Culture Sensitivity and Information Access: A Qualitative Study among Ethnic Groups

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Abstract

Fairness has been touted as one of the most important issues for responsible AI as sophisticated AI-powered systems increasingly impact human lives. At the same time, access to information is essential in today's knowledge economy and fundamental to American democracy. However, certain groups of the population might be excluded or lack access to participate fully in public discourse/economy because their cultural background presents obstacles to accessing or comprehending uniformly disseminated information without consideration of cultural relevance. The current study is the first study of a large research project on AI fairness and information access designed to explore how different minority groups perceive their information access needs and how cultural factors might shape their information access experiences. Data was collected through 49 comprehensive interviews conducted with a variety of ethnic groups. Thematic analysis technique and NVivo 12 plus were used to analyze data. Findings revealed that while ethnic users can identify several challenges and issues regarding their information access, they either do not realize or cannot explicitly articulate how their ethnic backgrounds or cultural factors would shape their information access experiences.

Keywords

AI, cultural sensitivity, information access, ethnic groups, phenomenology, in-depth interview

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Fairness has been touted as one of the most important issues for responsible AI as sophisticated AI-powered systems increasingly impact human lives. At the same time, access to information is essential in today's knowledge economy and fundamental to American democracy. However, certain groups of the population might be excluded or lack access to participate fully in public discourse/economy because their cultural background presents obstacles to accessing or comprehending uniformly disseminated information without consideration of cultural relevance. The current study is the first study of a large research project on AI fairness and information access designed to explore how different minority groups perceive their information access needs and how cultural factors might shape their information access experiences. Data was collected through 49 comprehensive interviews conducted with a variety of ethnic groups. Thematic analysis technique and NVivo 12 plus were used to analyze data. Findings revealed that while ethnic users can identify several challenges and issues regarding their information access, they either do not realize or cannot explicitly articulate how their ethnic backgrounds or cultural factors would shape their information access experiences.

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Introduction

The significance of fairness in responsible AI has gained prominence as advanced AI systems increasingly influence human existence (Stephen & Ahmad, 2017). Simultaneously, access to information is crucial in the present knowledge-driven economy and vital for the functioning of American democracy. Nevertheless, certain segments of the population may face exclusion or limited access, hindering their full participation in public discourse and the economy due to cultural barriers that impede their ability to access or comprehend universally distributed information without considering its cultural relevance. Such information access inequality can result in social injustice to certain cultural groups. Thus, it is imperative to incorporate the more intricate cultural dimension into sophisticated AI models in the context of access to information by identifying means of disseminating information effectively through cultural resonance.

Extant research examining the interplay of AI and fairness often focuses on the perspectives of statistical machine learning (Dwork et al., 2012). Though fairness is a complex, social, and cultural construct best addressed beyond technical and algorithmic means (Bellamy et al., 2018), and multiple voices are needed from different domains to shape the creation and adoption of fair AI (Zhang et al., 2020). In today's knowledge economy, fairness is about treating different groups equally not by giving them the same information in the same way, but

by giving them the right information the right way so there is the same desirable outcome for the different groups.

To level the playing field of access to information when considering both equality and equity, we must tailor the way information is delivered within the context of cultural relevance. Previous research has shown that an emotional instead of a cognitive approach is much more effective in a cluttered, digital environment for messaging (Chen & Wang, 2019). By utilizing AI to identify the best approach to disseminating information that connects culturally with a specific group, the information can be delivered more effectively because of the affective, and cultural resonance, thus contributing to a fairer system of information access.

Research in viral marketing has either focused on finding an optimal seeding set or using AI to personalize content in real-time for optimal outcomes (Li et al., 2019; Nguyen et al., 2016; Zhang et al., 2020). However, no studies have systematically explored cultural features for building fairer machine learning (ML)systems in the context of information access. The overall goal of the research project is to improve the fairness of information access with the help of an ML system that incorporates the lens of cultural sensitivity (Chen & Starosta, 2000). In order to do so, the first step is to identify cultural groups' information access needs, possible barriers to their information access, and how their cultural backgrounds may influence their information access experiences. The current study is the first study of a large research project on AI fairness and information access designed to explore how different minority groups perceive their information access needs and how cultural factors might shape their information access experiences. The study specifically aimed to examine the information access experience of minorities residing in the United States. This focus was chosen due to the nation's diverse population and the existing disparities that encompass various aspects of minorities' experiences.

Literature Review

Fairness and AI

Fairness is a complex concept that is open to debate in the realm of social science and everyday encounters. Similarly, there is no unified definition of fairness in the eyes of computer scientists and statisticians. The Institute of International Finance defines fairness as "a principle that understands and minimizes discrimination based on legally protected characteristics and aligns with ethical principles" (The Institute of International Finance, 2019) . It is also broadly understood as the absence of bias towards an individual or group based on inherent or acquired characteristics, such as gender, religion, age, and race, that are irrelevant in the particular context of decision-making (Saxena et al., 2018).

In the context of AI, no agreement has been achieved upon the definition of fairness as well. By surveying the literature in computer science, Narayanan (2018) identifies 21 definitions of fairness; from statistical bias to societal bias, from group fairness to individual fairness, from process fairness to outcome fairness, the comprehensive list seems to make it impossible to arrive at one true definition that meets all criteria. Yet, Narayanan (2018) argues that the variety of definitions derive from diverse contexts and different applications affecting distinct types of stakeholders suggests that one layer of meaning of fairness can indeed be harmful. According to the machine learning literature, statistical notions of fairness employed include definitions based on predicted outcome, predicted and actual outcomes, predicted probabilities and actual outcomes; similarity-based measures include causal discrimination, and fairness through unawareness; and causal reasoning include counterfactual fairness, no unresolved discrimination, no proxy discrimination, and fair inference. The result of their research demonstrates that further clarification is needed to decide which definitions are

appropriate according to the context (Verma & Rubin, 2018). Another proposed taxonomy based on 10 fairness definitions includes individual fairness, group fairness, and subgroup fairness (Mehrabi et al., 2019). The authors stress that the identification of the sources of the bias and their types is the key to solve fairness-related questions (Mehrabi et al., 2019).

Unfair outcomes caused by bias in AI systems have been discovered in various fields affecting different groups of people. For instance, biases in algorithms used in recidivism prediction instruments have been found to have a disparate impact on the assessment of the likelihood that a criminal defendant will reoffend in the future (Chouldechova, 2017). Another study identifies ways how AI systems exclude the consideration of people with disabilities or overlook such data as outliers, thus impeding equal access or even cause more negative effects such as amplifying existing stereotypes (Findlater et al., 2019; Givens & Morris, 2020; Guo et al., 2019). Researchers have also identified unfairness in existing AI systems based on gender (Bolukbasi et al., 2016; Buolamwini & Gebru, 2018; Liu et al., 2019) and race (Angwin et al., 2016; Skinner et al., 2020).

Along with the identified problems, specific or universal solutions to diagnose and mitigate bias and ensure fairness are proposed by researchers and practitioners. Multiple technical mitigation strategies are suggested. For example, Schnabel et al. (2016) proposes a principled approach to handle selection biases by adapting models and estimation techniques from causal inference (Schnabel et al., 2016). IBM also releases an open-source toolkit of metrics to check for and mitigate unwanted bias in datasets and machine learning models (Bellamy et al., 2018). Meanwhile, recognizing fairness is indeed a societal concept, researchers also propose frameworks that value human input. One example is to elicit human policymakers' preferences before looking for the optimal model that maximizes fairness and utility (Zhang et al., 2020).

AI Fairness and Information Access

Faibisoff and Ely (1974) defined information as a symbol or set of symbols that has the potential for meanings. Raw data is not information until the data are used by people to achieve certain goals. In this sense, information can be regarded as "data that are processed to be useful" and "provides answers to 'who,' 'what,' 'where,' and 'when' questions" (Bellinger et al., 2018). AI transforms raw data into information in an economic way overcoming the limitation of human cognitive capacity (Sangüesa, 2018). While digitization makes both data and information more accessible, research on AI and information access has mainly focused on the refinement of data aggregation and processing. Studies on the technical aspects from the server's end are abundant such as techniques for collecting user information and building user profiles (Buraya et al., 2017; Wang et al., 2019). Discussion on the balance between data access and exclusion is also mostly from the perspective of organizational stakeholders in the data exchange market. While it is apparent that personalized user profiles lead to adaptive information delivery to the end-users such as personalized search results (Cai & Chen, 2016), advertisements (Deng et al., 2019), and new recommendation (Lian et al., 2018) through filtering and rating systems (Wærn, 2004), research is still lacking in terms of its impact on information access from the users' perspective in the context of AI.

In general, research on fairness in the context of AI systems on various aspects does not lack quantity or quality, yet the lack of a consensus on the definition of fairness and the complexity of fairness as a societal issue makes it hard to evaluate the research results from a broader perspective and to implement the suggestions for improvements. An interdisciplinary effort to address this issue is needed. In addition, while research that revolves around data and information on the provider's end seems prevalent, information access for users is often neglected. Research on information access need for ethnic groups is even scant.

Ethnic Group Information Access Needs and Barriers

Information needs are needs that are essential for human beings to have for survival purposes. Information needs are not objective and universal but are formed and shaped by individual characteristics and environmental circumstances (Faibisoff & Ely, 1974). Similarly, information access needs are also diverse, and generated and influenced by different individual, social, and cultural factors (Fish et al., 2019). According to Faibisoff and Ely (1974), information access has different dimensions such as societal, institutional, physical, psychological, and intellectual. Given the variations of information access needs, dimensions, and resources, people have different ways to access information including word-of-mouth, web access, web search, mobile application, SMS service, and other (Heimonen, 2009). Compared to the general population, ethnic and minority groups in the U.S. are more likely to encounter information access challenges and barriers in different domains such as health care (Arora et al., 2002; McCloud et al., 2016), agriculture (Achugbue & Anie, 2011), and recreational and municipal programs (Thapa et al., 2002). The Digital Divide is something that separates information access and groups who are lacking technological and informational literacy.

Health care should be easier to access online due to the availability of technology, but providers still fail to include patients who are illiterate, part of a lower socioeconomic class, and not fluent in English. According to a study done by Arora et al. (2002), ethnic women in a lower socioeconomic class with breast cancer encountered greater barriers to access information thus resulting in poorer health outcomes. Other factors that deter patients from accessing more information are their lack of awareness of resources and simplified translations (Watts et al., 2004). Therefore, access channels need to have their information be clear through better translation, readability, and comprehensibility.

Cultural beliefs and norms influence data and information consumed by ethnic groups. According to Zhu and Du (2020), ethnic minorities with small populations (EMSP) indicated that they preferred not to cross boundaries of their communities when seeking information, as they did not want to deviate from their traditions and customs, lifestyles, and ethnic identity. These small ethnic groups mainly communicated information between each other with limited search to other sources outside their group, mostly due to their social customs and behavior norms.

When accessing information from home, ethnic patients do not always know exactly what they are looking for which could reduce their accessibility to helpful resources (McCloud et al., 2016). In addition, Internet connectivity also prevents ethnic users from accessing information which results in significantly lower rates of Internet health information seeking, reflecting the persistence of communication inequalities (McCloud et al., 2016). These communication inequalities indicate unequal distribution of communication resources which demonstrates the socioeconomic divide in healthcare information access.

In addition to healthcare, ethnic groups are experiencing information access challenges and barriers in other areas. Lewis and Ladislaw (2020) found that the government failed to address ethnic groups' information access needs when disseminating climate change information. Finally, Thapa et al. (2002) found that traditional outdoor recreational activities have been dominated by the white population. A lot of the information disseminated concerning this topic is done on sight. However, due to the lack of access to information, ethnic groups are unable to have their needs addressed in this context. While many factors may shape ethnic groups' information access experiences, the information system that is lacking cultural relevance and fails to satisfy ethnic groups' information access needs is a critical factor in today's technological-driven and algorithm-supported environment (Heimonen, 2009). Therefore, building a culturally resonant information dissemination system via sophisticated

ML model to level the information access inequality has become an imperative task. In order to achieve this goal, the cultural sensitivity theory offers a valuable theoretical perspective.

Cultural Sensitivity

Today's society has become increasingly pluralistic and diverse because of the change of demographic make-up as well as societal and cultural value which means that intercultural communications cannot be avoided. People need to have a greater sense of cultural sensitivity in their encounters with culturally dissimilar others. Even in the context of national unity countries, cultural sensitivity is seen as a necessary factor in effective interracial communication and harmonious racial relations (Tamam, 2010). In this sense, cultural sensitivity is not only a theoretically relevant but also a practically pertinent construct. According to Foronda (2008), cultural sensitivity can be defined as "employing one's knowledge, consideration, understanding, respect, and tailoring after realizing awareness of self and others and encountering a diverse group or individual" (p. 210). As a result, cultural sensitivity would lead to positive outcomes such as effective communications, effective interventions, and satisfaction.

In literature, two major different theoretical perspectives exist regarding the conceptualization of cultural sensitivity (Bennett, 1986, 2017; Bennett & Bennett, 2004; Chen, 1997; Chen & Starosta, 2000). By taking a developmental approach, Bennett (1986, 2017) and Bennett and Bennett (2004) identified different stages of the cultivation and formation of cultural sensitivity from "ethnocentrism" to "ethnorelativism." According to Bennett (1986), ethnocentrism means that people regard their own culture as central to reality without questioning the beliefs and behaviors they receive in their primary socialization process. Those experiences of beliefs and behaviors are taken for granted. By contrast, ethnorelativism means that people deem the experience of their own beliefs and behaviors as just one of the multiple realities. They are willing to embrace and appreciate other beliefs and behaviors in other realities. Specifically, Bennett's (1986) model is divided into six stages of development including denial, defense, minimization, acceptance, adaptation, and integration. The first three stages are ethnocentrically oriented meaning that the tenets of one's own culture are experienced as central to reality (Bennett & Bennett, 2004). For instance, the study explains that "Individuals operating at a Denial level of sensitivity are likely either not to perceive difference at all, or to employ wide categories in perceiving difference" (Bennett, 1986, p. 182). A real-life instance of this would be the generalization and confusion among Koreans, Chinese, and Japanese. Not only does this cause irritation to those who are native to those countries, but it demonstrates how their cultural differences are not well-understood. The last three stages are ethnorelativistically oriented suggesting that one's own culture is experienced in the context of other cultures (Bennett & Bennett, 2004). For example, at the stage of integration, people can not only clearly differentiate differences among Chinese, Korean, and Japanese cultures but also detect dynamics and nuances within each culture. In other words, people have fully developed cultural sensitivity who experience difference as an essential and joyful aspect of all life (Bennett, 1986).

The second theoretical approach to study cultural sensitivity is Chen and Starosta's (1997) affective orientation and cultivation of sensitivity. According to Chen and Starosta's (1997), cultural sensitivity is one aspect of cultural competence. Cultural competence is defined as "the process by which individuals and systems respond respectfully and effectively to people of all cultures, languages, classes, races, ethnic backgrounds, religions, spiritual traditions, immigration status, and other diversity" (Danso, 2018, p. 412). Cultural competence has cognitive, affective, and behavioral components, and cultural sensitivity is primarily grounded at the affective level (Tamam, 2010). From this perspective, cultural sensitivity could be

defined as "an individual's ability to develop a positive emotion towards understanding and appreciating cultural differences that promotes an appropriate and effective behavior in intercultural communication" (Chen & Starosta, 1997, p. 5). This definition suggests that cultural sensitivity is a dynamic concept. In order to become a culturally sensitive person, one has to motivate him/herself to understand, appreciate, and accept differences among cultures, and to produce a positive outcome from intercultural interactions. Specifically, culturally sensitive persons must possess qualities such as self-esteem, self-monitoring, open-mindedness, empathy, interaction involvement, and nonjudgment (Chen & Starosta, 1997). Cultural sensitivity can be fostered and developed through training (Chen & Starosta, 2000). The six general categories of cultural sensitivity training programs are affective training, cognitive training, behavioral training, area simulation training, cultural awareness training, and self-awareness training (Chen & Starosta, 2000). Like human beings, algorithms and ML models can obtain cultural sensitivity through training as well (Ribeiro & de Aguiar, 2011). To train algorithms and ML models effectively, the initial stage involves identifying cultural attributes that can enhance the sensitivity of these models when interacting with diverse ethnic users within the framework of information access. As previously mentioned, this study represents one component of a broader AI research project. The overarching research objective of this large-scale project is to design and develop culturally sensitive algorithms within the information dissemination system, with the aim of facilitating the information access needs of minority populations. In the context of this smaller research project, our focus is on exploring the information access experiences of minorities and examining how cultural factors may influence their access to information. Through this investigation, we aim to uncover cultural features that can be utilized to train machine learning models, thereby enhancing the effectiveness of the algorithms in meeting the information needs of minority communities. Based on the research purpose, two research questions were proposed:

R1: What are ethnic groups' information access experiences?

R2: How do cultural factors shape ethnic groups' information access experiences?

Method

Self-reflexivity Statement

The research team consisted of three accomplished female scholars from diverse fields, forming an interdisciplinary collaboration. The first author specializes in multicultural mass communication strategy and possesses a profound understanding of big data, as well as consumers' interpretations of AI. Her expertise lies in qualitative research methodologies, enabling her to delve deep into the subject matter. The second author's research interests encompass digital media consumption, AI applications in media/communications, human-machine communication, and cross-platform audience behavior. She is well-versed in survey research methodologies, allowing her to gather comprehensive insights from a wide range of participants. The third author focuses on scalable and interpretable machine learning, optimization, and cybersecurity, primarily within the realms of social media and critical networking infrastructure. Her extensive knowledge and expertise contribute to the development of robust and secure systems. All three researchers share a common interest in exploring the impact of new technologies and communication on marginalized communities. Specifically, they are dedicated to addressing the disparities that arise among minorities due to emerging technologies like AI. This shared research interest serves as a driving force behind

their collaboration on a large-scale research project. The primary objective of their project is to mitigate the information access disparities experienced by minorities. To achieve this, they aim to design and develop culturally sensitive algorithms within the information dissemination system. By doing so, they intend to foster inclusivity and reduce the barriers faced by marginalized communities in accessing crucial information. The current study is a small qualitative study of a large-scale research project with the purpose to identify minorities' information access experiences and possible cultural factors that might influence their experiences.

Research Approach

We adopted a phenomenological approach to explore the experiences of minorities regarding their access to information and how cultural factors might influence these experiences. Phenomenology, as a qualitative research approach, delves into the shared or diverse meanings of a social group's lived experiences related to a particular concept or phenomenon (Creswell & Poth, 2018). It examines human experiences and the structures of consciousness as perceived from the perspective of individuals themselves (Sokolowski, 2000). Phenomenologists aim to describe the "what" and "how" of these experiences as reported by the social actors involved (Creswell & Poth, 2018). By utilizing a phenomenological approach, we sought to gain access to the consciousness of minorities and describe their day-to-day encounters with information access from their own subjective standpoint. Our goal was to approach their experiences with openness and freshness, developing an understanding that is shared among the researchers and the participants. We aimed to uncover the fundamental nature of the phenomenon through a process called phenomenological reduction (Moustakas, 1994). Phenomenological reduction is a data analysis method that helps the researcher maintain awareness of their own beliefs, values, and positions while gradually revealing the essence of the phenomenon through a systematic procedure (Creswell & Poth, 2018). This process involves steps such as bracketing, horizontalizing, organizing invariant qualities and themes, and constructing a textural description (Moustakas, 1994).

Sample

The target population of the study is ethnic people who are 18 years or older, belong to one of the social groups: Black or African American, Asian American, Hispanic and Latino American, American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander, and are living in the U.S. Purposive sampling and snowball sampling (Creswell & Poth, 2018) were used to recruit participants. Specifically, three researcher assistants' social network was used to recruit initial participants, and after that each participant was asked to recommend other participants until the point of saturation was reached (Corbin & Strauss, 2008). In total, 49 ethnic people aged from 18 to 83 years old with diverse backgrounds participated in the study. Among the participants, 24% were male and 76% were female, 34% were Asian American, 30% were Hispanic or Latinx American, 14% were Black or African American, and 22% were Native American or others.

Data Collection

In-depth interviews were conducted to collect data. Based on the purpose of the study, an interview guide consisting of two parts was developed. The first part focused on participants' information needs, including questions such as:

- In general, how do you obtain information in your daily life?
- What are the channels and sources for you to obtain information?
- How often do you find yourself searching for online information daily?
- What information do you usually obtain online?
- What categories of information do you search online?
- How do you obtain your information online?
- What information needs do you have that you have not fulfilled?

The second part concentrated on participants' information access experiences and possible cultural impacts on their information needs and access experiences including questions such as:

- When you search for information online, have you encountered any issues or difficulties? Can you think of an example?
- When you search for information online, have you encountered any information access issues or difficulties? Can you think of an example?
- When you search for information online, have you encountered any information access issues or difficulties that caused by your ethnic identity or cultural background? Can you think of an example?
- What are the cultural factors that you think would shape your information search experiences? Can you think of an example?
- What are the cultural factors that you think would shape your information access experiences? Can you think of an example?
- How can you enhance your online information search and improve your overall information access experience, both for yourself and your cultural communities?

Considering the semi-structured nature of our interview guide (Creswell & Poth, 2018), it is important to note that the interviewer has the flexibility to modify and adapt the interview questions in response to the participants' feedback and information provided during the interview process. Given the safety concern during the COVID-19 pandemic, all the interviews were conducted via video conference software of Zoom at times convenient to the participants. Each interview lasted from 30 minutes to 70 minutes.

Data Analysis

Thematic analysis technique and NVivo 12 plus were used to analyze data (Miles et al., 2018). Firstly, the researchers were memoing throughout the interviews (Corbin & Strauss, 2008); every researcher listened to each recording several times, input all the transcripts into the software of NVivo, and read each transcript at least two times. Secondly, the researchers identified and compared repeated or similar words, phrases, and sentences appearing in every transcript assisted by the exploration function of NVivo; generally, 20 to 30 codes were generated in each transcript. For example, some of the codes include information needs, information access, language, cultural identity, information source, information access issues, and so forth. Finally, the researchers clustered the invariant codes into themes. During this phase, the researchers focused on the internal relationships and structures of the codes and grouped them into appropriate themes. For example, the codes of information needs, information access, language, information access issues, and cultural identity were grouped together and formed the theme "Culture Information Access Issues: Lack of Availability,

Variety, Breadth, and Depth." Quality control measures include member checking, peer debriefing, and external auditing (Creswell & Poth, 2018). First, the initial report of findings was sent to some of the participants to review to make sure the researchers' interpretations represent their reality. In addition, a qualitative researcher who is familiar with the topic reviewed the research process to ensure the rigor and quality of the research. Finally, the anonymous journal reviewers served as the external auditor to further evaluate the research procedure to guarantee its thoroughness and the excellence of the study. In the following section, we will delve into the three prominent themes that have emerged from the data, shedding light on the experiences of the ethnic group in relation to information access.

Findings

Culture Information Access Issues: Lack of Availability, Variety, Breadth, and Depth

A trend identified across many of the participants was the lack of information available for both their general cultures and specific cultural topics. Many of the participants were either first-generation Americans or second-generation Americans, so their culture is a subject that they tend to search to gain knowledge about topics within the umbrella. However, when searching for information regarding their culture, those participants found it was challenging and difficult to obtain both general and specific information on culture related topics.

Participants of the study indicated that when searching for their specific cultures, they can only obtain basic or non-descriptive information about the subject that lacks both breadth and depth. For example, Jessica, a 20-year-old Vietnamese and Chinese American student, found that when she explored topics concerning her backgrounds, "very similar information like throughout, it's kind of just like a snapshot.… I feel like everything is very like surface level."

Selin, a 20-year-old illustrator, identified slim options when searching about her culture:

> Usually if I'm looking for something, Turkish, that I know I'm going to need like a Turkish website or source for I'll type the question in Turkish because that usually brings like better results. If it's in English, usually it's for like tourists and stuff and that's just, I don't like that kind of stuff.

Selin also mentioned that she must go to particular websites to stream Turkish shows, which demonstrates the lack of diversity of streaming service in American platforms. These examples clearly illustrate how Jessica and Selin encountered difficulties in accessing the specific cultural information they needed, indicating a significant lack of breadth and depth in available resources. As a Samoan chief who identifies strongly with his background, Jason, a 50-year-old, retired veteran and professor finds it is difficult having others learn about his background and he could not find enough information of Samoan culture because it is a small nationality in a larger umbrella of the ethnic minority as he indicated:

> [T]here's not as much information for Samoans. So if you look up the meaning of a Samoan tattoo or a Samoan, you know, myth, they might have something kind of similar but then immediately talk about Hawaiian and Tahitian and other things that they might have more relevant information on because it's just a larger… [the Internet] they just kind of like all lump that together.… I'd like to research a good program like Rosetta Stone for Samoan's right so my kids can learn some more, and that's a very popular program, but they won't have it for

those you know they'll have it for the main cultures like French and Spanish, and German, but they won't have it for Samoan.… I definitely think that there's more attention paid to other cultures, as not everybody treated equally.

When searching for culture related topics, participants also had difficulties finding relevant information. This was not specific to the topic of the query, but more to the boundaries of the topic. For example, Caitlin, a 20-year-old Cuban American, was doing research for a school project of the Cuban government exiling priests during Fidel Castro's dictatorship. She had to jump through hoops in order to get information concerning this topic as many of her results were narrowed due to the sensitivity of the topic. She vividly described her experiences by saying that:

> I knew my research project was not going to be an easy one because I knew there was not a lot of information actually out there on the topic so I like really, really dig deep to find anything and it was like I found like one or two sentences and like a 12-page paper like I could read the whole paper just to find that exact, but I think that was like the one time where I seriously struggled to find any information, because finding any information about Cuba is always gonna be a pain.

Failing to access information online, Caitlin conducted interviews among Cubans who were alive during the time of Fidel Castro's and uncovered much more rich information about this topic, especially the protest signs, which cannot be found anywhere on the Internet. The insights shared by these participants shed light on the importance of addressing the inadequacies in cultural information availability and the need for more comprehensive and diverse resources to cater to the interests and backgrounds of individuals from various cultures and communities.

Another challenge discussed by the participants when accessing culture related information is the language barrier and inaccurate translation. Some participants, especially the first-generation immigrants mentioned that they preferred to search certain cultural related information such as food recipes using their native language. However, when they use their native language to search, they either cannot find the needed information, or the information outcome is of low quality. For the second generations, while the information access problem remains the same, the reason is different. In general, the second-generation ethnic groups are bilingual, but their English is usually better than their parents' native language. Therefore, unlike their parents, they prefer to use English to search culture related information. However, because of inaccurate translation, like the first generations, they either could not find the right information or could not locate the information with high quality. For example, Clarence, a 25-year-old Asian American, discussed her information search experiences:

> Like, for example, like Taiwanese food or because Taiwanese are you know long time ago ethnically, they are Chinese, so a lot of the food and stuff is similar so it's hard to differentiate like you know what actually originate in Taiwan. … So, I think like even searching like Taiwanese food recipes it's very hard. … But it's still like that's another layer of you know possible misunderstandings right so then what's left is the results, the cooking recipes that are in English within those might be more readily available, but I don't have as much trust in them to be like authentic you know or actually be. You know, you know, like things I might have had in my childhood or something like that.

As Clarence pointed out, the inaccurate translations and lack of trust in online information made it difficult for her to locate genuine Taiwanese recipes, leaving her uncertain about the reliability of the search results.

These challenges surrounding language and translation highlight the pressing need for more accurate and culturally sensitive content in various languages, enabling individuals from diverse backgrounds to access reliable information about their cultures and heritage. Improved language support and precise translations would significantly enhance the search experience and foster a deeper understanding of cultural practices and traditions for both first- and second-generation individuals alike.

Other Information Access Issues: Paywall and Location

When discussing barriers of information access on the Internet, many participants identified paywalls as a hinderance for them to access information. For example, Darian, a 26-year-old African American graduate student described how paywalls have become a barrier for him to conduct research:

> So, you would have to pay like $50 for an article. And it's like, I live on a teacher, like a TA stipend. So, I don't have $50 to throw at some publishers." Not only does this limit his information search, but it hinders the research he is trying to conduct: "I have to work harder to kind of make the arguments I want to make in my work and find other sources that kind of talk around with me rather than other sources I'd rather use instead.

Paywalls also exist outside of academic context that prevent ethnic people to access the needed information in their everyday lives. For example, Michael, a 21-year-old African American creative director described how paywalls are an "access barrier" to information he was searching:

> That's probably a similar thing like where I think it's actually more so on social media where … where there's like paywalls and I can't tell because when somebody posts it, it looks like it's completely accessible and then you click on it and there's a paywall.

Another participant Stephanie, a 19-year-old Hispanic student shared the same concern. Stephanie has attempted other methods in order to get the information she was searching for by attempting to bypass the paywalls, "I've tried to use like paywall not hacking, but like websites that go through it. And that hasn't been successful, so I feel like in that sense, my research has been limited to an extent."

The presence of paywalls creates a notable disparity in information access, disproportionately affecting individuals who cannot afford or are unwilling to pay for subscriptions or access fees. Such barriers hinder the ability to explore diverse perspectives and access vital knowledge, limiting the intellectual growth and research potential of many users.

Addressing these paywall limitations is crucial for fostering equitable information access on the Internet. Initiatives to provide more open access to information or alternative funding models for academic and media content could significantly contribute to breaking down these barriers and allowing individuals from all backgrounds to explore a broader spectrum of knowledge.

Another prominent barrier is the breadth of information possibly limited by the geographic location of United States. As participants who have lived in other countries or have family members living in other countries described, outside of the US there is a different level of access to information. The information is not necessarily better or worse, but the type of information that is more widely available is the information pertaining to the culture of that country. For example, Selin compared her information access experiences in Turkey and to those in the United States:

> When I'm in Turkey, I can't access the American shows on Netflix, a lot of the time. When I'm in the US, if I'm looking for something like sometimes, I like to watch Turkish TV and there's like certain stream websites and stuff for that, but because I'm in the US, I can't access them.

The conflict of the limitations of information based on geographical location can make ethnic minorities who closely resonate with their culture feel diminished. Andrea, a 19-year-old Hispanic daycare worker explained how the information differences can affect her by saying:

> I feel like …it is biased towards like the American side, like the US and making the US seem like greater than like Latin American, like countries seem like poorer and like more like isolated than what it really is.

The unequal access to information can perpetuate biased perspectives, overshadowing the richness and diversity of various cultures and leading to a sense of marginalization among those who identify closely with their heritage.

Addressing this barrier involves recognizing and embracing the diversity of cultural backgrounds within the United States. Ensuring equitable access to information from around the world can promote cultural understanding, break down stereotypes, and foster a more inclusive and informed society. By facilitating the availability of international content and perspectives, individuals can gain a broader understanding of different cultures, contributing to a more enriched and harmonious global community.

Learned Traits that Shape Information Access

The way that people seek and receive information is affected by the way their families and communities interact with information. The impact that the environment participants grew up in seemed to have a significant impact on how they seek and receive information and how they trust the accuracy of the information. Kaori, a young Jamaican American, explained how word of mouth is easier to access information, especially when the subject of information she is looking for is human-focused: "[if] I have a question that's highly like, human focused or like feelings focused, then I always go to like, people who are in the situation that I am like, looking at."

She further explained the cultural factor that she believes shapes her information search experience is the social aspect of Jamaican culture. Many specific cultures that tend to have big families and have a strong center around interacting with people rely on word of mouth as a main method of information gathering. Sophie, a 20-year-old African American student, described how her family and cultural tradition made word-of-mouth become the most convenient and trustworthy information source for her:

> I think growing up, it was always like, taught families like it just seemed like there was, you know, have your back like that kind of stuff. So, we would never have a reason to kind of question the things that they tell you… I might say I use more like word of mouth so kind of whatever like I'm told I can only get from that.

Sophie's experience reflects the deep-seated trust in the information shared within her close-knit community, which has influenced her information-seeking habits. These insights underscore the significance of cultural influences and familial traditions in shaping individuals' approaches to seeking and trusting information. The power of word of mouth in these contexts lies in the sense of reliability and emotional connection that comes with information shared within close-knit communities. Recognizing and understanding these cultural factors can help improve information dissemination and ensure that diverse perspectives and experiences are valued and considered in an increasingly interconnected world.

Participants tend to believe that other factors rather than their ethnic background have more impact on their information access. The factors those participants mentioned include socioeconomic factors, religious practices, and community culture. Many participants of the current study belong to a relatively high socioeconomic class, which gives them greater access to resources. For example, Sophia, a 20-year-old Hispanic young lady explained how her background and her financial status are two separate entities for receiving information:

> The socioeconomic impacts that come along with being Hispanic tend to have a larger effect on access to the Internet and other resources than actually being Hispanic. Because historically, it's been more difficult for immigrants who often come here without much to start fresh and be able to support themselves economically. It's just different here at XX because most people who attend this University are better off. For example, I had a psychology professor say the XX average household income was about $100,000 or a little over that I forgot.

Sophia's insights highlight the significance of socioeconomic factors in shaping information access. These factors can create disparities in the opportunities available to individuals from different economic backgrounds, regardless of their ethnicity.

Another factor frequently mentioned by the participants is their religion practices. Uma, a 19-year-old Indian student described how her biracial background and bireligious background may influence her search results and advertisements that appear on her screen. She describes that when she is looking for information concerning Hindu holidays or information, she tends to get extremely targeted advertisements such as Bollywood ads, "It affects the ads that are shown, but the content itself I don't think it touches."

She describes the way the information readjusts itself as "specific skewed." especially when she also looks up her Christian facts and holidays around the same time. This indicates that there might be some level of personalization in search results based on religious preferences. Muaausa, a 50-year-old Asian American Tiki Sculptor expressed similar situations that information may be adjusted due to religious preference, but he said that he gets narrow, one-sided views of opinions in religion that have questionable integrity. These insights demonstrate how the algorithms and systems used to personalize online content can reflect users' religious preferences and beliefs. While such personalization might seem helpful in targeting relevant information, it can also lead to the reinforcement of preexisting beliefs and potential information bubbles. This can limit exposure to diverse perspectives and nuanced information, potentially impacting users' ability to critically evaluate information and form well-rounded views.

Finally, according to the participants, the culture of the community where the minorities are living is another important factor. Growing up in a white community, where the second-generation citizens are not fully exposed to people who have similar backgrounds to them may shape their information access experiences. The information they access is not necessarily different from that around them, but they are less exposed to the diversity of their culture and may not tend to explore it as much. Dominique, a Filipino 38-year-old elementary teacher, who grew up in white communities in both Texas and Florida expressed her lack of knowledge of Filipino culture because of her assimilation into her community and the fact that she does not know other Filipino Americans in her community. Sophia, the Hispanic young woman discussed a similar situation:

> I honestly feel like since I kind of look more American than like, your typical Hispanic, like, that's obviously stereotyping and everything, but I've always been like, kind of like, people don't really associate me as like being Hispanic…. But I feel like that's probably had like an influence on like how I've grown up to just because I don't look stereotypically Hispanic or have like an accent. So, I've like been able to, I forget the word, like blend in or kind of like assimilate, like, very well.

The influence of the community culture on information access experiences underscores the importance of fostering diverse and inclusive communities that celebrate and embrace different cultural backgrounds. Creating spaces where individuals can freely express their heritage and identity can lead to a richer exchange of ideas and understanding. Encouraging intercultural interactions and providing platforms for minority groups to share their experiences can enhance information access and bridge cultural divides. Overall, the factors that can be associated with resonating with cultural backgrounds may have a stronger affect than the culture itself does. Being an ethnic minority does not automatically place these participants in a box, but it depends on the other factors that influence the way people live which consequently shape those minorities' information access experiences.

Discussion

The purpose of the current study is to uncover different ethnic groups' information access experiences and how cultural factors may shape their experiences in order to identify cultural features they could use to develop a culturally sensitive ML to facilitate and ensure the equality and equity of information disseminating among different social groups in the United States. Findings revealed that while ethnic users can identify several challenges and issues regarding their information access, they either do not realize or cannot explicitly articulate how their ethnic backgrounds or cultural factors would shape their information access experiences.

The information access challenges and issues those ethnic users identified are primarily at the societal (family tradition, community culture, and paywalls), physical (location), and intellectual (language and translation) dimensions (Faibisoff & Ely, 1974). Information access issues at the institutional and psychological dimensions are not mentioned by the participants. Different from previous research (Achugbue & Anie, 2011; Arora et al., 2002; Lewis & Ladislaw, 2020; McCloud et al., 2016; Thapa et al., 2002), the main domains the participants discussed with information access issues include cultural heritage (food recipe, cultural myth, and historical events), academic research (articles and resources), news (international news), and entertainment (TV shows).

The cultural features revealed in the current study that shape ethnic users' information access are mainly socializing agents (Caprar et al., 2015) including language (native language

and translation), religion (bi-religions and multi-religions), and geography (national and local). Although we did not directly examine the ML model of information dissemination, based on the participants' experiences, it seems that the ML model does lack cultural sensitivity that fails to satisfy ethnic groups' information access needs. Hence, it is imperative to design and develop culturally sensitive ML models to better improve ethnic groups' information access experiences. The domains and cultural features uncovered in the current study would provide useful reference to train the model.

Limitation and Future Research

The current study bears some limitations. First, although our sample is diverse in terms of age and ethnicity, the complex and dynamic nature of ethnic groups may require a larger and more diverse sample to catch the nuances and reflect the variations. Future research may recruit a more sophisticated sample to replicate the current study. Second, since culture is a multi-dimensional and multi-layered construct which has latent values that mostly influence people implicitly, it is hard for ethnic users to be aware of and clearly articulate how culture affects their information access experiences. Future research may use other methods such as projective techniques, experiments, or surveys to further examine the cultural impacts on ethnic users' information access. Similarly, given the nature and characteristics of qualitative research approaches, findings of the current may not be generalizable to the large population. Quantitative studies are needed to validate and generalize findings to the target population. Finally, although online interview is an effective interview technique and appropriate to apply in the current situation, due to the constraint of the technology, interviewers may miss some nonverbal communication signs and possibly misinterpret interviewees' descriptions.

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