggests that public trust in AI is lower for sensitive contexts [3].

To illustrate, marginalized people such as refugees and asylum seekers have been shown to have high privacy and security concerns [24] coupled with low agency in detailing what data they are willing to share [10, 33]. In addition, stigma and vulnerability are some of the harmful consequences of data leakage, which may have a stronger impact within already marginalized people [28]. The lack of trust and fear of being treated negatively additionally hinders accessing services and causes further marginalization [27, 36] but is also a barrier to accessing technological driven services. Previous research shows that transparency and choice over how the data collected is used (and re-used) have an important role in the perception of trustworthiness of the technologies using/asking to share data, but existing initiatives are failing to provide that [44]. Thus, we need better tools and methods to support designing more trustworthy technologies which provide reassurance to marginalized people who had negative experiences with different services and fear discrimination.

1.2 Striving to Design for Inclusion and Diversity

The aforementioned challenges are underpinned by the lack of meaningful and active inclusion of marginalized people in the design of AI/ML technologies. However, designing with marginalized people presents its own challenges [7, 19, 35, 45]. It has been identified that even in non-marginalized contexts there is a lack of designing human-friendly which involve target-populations [40, 47]. In previous CHI workshops it has been emphasized that HCI researchers need more accessible, intuitive and easier-to-use tools to facilitate an inclusive design process [21]. Despite recent efforts exploring how to create design tools (e.g., for explainable AI systems [26]), such works have not been focused on engaging with marginalized people. Consequently, we are aiming to provide a platform to discuss possible starting points on how to engage marginalized people in the design process.

Researchers working with people with disabilities argue for including people with disabilities in the development of models of AI systems and point out inclusive design, participatory design and value based design as promising approaches [41]. In addition, successful intercultural communication within the design process can promote its implication in the technical development, which in turn helps building trust through the use of the application itself [16]. Indeed, communicating the nature of the technology through participatory or community-based design processes [20, 48–50] may not only increase the understanding among marginalized groups but will also enable the design of AI/ML technologies based on their principles and understanding of data-justice, trust and transparency.

However, different marginalized groups have different needs [18, 40]. For instance, prisoners' opportunities for technical participation in the design process are massively restricted as they are not trusted to use technologies without criminal intention. Additionally, post-colonial HCI has identified several intercultural challenges of designing technologies in the 'Global South' [6, 23]. Overall, the aforementioned literature highlights the need to develop a better understanding of how to design AI/ML technologies with and for specific marginalized populations in order to counter challenges related to transferability and data-justice.

1.3 Workshop Goals

Designing inclusive AI/ML technologies is a field that involves stakeholders from multiple areas with a variety of different backgrounds. Consequently, we aim to utilise virtual platforms to broaden participation in our one-day workshop. We are striving to include participants with a variety of different backgrounds such as HCI scholars, AI/ML researchers, non-academic community organisations and people from marginalized communities — that either have experience/interest in AI/ML technologies, and/or in working with marginalized people.

The workshop will promote knowledge and experience exchange particularly in relation to the previously outlined challenges. Through the workshop we aim to formulate novel approaches/methods and principles for designing AI/ML technologies for and with marginalized people.

The key objectives of this workshop are:

(1) bringing together communities working with marginalized people and exchanging experiences on working with developing and investigating data driven technologies
(2) identifying and developing a design agenda for how to design/develop AI/ML technologies with/for marginalized people and for the design itself of the AI/ML driven technologies
(3) ideating processes and tools for designing/ developing AI/ML technologies with/for marginalized people.

These key objectives lead to the following workshop outputs:

(1) the creation of a community of cross-disciplinary researchers/ practitioners working with AI/ML technologies and/or marginalized people
(2) a collection of guiding principles supporting designing/developing AI/ML technologies with/for marginalized people in the future
(3) a collection of initial tools/methods supporting the application of these principles.

2 ORGANIZERS

This group of workshop organizers reflect expertise in the intersection of working with marginalized people in multiple geographical contexts and AI/ML and data driven technologies. Additionally, the organizers have experience running successful workshops at CHI and other ACM and affiliated venues [2, 5, 14, 30, 34, 37–39].

Franziska Tachtler is a PhD student and research associate at HCI Group, TU Wien. Her research focuses on the role of technology in promoting resilience of young asylum-seekers and their social-ecological systems. She works with young asylum-seekers, volunteer organizations and mental health service providers using participatory engagement methods.

Konstantin Aal is a PhD student and a research associate at the Institute for Information Systems and New Media, University of Siegen. He is part of come_ IN, a research project which founded several computer clubs for children and their relatives including refugees. His current research focuses on technology appropriation by local communities in the Global South.

Tanja Ertl is a PhD student at the Institute for Information Systems and New Media, University of Siegen. Based on the Grounded Design approach, her research focuses on the promotion of wellbeing of marginalized groups by transforming therapeutic methods into self-help tools to bridge the gaps in state care that currently exist to support integration and resocialization processes.

Daniel Diethei is a PhD student and researcher at the University of Bremen, Germany. As a member of the Leibniz Science-Campus Digital Public Health he works with digital technologies in medicine and healthcare with a focus on underserved populations.

Jasmin Niess is a postdoctoral researcher at the University of Bremen, Germany. Her research focuses on the design and evaluation of technologies that improve wellbeing. Her past experiences in academia and socially-relevant work engagements make her particularly enthusiastic about conducting research that improves societal wellbeing.

Mohammed Khwaja is a research scientist and a PhD student at Imperial College London. He investigates how data science and psychology can be merged to personalise digital interventions. His

previous research included the exploration of differences in machine learning prediction models across different cultures.

Reem Talhouk is a Vice Chancellor Research Fellow in the School of Design and the Centre for International Development at Northumbria University. She has over 5 years of experience in designing technologies with refugees and asylum seekers in the Middle East, Europe and Australia. Her current research focuses on developing design methods for socially just humanitarian and global development innovation.

Giovanna Nunes Vilaza is a PhD student and research associate at Department of Health Technology, Technical University of Denmark. Her current research aims at proposing ethical and participant-centered futures for open-access data platforms for behavioral monitoring.

Shaimaa Lazem is an Associate Research Professor at SRTA-City, Egypt. Her research interests include participatory design, post-colonial computing, and decolonizing HCI. Her previous projects included designing heritage documentation applications for rural populations.

Aneesha Singh is an Assistant Professor of Human Computer Interaction at the UCL Interaction Centre. She is interested in the design, adoption and use of personal health and wellbeing technologies in everyday contexts. Her research focuses on digital health, ubiquitous computing, multisensory feedback and wearable technology, especially in sensitive and stigmatised populations.

Marguerite Barry is Lecturer and Assistant Professor at the School of Information & Communication Studies at University College Dublin. Her research focuses on developing practical ethical frameworks to inform design of AI technologies.

Volker Wulf is a computer scientist with an interest in the area of IT system design in real-world contexts, this includes the development of innovative applications from the areas of cooperation systems, knowledge management and community support. He is head of the Institute for Information Systems and New Media at the University of Siegen.

Geraldine Fitzpatrick is Professor of Technology Design and Assessment and heads the Human Computer Interaction Group at TU Wien. She is also an ACM Distinguished Scientist, IFIP TC-13 Pioneer Award recipient, and IFIP Fellow. Her research is at the intersection of social and computer sciences, with a particular interest in supporting wellbeing, community building and active engagement.

3 PRE-WORKSHOP PLANS

The workshop will be promoted through a dedicated website that will communicate the aims and structure of the workshop and will also be updated with position papers of workshop participants and workshop outputs (see https://techforthemargins.wordpress.com). We will spread the call for submissions through relevant academic mailing lists (e.g., displaced-hci mailing list, CHI Announcements, ArabHCI) and social media groups (afriCHI, HCI4d Google Group, Computing and Mental Health Linkedin group, HCI across borders Facebook group). We will also actively seek submissions from our network and contacts, with a special focus on non-academic community organisations working with and for marginalized people

such as (forced) migrants, as well as social activists within marginalized. A total of 20 participants (excluding organizers) will be invited to partake in the workshop based on the position papers submitted.

4 WORKSHOP STRUCTURE

The workshop will facilitate interactive activities among participants, clustered based on application areas (e.g., social care) and the marginalized people they are working with, in order to achieve workshop goals.

To better facilitate remote participation living across time zones and exchange among participants, we will offer pre- and post-workshop activities, such as collecting materials in advance to provoke discussions at the workshop and final reflections after the workshop. Prior to the workshop, we will create a shared platform, e.g., a google doc sheet, where the participants can introduce themselves and discuss their backgrounds, interests and challenges to establish a first exchange.

In addition, we will use platforms such as Well-Sorted to collect and group overarching challenges and themes, and offer the possibility to meet pre-conference virtually, which takes place at a different timezone than the conference, to establish first discussions and support participants to become familiar with the overall scope and idea of the workshop. In order to create a social connection at the workshop, we will ask the participants in advance that they either keep their video on or have a profile picture of themselves.

Across all phases of the workshop, we will work with digital platforms such as Miro, Well-Sorted, and Wonder. Wonder will be used as an inclusive, immersive and interactive space for all by creating several room areas for discussion and exchange. It is a robust online tool that workshop co-organisers have trialled with participants living in contexts of intermittent and weak internet connectivity. During the workshop co-organisers will act as facilitators and support groups in different rooms in documenting the discussion and adding content to digital platforms. As a backup conference tool we will use Zoom.

The 4 hour long workshop will consist of three main activities (see workshop schedule in Table 1). We may adapt the time of the workshop based on a form to be sent to accepted participants inquiring about their time zones in order to ensure that most participants can attend. In the case of participants not able to attend all of the workshop synchronously, participants will have the opportunity to participate in pre and post workshop activities asynchronously through contributing discussion points on the digital platforms Well-Sorted and Miro. By setting up the digital infrastructure in advance and involving the accepted participants in pre-workshop activities, we will ensure that participants are familiar with the tools and know each other in advance. Therefore, the barriers to participating in the workshop via a video conference tool are much lower.

Discussions in the activities will be based on the challenges and experiences presented by participants in position papers.

5 POST-WORKSHOP PLANS

The post-workshop activities will focus on establishing a community that engages in the development of design methods that HCI researchers can draw on when engaging in the designing of AI/ML

Timetable (CET)	Activities
13:00-13:15	Welcome
13:15-14:00	Activity 1: Understanding and situating AI/ML technologies in contexts of marginalization in each application area
14:00-14:15	Break
14:15-15:00	Activity 2: Formulating principles that will guide future work
15:00-15:15	Presenting back
15:15-15:30	Break
15:30-16:30	Activity 3: Developing methods and approaches for designing with marginalized groups
16:30-16:45	Presenting back
16:45-17:00	Wrap up and next steps

Table 1: Workshop Schedule in CET. We plan to adjust the schedule to the participants' time zones.

technologies for/with marginalized populations. To support future collaborations, we will discuss a means of communication through which participants can support one another, and identify collaborations/ funding streams (e.g., slack channel, series of seminars to be conducted throughout the year, meetings for further discussion) for future research in this area. In addition, we will facilitate a post-CHI reflection meeting to discuss the outputs of the workshop and exchange our experience of the whole conference. This will help to create a sense of research community.

We will share all the documentation of the activities and workshop outputs through the workshop websites and in the form of a public facing blog post and Interactions article. Interested participants will be invited for further discussions on working towards a special issue in ToCHI that will unpack the challenges and future of AI/ML technologies and design in contexts of marginalization. Follow-up workshops and Special Interest Groups at other ACM and different disciplinary conferences in the area of health & social wellbeing and ML will be held to further discussions and grow the community interested in this research area.

6 CALL FOR PARTICIPATION

The integration of Artificial Intelligence (AI) and Machine Learning (ML) into social, health, and public sectors could bring promising benefits. However, these technologies lead to several challenges, e.g., privacy concerns, unfairness, and the increase of marginalization. Thus, it is essential that more attention is given on how we design such systems for/with marginalized people.

This workshop will provide a forum to exchange experiences on designing technologies for/with marginalized people and AI/ML driven technologies. We will explore potential tools to support designing AI/ML systems with marginalized people, and develop a design agenda. We use a broad definition of marginalized people that may include, but is not limited to, people of/with low socioeconomic status, disabilities and migration histories.

We invite researchers, practitioners and community members interested in the aforementioned topic to submit a 2-4 page position paper as PDF using ACM Master Article Template. Submissions

should critically reflect on current projects and/or present challenges and approaches. In particular, we encourage submissions that reflect on:

- case studies with marginalized people and/or AI/ML,
- design methods used with marginalized people that may be transferable to the design of AI/ML technologies,
- past experiences illustrating positive or negative outcomes of AI/ML in this context.

Submissions should be sent to techforthemargins@gmail.com by February 3. Acceptance will be based on quality, relevance, and diversity and will be communicated by February 21. At least one author of each accepted position paper must register and attend the workshop and register for at least one day of the conference.

More details on https://techforthemargins.wordpress.com/

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