Florida Atlantic University

COT6930 Human Computer Interaction

Spring Semester 2024

Assignment 3

Survey Study of Trending Topics in HCI Research

Prepared for:

Dr. Fatima Boujarwah

By:

Nicholas Kumia

Report written by: Nicholas Kumia
Due Date of report: 04.02.2024

Abstract

As technology continues to pervade all areas of life, it is critical to assess the effectiveness of technology to meet the needs of users; specifically, the ability to capture an accurate context of people in order to integrate technology seamlessly. America, as a multicultural nation with many different socio-ethnic backgrounds, presents an interesting challenge where the lines between cultures continue to blur. This analysis explores the concept of Digital Cultural Heritage Engagement to highlight the ways in which technology can work within the constructs of existing cultural heritage, preserving human elements and bridging the gaps into the modern age.

Literature Review

In pursuit of this topic, research papers from the international stage were explored to give context into how countries are grappling with it from a more stable context (i.e. less cultures to consider). A small note that, even within the same culture, there are many subcultures that showcase a similar problem of multiculturalism; the problem is more micro-multiculturalism within similar cultures vs macro-multiculturalism across multiple cultures. The work explored can be categorized into these three groups:

- Creating technology to bridge the gap between traditional practices and habits and modern technological processes and procedures. [1], [2], [3], [4]
- Studying the effects of technology on social groups and the evolution of cultural practices [5], [6], [7], [8], [9]
- Analyzing cultural qualities from existing data [5], [10]

Like most HCI solutions, cultural applications of technology are very customized and personal to the users. Many of the papers spoke to this point, highlighting the need for accurate historical narratives [1] and subtle and emotional communication [2]. In contrast to this, there was also a need for individual control of experiences, evident from preferences for self-exploration [1] and user-controlled data sharing [6]. The central themes encourage connection and community and require technology to be able to facilitate emotions, if understanding emotion is not possible. This is emphasized in the analysis of Clarifai where the issue is raised that "machines lack lived experience and thus, they have not been taught social norms" [3]. A follow-on point is mentioned about, "if our goal is human likeness, we must admit that social stereotyping is a reflection of this engineering goal, and that it must be managed rather than eradicated." [3] It is an intriguing perspective that social stereotypes are being described as an inherent human nature, whereas, in day-to-day life, media in public forums attempt to be as politically correct as possible. Under the hood, it would seem as though some form of cultural stereotyping is necessary to ensure technology meets the needs of users.

Perception is an important consideration in integrating technology; yet, it's difficult to measure. [6] attempts to qualify UTAUT constructs borrowing from work in 1989 [11], focusing on the perceived notions of usefulness, trust, risk, enjoyment and compatibility. This perception may also not be a reliable source of truth due to filter bubbles and echo chambers [7] that are intensified

in online settings. A sobering conclusion was that current polarization metrics cannot effectively distinguish between polarization behaviors [7]. Because online data is not reliable and reliable data cannot be distinguished from unreliable data, the most effective source of input for technological development remains to be real user interactions, via questionnaires, interviews, think alouds and co-creating spaces. [8] has found that Twitter has provided a platform to give the Black community a space for its voice. However, even when using online platforms, having direct connections with context is key in extracting meaningful information. With all things considered, there are applications where purely machine data can be coupled with human data to provide some insights into technological developments. [5] talks about how satellite imagery in union with survey data provided more accurate results in determining poverty lines. The connection between financial status and technological adoption being very closely linked is common knowledge.

Common Themes

All papers touch upon the intersection of technology and cultural heritage in different ways. Whether it's using AR for cultural heritage preservation [1], designing interfaces for immigrants to maintain connections with their cultural roots [2], or considering the impact of AI on cultural representations [3], [8], technology plays a significant role in shaping cultural identities and can be used to preserve it as well. Ethics and responsible use of technology is visited multiple times throughout the papers with such examples as addressing biases in AI and AR applications [1] and privacy concerns in contact tracing apps [6]. Balancing the benefits of technology with user privacy and data security remains a critical challenge. The intersection between social impacts and technology is explored, including cultural preservation [4], immigrant integration, polarization on social media [7], and public health interventions. There is a clear interest in how technology can address societal challenges and contribute positively to communities.

Gaps

While ethical considerations are discussed, there is a gap in comprehensive guidelines or frameworks for ethical AI development and deployment, especially in cultural heritage and social media contexts. Obtaining a clear source of truth remains difficult and validating information presents unique struggles. Many of the studies were short-term efforts within a timeframe of months, between January and February 2021 [6] or between January 1, 2022 and July 31, 2022 [7], Between May 2022 to Jan 2023 [4] or one time studies [1]. It demonstrates short-term solutions to short-term problems; however, understanding larger trends is not as feasible. Cultural preservation is of specific importance because if it is not tracked over longer timeframes, it is not possible to know what gets lost along the way. The concepts of managing social stereotyping [3] and understanding perceived notions [6] are introduced; however, there’s a gap in addressing the specific needs and perspectives of diverse cultural groups, especially in technology design and implementation. There's potential for more research on user education and awareness regarding technology use. It was interesting to see that participants were “given two minutes to become familiar with” [2] KEPEIN and that was deemed enough time. Some technological familiarity must have been assumed.

Strengths and Limitations

The papers collectively covered a range of diverse aspects of life with unique cultural implications. Additionally, a plethora of empirical methods were used to analyze data, such as single-/bi-/tri-factor analysis [Kernel Density Estimation (KDE) and k-means] [7], Partial Least Square Path Modeling (PLSPM) [6] and principal component analysis [5]. Being able to quantify data strengthens the results of the analysis. There were practical heuristics or recommendations at the end of the studies, summarizing their findings.

As with most HCI research, most of the real-life studies had small user groups, withering 20 participants to 9 participants [1], using 242 participants to characterize the US [6] or 254 users for the population of users born 1964 or earlier [4]. Some of the scopes were narrow enough that the participants size was acceptable; however, that makes generalization of the data less feasible. [7] even found that the metrics for distinguishing polarization behaviors was not effective. It is not clear whether that finding can be generalized; however, that paper had the largest sample size. As discussed by [8], more research is needed for specific cultural groups.

Future Research Directions

Feeding back into the general question of how to build technology that works within the constructs of existing cultural heritage, additional emphasis should be put on the following areas:

Defining the ethical grounds to allow social stereotypes and filter between them.

This builds on the results of [3] and seeks to understand how to balance social constructs in different settings. By exploring the conditions that enable the acceptance of certain stereotypes, trust in technology can be increased, such that technology is not expected to meet unrealistic social expectations. This may lead to either technology specifically designed for certain social groups, environments or applications or a more robust technological solution with different modes that tailors experiences to the context of its existence. This will unearth some level of customization required to meet cultural needs.

Integrating and/or updating existing technologies to meet cultural needs (as opposed to creating additional technology).

This provides a counter to [2] and talks to not needing to invent new technologies for new people if possible. There have already been countless technologies built to address gaps in technology,

- "InTouch [12], enables social relationships for seniors separated from their families"
- "Whisper Pillow [13] is an interactive artifact for mediating emotional expression among couples with different daily routine"
- "SnowGlobe [14] enhanced salience and closeness"
- "Tangiball [15] led to an enhanced social experience and a stronger sense of presence"

- "Huggy Pajama [16] allows remote physical interaction through two physical entities connected via the Internet"
- "Messaging Kettle [17] encourages communication with faraway friends"

However, this creates more financial burden to maintain new technology, if it needs to be used in coordination with existing technology. While modern technology will benefit from HCI analysis, is there anything that can be done to improve technology integration when it may not have been designed for a particular purpose?

Analyzing how to provide transparency to increase trust in and usefulness of technology while reducing the risk of destroying important cultural references.

Many, if not all the, studies raised concerns of privacy and trust in technological systems and their providers/maintainers. The government and society at large have done little to help ease this problem. Without exposing all the messy implementation and technical details with users, how can transparency be implemented to allow users to understand the full lifecycle of their interactions with technology?

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