Information Research - Vol. 30 No. iConf (2025)

Information access via voice commands on YouTube: empirical evidence on the consequences for a marginalised community in Bangladesh

Joy Bhowmik, Viviane Frings-Hessami, Gillian Oliver, and Md. Khalid Hossain

DOI: https://doi.org/10.47989/ir30iConf46945

Abstract

Introduction. This paper examines the socioeconomic and cultural consequences of using voice commands on YouTube to access information by a small-scale marine fishing community in Bangladesh.

Method. The study employs a qualitative approach, grounded in ethnographic fieldwork, to explore the challenges in accessing and utilising information on YouTube. Data were collected through focus groups and interviews with male and female individuals in the community, offering insights into their unique experiences.

Analysis. The data was analysed using reflexive thematic analysis, beginning with categorising the types of information accessed and their societal impact. Patterns within these categories were identified, leading to the development of key themes.

Results. The findings highlight that YouTube's content often fails to align with the specific needs of this community, exposing them to irrelevant or harmful information. This results in negative consequences, including economic losses from information overload, increased domestic violence, and a gradual erosion of societal norms.

Conclusions. The study concludes that while YouTube is unsuitable for fishermen, the preference for audio-visual content underscores the need for a customised digital platform. Further research should investigate shared community spaces that combine physical and digital information, aligning with their diverse needs and capabilities to empower them with essential information.

Introduction

Accessing information through voice on smartphones has evolved from science fiction to reality, a transition first envisioned by Captain Kirk in Star Trek. This transformation has been made possible by the development of powerful smartphones and cloud-based computing. The increasing prevalence of web-enabled smartphones has created a need for quick and constant access to vital information, thereby elevating the importance of speech technology to meet users' demands for ubiquitous mobile access—any time, any place, and in any scenario (Schalkwyk et al., 2010). This emphasis on ubiquitous mobile access ensures that users can remain connected to the digital world, regardless of their location. Google, a prominent information retrieval system, is leveraging voice services to provide this ubiquitous access (Al bool et al., 2010).

Voice search enables users to input queries in spoken language and receive relevant results through system-generated transcriptions, thereby ensuring immediate and direct access to information, which is particularly popular on mobile devices (Jiang et al., 2013). Voice searches, or voice-enabled searches on mobile devices, aim to streamline the process and focus more on audio-visual content that requires less interaction with the mobile's touchscreen compared to traditional text-based inquiry and social networks (Guy, 2018; Barten, 2024). The accessibility of information using voice on smartphones is particularly beneficial for individuals with visual impairment or limited literacy skills, as it does not require visual attention or the use of hands for typing inquiries, thereby providing them with a level of independence and access to information that was previously challenging, and highlighting the potential of voice technology to empower these user groups (Dogan, 2024). In this context, the use of voice commands to access information on YouTube has significantly increased, which resulted in YouTube introducing its own voice-enabled search engine within the app (Dudharejia, n.d.). Additionally, the availability of users-made video content on YouTube (Seo & Jung, 2022) for similar types of users and the availability of important information on YouTube which is difficult to access from other sources (Lee et al., 2022) motivate users to use YouTube as a useful resource to access information.

However, the increasing sophistication of algorithmic technology presents significant obstacles for users in accessing information using voice commands on smartphones. For example, when a user is currently watching a video on YouTube, the platform automatically suggests a list of related videos (Airoldi et al., 2016). On the other hand, inaccuracies in YouTube's recognition of voice commands—caused by background noise and unclear pronunciation (Shokouhi et al., 2016) and difficulties in multilingual speech recognition vocabularies for the transcription of the videos (Schultz & Waibel, 1998; Jouvet et al., 2018) can result in the delivery of inaccurate information. While YouTube offers diverse content for entertainment, education and instruction that can teach users nearly anything (Bryant, 2020), visually impaired or illiterate individuals may encounter difficulties in effectively utilising the platform, potentially leading to serious repercussions.

Moreover, individuals who are illiterate or have limited literacy may confront substantial hurdles when using smartphones to access information, particularly when applications fail to accommodate their specific needs and preferences or do not target these individuals as potential users. These hurdles may arise from efficient access to exact information and evaluation of information. In addition, biased or one-sided suggestions within applications that offer voice command options to access information, such as the algorithms on Facebook and YouTube, can worsen these issues by promoting specific types of videos, content creators, or channels (Bessi et al., 2016). Individuals lacking a thorough understanding of these algorithms and their underlying properties may be disproportionately affected by such biases, which could contribute to the formation of ideological echo chambers among users (Kirdemir et al., 2021; Brown et al., 2022).

In this paper, we investigate the experiences of a marginalised community in a developing country, namely a small marine fishing community in Bangladesh, in accessing crucial information through smartphones and YouTube using voice commands, as well as the consequences of this practice on

their lives. In Bangladesh, people in marginalised communities predominantly use voice commands to search for multimedia content like videos, music, and occasionally weather updates on YouTube. Nevertheless, this practice can have unintended negative consequences, resulting in unfavourable outcomes despite the good intentions of those who prefer vocal commands to access information due to illiteracy. The purpose of this paper is to provide empirical evidence that can contribute to improving voice search systems by recognising the implications of voice-enabled search queries and supporting the collaborative design of targeted, user-oriented online information resource platforms. This platform would allow users to apply voice commands to access necessary information while considering their capabilities, needs, preferences, and challenges.

Related work

Voice commands in accessing information

Previous research has been conducted on the use of voice commands by different users, encompassing their performance, search pattern strategy, and effectiveness. For instance, Schalkwyk et al. (2010) comprehensively described the history of voice search efforts at Google in their research. They provided an in-depth description of the technology employed at Google and the challenges faced in making voice search a reality. Another study by Yi and Maghoul (2011) investigated the characteristics of search queries submitted from mobile devices using Yahoo! Search for Mobile. They focused on users' behaviour and found that people may use voice queries when required, which are considerably longer than typed mobile queries. Additional studies have been conducted to understand how users overcome challenges in voice user interfaces (Myers et al., 2018). When users employ voice to search for information, they frequently need to reformulate queries due to voice input errors such as speech recognition errors and improper system interruptions. In a study conducted by Jiang et al. (2013), it was found that language plays a crucial role in voice search, particularly in relation to user query reformulation behaviours. The study involved user experiments with native English speakers, revealing that these individuals often rephrase their queries using both lexical and phonetic alterations. The research sought to assess the effects of common voice input errors on users' search advancements and the efficacy of various reformulation strategies in mitigating these errors.

In another study Guy (2018) analysed voice queries in mobile web searches with a particular focus on the semantic and syntactic characteristics of these queries. His empirical evaluation revealed that the language used in voice queries more closely resembles natural language compared to typed queries. His study suggests that voice search functionality should incorporate voice-based result presentation to facilitate a fully hands-free interaction with users and also emphasise the development of new metrics for evaluating user satisfaction with voice queries. Xing et al. (2020) attempted to grasp users' performance, query characteristics, query strategy, spoken conversational search, and perception of voice search by reviewing 27 publications. They found that the majority of the studies were primarily conducted with young and well-educated populations. Moreover, Kiesel et al. (2020) applied voice-based search to investigate argument mining and conversational search. Through an online survey, they found that participants expected to primarily use voice-based argument search at home, either independently or with others. Additionally, they anticipated that such search systems would provide comprehensive information on retrieved arguments, such as the source, supporting evidence, and background knowledge on the mentioned entities or events.

Crestani and Du (2006) conducted research on the retrieval effectiveness of spoken and written queries. Their results demonstrated that using speech to express one's information needs enables a more natural expression and encourages the formulation of longer queries. However, despite spoken queries being longer in terms of the number of words, they do not appear to be significantly more effective than written ones. In a recent study, Jha et al. (2024) conducted an examination of voice-based assistants and their role in voice-based searches for accessing information on the

internet. The study observed that the methods through which users retrieve content are influenced by alterations in search engine algorithms. These modifications have implications for the digital marketing approaches employed by websites to attract visitors, establish brand identity, and execute promotional campaigns.

YouTube as a source of information

YouTube plays a significant role in entertainment by providing a vast repository of videos catering to diverse interests. It has established a unique role as a repository of popular culture, creating a diachronic archive over time and expanding synchronically in its scope (Arthurs et al., 2018). A key factor in YouTube's popularity is its accessibility; it is free to use, and while creating an account enhances the experience, it is not necessary to have an account to watch videos. In addition to entertainment, YouTube serves as an online educational platform. For example, research has shown that YouTube is utilised in Malaysia to teach social expression (Raj et al., 2019). Another study by Shoufan and Mohamed (2022) reviewed 647 papers and found that YouTube is a rich, free, easy-to-use, and enjoyable source of learning content for students. Furthermore, YouTube has been identified as an effective pedagogical tool for blending education with entertainment, creating engaging learning experiences beyond traditional classrooms (Hua, 2015). By prioritising entertainment, these channels capture larger audiences and maintain subscriber interest, making learning more accessible and enjoyable.

Moreover, YouTube is increasingly being used as a platform for disseminating health information (Madathil et al., 2015), providing valuable insights into various diseases (Delli et al., 2016; Onder et al., 2021; Diers et al., 2023). During the COVID-19 pandemic, YouTube became a significant source for accessing medical information (D'Souza et al., 2020; Andika et al., 2021). Additionally, YouTube serves as a social media platform that helps farmers improve agricultural practices (Kesherwani et al., 2022), especially through agriculture-related videos that can enhance the skills of young farmers (Paudi et al., 2022). Furthermore, YouTube serves as a valuable source of fishing techniques, enabling fishermen in Indonesia to expand their knowledge base by accessing various videos on different fishing forums (Pratiwi et al., 2023).

However, digital non-participation among marginalised populations, such as people living with disabilities, older individuals, disadvantaged youth, and women, compounds existing disadvantages (Davis & Farmer, 2016). To address this issue, several marginalised individuals with literacy challenges are using voice commands to access information via smartphones.

Information access through YouTube by individuals with low or no literacy

Several studies have explored various aspects of voice search and video content on YouTube, addressing diverse user needs across different demographics. For example, Balasuriya et al. (2018) identified barriers and opportunities in voice-activated interfaces, specifically examining how intellectually disabled users in Australia utilise voice commands to search for YouTube content. Similarly, Kversøy and Kversøy (2018) investigated how individuals with intellectual disabilities in Norway use YouTube as an alternative search tool. Research has also focused on age-related patterns of YouTube usage. Lee et al. (2022) found that older adults in South Korea actively engage with YouTube, despite concerns about fake news and costs, viewing its content as more unbiased than traditional media. Hourcade et al. (2015) analysed YouTube use among infants and toddlers, observing that interactive content, particularly educational apps, supports the development of children's perceptual and motor skills.

YouTube has also been examined regarding the personalisation and dissemination of misinformation. Hussein and Juneja (2020) demonstrated that while demographics such as age, gender, and location have minimal impact on misinformation in search results for new accounts, these factors become influential once a watch history is established. Beyond these studies, other research has addressed the broader implications of algorithmic technology, biases in video

recommendations, and factors contributing to video popularity on YouTube (Roth et al., 2020; Bryant, 2020; Foster, 2020; Lutz et al., 2021; Kirdemir et al., 2021; Gran et al., 2021; Brown et al., 2022; Haroon et al., 2022; Vybihal & Desblancs, 2023).

Despite the existing research, a significant gap remains in the literature concerning the experiences of marginalised communities in low- and middle-income countries of the Global South when using YouTube through voice commands. While prior studies primarily focus on user experiences in developed country contexts, there is limited evidence on how marginalised groups, such as small-scale marine fisherfolk in Bangladesh with limited literacy and digital skills, engage with YouTube. Specifically, it is unclear whether these communities can effectively achieve their intended goals when using the platform. Failure or difficulty in accomplishing these objectives may lead to an unjust outcome, reflecting what Beard and Langstef (2018) describe as "unjust use". To address this gap, the present study adopts an interpretive phenomenological approach to comprehensively examine why individuals from a marginalised community interact with YouTube using voice commands and the subsequent consequences of this engagement.

Data and methods

This research is part of a PhD project that explores the information cultures of a small-scale marine fishing community on a coastal island in the south-eastern part of Bangladesh, employing the information culture assessment framework by Oliver and Foscarini (2014). The project aims to identify the factors that shape the community's perceived value of information and influence their attitudes when engaging with information. The focus on this community arises from previous findings that their information environment does not adequately meet their needs (Shuva, 2017). Various barriers impede access to reliable and authentic information, including social inequality, a lack of internal information infrastructure, and educational and cultural constraints. Small-scale marine fisherfolk in Bangladesh, at the bottom of the social hierarchy, create distinct "small worlds" characterised by information filtered via their unique worldviews, social norms, and beliefs (Chatman, 1999). Despite having their traditional means of communication, the extensive use of smartphones—with limited or no awareness of responsible usage—leads them to access and use information through various applications available on these devices.

Data collection

Oliver and Foscarini (2014) define information culture as the value attributed to information and attitudes toward it. In line with this concept, the first author investigated various critical information required by fishermen to achieve different purposes in their everyday lives. He collected data on how fishermen accessed this information, focusing on their preferred methods, the reasons for these preferences, their challenges, and their level of trust in different types of information. Ethnographic fieldwork was conducted on the island between December 2023 and January 2024 to collect data for the project. This involved four focus groups, each comprising 8–10 participants and lasting approximately 1.5 hours, and 10 in-depth interviews with male and female participants. Male participants were fishermen directly involved in fishing, while female participants were family members of fishermen. This approach provided a deeper understanding of the community's information practices and the socio-cultural dynamics influencing their access to and use of critical information.

Ethnographic fieldwork

The utilisation of an ethnographic approach in social research enables a deeper understanding of behavioural factors among participants, which may not be easily distinguished through other data collection methods. In this study, field data collection took place during the fishing season, which presented challenges in recruiting participants, as most fishermen were either at sea or preparing for upcoming trips. To address this, the first author asked them when they would be available and organised the focus groups and interviews at their preferred time. Given these logistical

constraints, non-probability sampling was employed, resulting in a small but targeted sample. Snowball and purposeful sampling were utilised for focus groups and interviews, respectively, to ensure the effective selection of participants.

Embracing the ethnographic approach, the first author who conducted the fieldwork made multiple visits to various villages, including the fish landing station, where fishermen sell their catch. The author speaks the same language as the fishermen, which enabled him to interact directly with them by participating in activities such as drinking tea and sharing snacks. This immersion fostered trust and friendships, allowing the researcher to become a part of their environment. Furthermore, ethnographic fieldwork, strengthened by interviews and focus groups, responds to the realisation that verbal descriptions may not always accurately represent reality and should be complemented by observation. According to Kawulich (2005), individuals may not always act in accordance with their verbal descriptions of their behaviour. Therefore, the ethnographic approach to data collection serves to illuminate how individuals perceive and articulate their everyday experiences.

To bolster the credibility of the study findings, three key strategies were employed: prolonged engagement, reflexivity, and triangulation (Ahmed, 2024). The author's one-month stay on the island, coupled with various data collection methods, contributed to the trustworthiness of the data. The rigour and reliability of the findings were further guaranteed by the continuous application of triangulation at various phases of data collection, as outlined by Johnson et al. (2020). The incorporation of ethnographic fieldwork in conjunction with interpretive phenomenology enabled the documentation of the lived experiences of fishermen concerning their use of YouTube as a source of information.

Data analysis

To conduct data analysis, this project followed the Reflexive Thematic Analysis (RTA) approach proposed by Braun & Clarke (2006). RTA is a theoretically flexible and accessible interpretative method for qualitative data analysis that facilitates the identification and analysis of patterns or themes within a given data set (Braun & Clarke, 2012). This reflexive approach emphasises the active role of researchers in knowledge production, encouraging reflective and thoughtful engagement with both the data and the analytic process. Braun and Clarke identified several theoretical assumptions that should be addressed when conducting RTA, conceptualised as a series of continua: essentialist versus constructionist epistemologies, experiential versus critical orientation to data, inductive versus deductive analyses, and semantic versus latent coding of data (Byrne, 2021). For this research, an experiential orientation was chosen as it aligns with the objective of this research. Adopting an experiential orientation involves understanding that participants' thoughts, feelings, and experiences reflect their internal personal states, aiming to reflect the experience of a social reality. Additionally, it helps acknowledge the social construction of the research topic.

The first author was responsible for collecting data in the field, analysing it, and disseminating the findings to the other co-authors through regular meetings to ensure their familiarity with the data. The initial codes were established to categorise the types of information accessed by YouTube, including the purpose, implications of information utilisation, proficiency in using YouTube, and justification for relying on the provided information. The data was then analysed to find common underlying patterns from which themes were identified. For example, social norms were identified as an important theme because YouTube used algorithmic technology that went against the societal norms of the fishermen.

Findings

Accessing information through YouTube: weather update

Accessing timely weather updates is another crucial information for the fishermen and other residents of the island, as accurate and quickly accessible information can potentially save lives during natural hazards such as cyclones. Fishermen, in particular, frequently check weather forecasts before embarking on expeditions. Failure to get such updates can have serious repercussions. While people can get weather information via traditional sources such as television news or loudspeaker announcements from local governments and non-governmental organisations, these are not the preferred methods because updates from these methods frequently come only after the environmental conditions have already worsened. Smartphones and internet connectivity, particularly through YouTube, offer a quicker and more convenient way for fishermen to receive weather updates, even well in advance of potential cyclones in the Bay of Bengal. As a result, many fishermen consider smartphones and YouTube as their preferred methods of accessing weather information.

Although YouTube is the preferred platform for accessing weather updates, many fishermen lack the necessary skills to effectively navigate smartphone applications. As a result, they rely on the assistance of more proficient peers within their community. For instance, in one village, a fisherman with higher skills in accessing weather information via a smartphone has earned the nickname '*Abhaoa*' (meaning '*weather*' in Bengali) due to his role in helping others check weather updates on YouTube. His knowledge stems from prior experience as a volunteer in a flood monitoring project conducted by the Bangladesh Water Development Board, where he learned to use a smartphone for flood monitoring. However, like many others in the community, his illiteracy necessitates the use of voice commands to access weather information.

Accessing information through YouTube: entertainment

Fishing is a labour-intensive occupation, and due to the challenging socio-economic conditions in many fishing villages, people often begin fishing from a young age, as by engaging in fishing, they can start earning an income from childhood. On this island, becoming a fisherman is a process of learning by doing, with individuals gaining experience through repeated participation in fishing expeditions. To become a skilled fisherman, one must have prior hands-on experience, as the profession requires direct engagement with the sea, often necessitating extended periods of time away from home.

When at sea, fishermen are constantly occupied with their work, leaving them exhausted upon their return. As a result, they value their leisure time greatly and make every effort to enjoy it. Furthermore, to protect marine species, Bangladesh enforces several fishing bans throughout specific times of year, preventing fishermen from going to sea. During the fishing ban periods, entertainment becomes an important part of their everyday lives, as most fishermen lack alternative employment or skills other than fishing.

In these instances, fishermen rely on their smartphones for entertainment, with YouTube being a popular choice. They mostly watch local movies, dramas, songs, religious music, and news. Because of their illiteracy, fishermen often utilise voice commands to access content-related entertainment. However, once they are on YouTube, they frequently watch the videos recommended by YouTube and watch content nonstop without actively looking for anything in particular. Accessing YouTube is straightforward for them because it simply requires an internet connection, allowing them to quickly and easily access audio-visual content without the need to register an account. Since they tend to watch videos one after another, their internet data is consumed quickly, requiring frequent recharges, which increases their overall internet usage costs.

Consequences of using voice commands on YouTube

Impact of online gambling on marriage and family

During fieldwork, it was observed that gambling is especially popular among young fishermen, with many engaging in it regularly. Continuous interactions with the fishermen as part of the ethnographic fieldwork approach unveiled the widespread nature of this issue, which was subsequently discussed during focus groups and interviews with both male and female participants. The fishermen revealed that their introduction to gambling primarily came through YouTube advertisements, which led them to download and install gambling-specific applications on their smartphones.

One fisherman shared that they had heard of another fisherman in their village who earned a lot of money through gambling. However, most fishermen stated that they consistently lose money, and they are unsure whether the claimed earnings of another fisherman were genuine or just a rumour. Gambling among fishermen focuses on popular sports in Bangladesh, such as cricket and football. Participation typically begins with small bets deposited into gambling platforms using mobile financial services like Bkash. Initial wins often encourage participants to increase their betting amounts, resulting in significant financial losses, with some losing all of their money. During the fieldwork in one village, a casual conversation with a group of young fishermen exposed the social dynamics of gambling. As the conversation progressed, one fisherman pointed to another and shared the following story, emphasising the shared experiences and narratives that support their gambling habits.

> *This guy earned 20,000 BDT as a one-month salary from a boat owner but lost the entire amount in a single night of betting through the betting app on his smartphone. This will have implications for his home because he has a wife and children. When he fails to purchase essential groceries, as is often the case in such situations, his wife is likely to confront him, leading to tension within the family. Gambling not only creates financial strain in managing household expenses but also exacerbates domestic issues, often culminating in conflicts, household violence, and, in some cases, divorce.*

Impact of sexist content on societal norms

During a social interaction at a local tea stall, the first author requested a young fisherman demonstrate their method of accessing content related to entertainment on YouTube using voice commands. The young fisherman tried using voice commands to play a music video. However, most of the choices were movie item songs—provocative musical sequences presenting women in exposing attire adapted for male attention, some of which featured adult content. He felt embarrassed to share these suggestions with the other fishermen present, as their societal norms do not permit the consumption of such content in public spaces. The fisherman clarified that although YouTube suggests these inappropriate videos, they do not intentionally search for such content. He also mentioned that, at times, such videos appeared even without any specific requests. During this conversation, an older fisherman who was present also added—

> *in our time, we only had Jatra Pala (local stage performances) as a form of entertainment. But now, with mobile phones, the younger generation has access to content that we could never have imagined. Young fishermen earn a lot of money through fishing, which they often spend on mobile phones and internet data for entertainment. However, such provocative content accessed by the widespread use of mobile phones has contributed to social conflicts and family problems within the community.*

The concerns raised by the older fishermen were echoed by female participants during focus groups and interviews conducted as part of the fieldwork. Nearly all female respondents expressed anxiety about their young children's behaviour, particularly its deviation from accepted societal

standards. They emphasised the importance of their children upholding the same beliefs and values they hold and expressed a strong desire to prevent their children from engaging in actions contradictory to those beliefs. The women expressed significant concern over the increasing exposure to inappropriate digital content, which they associated with a rise in social issues within their community, including higher divorce rates and incidents of sexual violence, such as rape. They observed that the widespread use of smartphones and internet access had introduced young people to content that undermines established societal norms and values, fostering behavioural changes that disrupt family structures and social cohesion.

Inaccurate weather information

In one focus group, the first author asked another fisherman to demonstrate how they access weather updates using voice commands. The fisherman attempted to use YouTube but quickly realised that he did not have mobile data. The author then offered a hotspot-based mobile internet connection. The fisherman used a voice command, asking, '*Ajker Abhaoar Khobor Bolo*' (Tell today's weather update). However, the author noticed that the first video shown was from two months ago. After pointing this out, the fisherman tried again, asking, '*Ei metro Abhaohar Khobor*' (Current weather updates), but this time the video was still two days old. When the author mentioned this, another fisherman remarked that while smartphones assist in quickly accessing weather updates, they often struggle to get accurate or timely information. He added that,

> *during the recent Cyclone Midhili, we struggled to receive accurate updates. From a TV channel on YouTube, we learned that the storm was expected to make landfall at noon, but it actually arrived four hours earlier, in the early morning. As island people, getting timely and accurate weather updates is crucial for us. Otherwise, the consequences can be devastating.*

Fishermen, particularly those who are illiterate, rely heavily on the video contents of YouTube, often placing trust in live broadcasts from television channels as reliable sources of information. IPTV (Internet Protocol Television) is widely popular in Bangladesh, with many regularly watching news through these channels. However, the channel used by these fishermen provided inaccurate information for the cyclone Midhili, which resulted in the weather updates not aligning with the actual events.

Discussion

Motivation for using smartphones and YouTube

Fishermen on the island increasingly rely on smartphones and YouTube for essential information, such as weather updates and entertainment, making these tools integral to their daily routines. This dependency has cultivated habitual usage and made smartphone use more pervasive (Oulasvirta et al., 2012). For many illiterate fishermen, YouTube serves as a crucial resource, enabling them to access information through continuous video content, which compensates for their inability to read. While this reliance underscores the value of YouTube in fulfilling their informational needs, it also results in substantial economic costs to buy mobile internet due to the extensive consumption of video content. Rumpf et al. (2022) highlighted the significant economic costs associated with problematic internet usage (PUI). In this context, behaviours such as online gambling, viewing adult content, and excessive use of social media are considered forms of PUI that contribute to financial strain.

Increased internet costs due to inefficient content consumption

Fishermen, due to their inability to read, are often unable to make informed decisions about the video content they consume on YouTube. When using voice commands, they cannot understand video captions or titles, forcing them to randomly select videos. This repetitive process of checking one video after another not only increases their data usage but also contributes to the perception

that internet costs are unreasonably high. These fishermen act merely as viewers without engaging in any form of interaction on the platform, such as liking, commenting, or sharing videos (Sui et al., 2022). Moreover, they lack knowledge of data-saving techniques, such as adjusting video quality, using data-saving features, or preloading content on Wi-Fi (Whitely, 2024). Although the Internet is seen as an essential infrastructure for audio-video content access on YouTube (Lehr & Sicker, 2017), this increased consumption continues to burden them with high costs.

Problems with voice recognition for fishermen

Fishermen use voice commands in Bengali (the local language), and the system often provides outdated information, especially regarding weather updates. This happens because voice search relies on Google's audio recognition technologies, which require proper settings to be turned on (YouTube, n.d.). Unfortunately, fishermen are generally unaware of this requirement, as their smartphones were set up with the help of the local mobile technician and without proper guidance or training. Additionally, they often use YouTube without a Google account and remain unaware of the potential benefits, such as improved voice recognition technology based on saved audio data (YouTube, n.d.). This lack of user knowledge limits the effectiveness of YouTube's voice recognition system and prevents the fishermen from optimising their use of the platform to meet their informational needs.

Problems with adult content and biased recommendations

Search and recommendation algorithms shape content results based on user queries and feedback, retrieving results according to individual user preferences. These algorithms increasingly rely on user profiles to optimise the content they present (Boratto et al., 2020). However, a critical issue with these algorithms is the prevalence of popularity bias, where widely viewed or highly rated content is consistently prioritised, creating a feedback loop that amplifies its visibility over time (Kirdemir et al., 2021). In the context of fishermen seeking entertainment, such as music videos, this bias often results in the prominence of adult content and gambling advertisements. The algorithm misinterprets their repeated consumption of video content as a preference for such material, reinforcing these undesirable recommendations. Consequently, much of the online content fishermen encounter is shaped by algorithms they do not understand, leading to distorted or harmful online experiences (Lewandowsky et al., 2023).

Biases inherent in recommendation systems, stemming from historical data, can exacerbate societal inequalities by influencing everyday information access. Lack of awareness about algorithms can exacerbate the digital divide, leaving vulnerable populations at a greater disadvantage (Gran et al., 2021). When these biases touch on sensitive attributes like religion or gender, they can reinforce discrimination and deepen existing inequalities (Boratto et al., 2019). In the case of young fishermen, persistent exposure to adult content and gambling advertisements not only alters their mindset but also leads to broader societal problems, impacting their families and communities.

Information overload challenges

Due to widespread illiteracy, many fishermen are unable to read video titles, which leads to confusion and indecision when selecting content. The exponential growth of digital information has exacerbated the problem of information overload, which significantly affects decision-making and productivity (Shahrzadi et al., 2024). For these fishermen, this overload, combined with their limited literacy, makes it challenging to navigate YouTube effectively. Moreover, the algorithm-driven technology behind YouTube fails to consider their literacy, further complicating their ability to access relevant information. As a result, their access to information via YouTube becomes problematic, much like how overconsumption of junk food negatively impacts health, as it does not consider their capacity to engage meaningfully with the platform.

Conclusion and future direction

This research explored how small-scale marine fishermen, a marginalised community, use voice commands to access information on YouTube, highlighting the challenges they face. YouTube, designed to serve a broad user base, does not effectively support this community, resulting in unintended negative consequences. Importantly, fishermen are not the primary customers of YouTube; instead, they unknowingly supply their data without compensation while receiving content tailored to YouTube's actual customers—advertisers and other entities who remain anonymous. This dynamic reveals that fishermen are utilising an unaccountable platform, exposing themselves to content that is not necessarily beneficial. In this way, fishermen are exploited as tools or resources to serve external interests, leading to consuming content that may have harmful consequences. YouTube thus fails to offer the same benefits to fishermen that it provides to its target users, reflecting a lack of fairness.

The rapid technological advancements of the digital age have transformed the dissemination and accessibility of information, creating a vast online information landscape. However, marginalised communities struggle to access accurate, relevant information on digital platforms, as illustrated in this research. Information experts can address these problems by identifying the specific kinds of information sought by these communities online, as well as their preferred formats, and then co-designing digital platforms that meet their needs. Such platforms can alleviate issues like information overload by organising targeted and accessible content while minimising economic costs and mitigating the negative impacts of algorithmic technology on societal culture and values.

Future research on investigating shared community spaces that function as information grounds can also help in understanding how to enhance their effectiveness by integrating physical and digital information tailored to the diverse needs of marginalised populations. These spaces hold the potential to serve multiple purposes, including the dissemination of accurate and reliable information, while also providing opportunities for culturally aligned entertainment and social engagement. Such spaces can play a critical role in overcoming informational disparities and empowering marginalised communities to participate more fully and equitably in the digital age.

Acknowledgements

This research is part of a PhD project investigating information cultures in marginalised communities, conducted under the Participatory Research and Ownership with Technology, Information, and Change (PROTIC) II project at Monash University, Australia. The authors acknowledge the funding support from the Empowerment Charitable Trust, the participants who contributed to this research, and the staff of the ECOFISH II project of WorldFish for their logistical assistance during field data collection. The authors also extend their gratitude to the esteemed reviewers for their valuable comments.

About the authors

Joy Bhowmik is a PhD candidate in the Faculty of Information Technology at Monash University, Australia. His research interests include information culture, information empowerment of marginalised communities, transforming shared community space as information ground, and documenting the impacts of climate change. He can be contacted at joy.bhowmikk@gmail.com

Dr. Viviane Frings-Hessami is a Senior Lecturer in the Faculty of Information Technology at Monash University, Australia. Her research interests include archival theory; recordkeeping literacy; information culture; the impact of cultural and linguistic influences on the management and preservation of digital information; analogue and digital preservation, and sustainable development. She can be contacted at viviane.hessami@monash.edu.

Dr Gillian Oliver is a Professor in the Faculty of Information Technology at Monash University, Australia. Her research interests include information and data cultures. She can be contacted at gillian.oliver@monash.edu.

Dr. Md. Khalid Hossain works as a Research Fellow at the Faculty of Information Technology of Monash University, Australia. His research interests include community informatics, environmental informatics, sustainability, and ICT for Development. He can be contacted at md.khalid.hossain@monash.edu.

References

Ahmed, S. K. (2024). The pillars of trustworthiness in qualitative research. Journal of Medicine, Surgery, and Public Health, 2, 100051. https://doi.org/10.1016/j.glmedi.2024.100051

Airoldi, M., Beraldo, D., & Gandini, A. (2016). Follow the algorithm: An exploratory investigation of music on YouTube. Poetics, 57, 1-13. https://doi.org/10.1016/j.poetic.2016.05.001

Al_bool, H., Ali, M., Ibrahim, H., & Habbal, A. M. M. (2010). Hands-Free Searching Using Google Voice. *IJCSNS*, 10(8), 47.

Andika, R., Kao, C. T., Williams, C., Lee, Y. J., Al-Battah, H., & Alweis, R. (2021). YouTube as a source of information on the COVID-19 pandemic. Journal of community hospital internal medicine perspectives, 11(1), 39-41. https://doi.org/10.1080/20009666.2020.1837412

Arthurs, J., Drakopoulou, S., & Gandini, A. (2018). Researching youtube. Convergence, 24(1), 3-15.

Balasuriya, S. S., Sitbon, L., Bayor, A. A., Hoogstrate, M., & Brereton, M. (2018, December). Use of voice activated interfaces by people with intellectual disability. In Proceedings of the 30th Australian conference on computer-human interaction (pp. 102-112).

Beard, M., & Longstaff, S. (2018). *Ethical by design: principles for good technology*. Ethics Centre.

Bessi, A., Zollo, F., Del Vicario, M., Puliga, M., Scala, A., Caldarelli, G., ... & Quattrociocchi, W. (2016). Users polarization on Facebook and Youtube. PloS one, 11(8), e0159641. doi:10.1371/journal.pone.0159641

Boratto, L., Fenu, G., & Marras, M. (2019, April). The effect of algorithmic bias on recommender systems for massive open online courses. In European conference on information retrieval (pp. 457-472). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-15712-8_30

Boratto, L., Marras, M., Faralli, S., & Stilo, G. (2020, April). International workshop on algorithmic bias in search and recommendation (bias 2020). In European Conference on Information Retrieval (pp. 637-640). Cham: Springer International Publishing. doi: 10.1007/978-3-030-45442-5_84

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.

Braun, V., & Clarke, V. (2012). *Thematic analysis*. American Psychological Association.

Brown, M. A., Bisbee, J., Lai, A., Bonneau, R., Nagler, J., & Tucker, J. A. (2022). Echo chambers, rabbit holes, and algorithmic bias: How YouTube recommends content to real users. Available at SSRN 4114905. http://dx.doi.org/10.2139/ssrn.4114905

Bryant, L.V. (2020). The YouTube Algorithm and the Alt-Right Filter Bubble. Open Information Science, 4, 85 - 90. https://doi.org/10.1515/opis-2020-0007

Byrne, D. A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Qual Quant* **56**, 1391–1412 (2021). https://doi.org/10.1007/s11135-021-01182-y

Chatman, E. A. (1999). A theory of life in the round. Journal of the American Society for information Science, 50(3), 207-217.

Chelba, C., & Schalkwyk, J. (2012). Empirical exploration of language modeling for the google. com query stream as applied to mobile voice search. In Mobile Speech and Advanced Natural Language Solutions (pp. 197-229). New York, NY: Springer New York. https://doi.org/10.1007/978-1-4614-6018-3_8

Crestani, F., & Du, H. (2006). Written versus spoken queries: A qualitative and quantitative comparative analysis. *Journal of the American Society for Information Science and Technology*, 57(7), 881-890. https://doi.org/10.1002/asi.20350

D'Souza, R. S., D'Souza, S., Strand, N., Anderson, A., Vogt, M. N., & Olatoye, O. (2020). YouTube as a source of medical information on the novel coronavirus 2019 disease (COVID-19) pandemic. Global public health, 15(7), 935-942. https://doi.org/10.1080/17441692.2020.1761426

Davis, H., & Farmer, J. (2016, November). Digital participation: engaging diverse and marginalised communities. In Proceedings of the 28th Australian Conference on Computer-Human Interaction (pp. 672-675). http://dx.doi.org/10.1145/3010915.3011866

Delli, K., Livas, C., Vissink, A., & Spijkervet, F. K. (2016). Is YouTube useful as a source of information for Sjögren's syndrome?. Oral diseases, 22(3), 196-201.

Diers, C. S., Remvig, C., Meteran, H., Thomsen, S. F., Sigsgaard, T., Høj, S., & Meteran, H. (2023). The usefulness of YouTube videos as a source of information in asthma. Journal of Asthma, 60(4), 737-743. https://doi.org/10.1080/02770903.2022.2093218

Dogan, S. (2024). Voice Control and Voice Searching. In Future Tourism Trends Volume 2: Technology Advancement, Trends and Innovations for the Future in Tourism (pp. 159-172). Emerald Publishing Limited.

Dudharejia, M. (n.d.). How to Optimize YouTube Videos for Voice Search. E2M. Retrieved September 13, 2024, from https://www.e2msolutions.com/blog/optimize-youtube-for-voice-search/

Foster, D. (2020). Factors influencing the popularity of YouTube videos and users' decisions to watch them.

Gran, A. B., Booth, P., & Bucher, T. (2021). To be or not to be algorithm aware: a question of a new digital divide?. Information, Communication & Society, 24(12), 1779-1796. https://doi.org/10.1080/1369118X.2020.1736124

Guy, I. (2018). The characteristics of voice search: Comparing spoken with typed-in mobile web search queries. ACM Transactions on Information Systems (TOIS), 36(3), 1-28. https://doi.org/10.1145/3182163

Haroon, M., Chhabra, A., Liu, X., Mohapatra, P., Shafiq, Z., & Wojcieszak, M. (2022). Youtube, the great radicalizer? auditing and mitigating ideological biases in youtube recommendations. arXiv preprint arXiv:2203.10666.

Hourcade, J. P., Mascher, S. L., Wu, D., & Pantoja, L. (2015, April). Look, my baby is using an iPad! An analysis of YouTube videos of infants and toddlers using tablets. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 1915-1924).

http://dx.doi.org/10.1145/2702123.2702266 Families and Their Use of Technology CHI 2015, Crossings, Seoul, Korea

Hua, K. (2015, June 23). Education as Entertainment: YouTube Sensations Teaching The Future. *Forbes*. https://www.forbes.com/sites/karenhua/2015/06/23/education-as-entertainment-youtube-sensations-teaching-the-future/?sh=54f09f247c2e

Hussein, E., Juneja, P., & Mitra, T. (2020). Measuring misinformation in video search platforms: An audit study on YouTube. Proceedings of the ACM on Human-Computer Interaction, 4(CSCW1), 1-27. https://doi.org/10.1145/3392854

Jha, A. K., Singhal, N., & Chhabra, A. (2024). Analysis of Voice-Based Searches and How They Affect Digital Marketing. Educational Administration: Theory and Practice, 30(5), 13914-13921. Doi: 10.53555/kuey.v30i5.6119

Jiang, J., Jeng, W., & He, D. (2013). How do users respond to voice input errors? Lexical and phonetic query reformulation in voice search. In *Proceedings of the 36th international ACM SIGIR conference on Research and development in information retrieval* (pp. 143-152). https://doi.org/10.1145/3182163

Johnson, J. L., Adkins, D., & Chauvin, S. (2020). A review of the quality indicators of rigor in qualitative research. American journal of pharmaceutical education, 84(1), 7120. https://doi.org/10.5688/ajpe7120

Jouvet, D., Langlois, D., Menacer, M. A., Fohr, D., Mella, O., & Smaïli, K. (2018). Adaptation of speech recognition vocabularies for improved transcription of youtube videos. Journal of International Science and General Applications, 1(1), 1-9.

Kawulich, B. B. (2005, May). Participant observation as a data collection method. In *Forum qualitative sozialforschung/forum: Qualitative social research* (Vol. 6, No. 2).

Kesherwani, Bhagyashree., Rout, Sandeep., Padhy, Deepayan., & Ravichandran, S. (2022). Social media help farmers: For improving agriculture practices. International Journal of Biology, Pharmacy and Allied Sciences, 11(1). https://doi.org/10.31032/IJBPAS/2022/11.1.1051

Kiesel, J., Lang, K., Wachsmuth, H., Hornecker, E., & Stein, B. (2020, March). Investigating expectations for voice-based and conversational argument search on the web. In Proceedings of the 2020 Conference on Human Information Interaction and Retrieval (pp. 53-62). https://doi.org/10.1145/3343413.3377978

Kirdemir, B., Kready, J., Mead, E., Hussain, M. N., & Agarwal, N. (2021, April). Examining video recommendation bias on YouTube. In International Workshop on Algorithmic Bias in Search and Recommendation (pp. 106-116). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-78818-6_10

Kversøy, K. S., & Kversøy, S. D. (2018). Exploring career possibilities for people with intellectual disabilities. Indian Journal of Career and Livelihood Planning, 7(1), 39-47.

Lee, J., Gwak, S., Gwon, J., Park, J., Eom, S., Hong, S., ... & Jung, H. (2023). Exploring the community of older adult viewers on YouTube. Universal Access in the Information Society, 22(4), 1393-1404. https://doi.org/10.1007/s10209-022-00918-3

Lehr, W., & Sicker, D. (2017). Would you like your Internet with or without video?. U. Ill. JL Tech. & Pol'y, 73.

Lewandowsky, S., Robertson, R. E., & DiResta, R. (2023). Challenges in understanding human-algorithm entanglement during online information consumption. Perspectives on Psychological Science, 17456916231180809. https://doi.org/10.1177/17456916231180809

Lutz, M., Gadaginmath, S., Vairavan, N., & Mui, P. (2021, December). Examining political bias within youtube search and recommendation algorithms. In 2021 IEEE Symposium Series on Computational Intelligence (SSCI) (pp. 1-7). IEEE.

Martijn, B. (2024, June 1). How search travel industry: How can your company benefit? www.revfine.com. Retrieved September 11, 2024, from https://www.revfine.com/voice-search-travel-industry/

Myers, C., Furqan, A., Nebolsky, J., Caro, K., & Zhu, J. (2018, April). Patterns for how users overcome obstacles in voice user interfaces. In *Proceedings of the 2018 CHI conference on human factors in computing systems* (pp. 1-7). https://doi.org/10.1145/3173574.3173580

Oliver, G., & Foscarini, F. (2014). *Records management and information culture: Tackling the people problem*. Facet Publishing.

Onder, M. E., & Zengin, O. (2021). YouTube as a source of information on gout: a quality analysis. Rheumatology International, 41(7), 1321-1328. https://doi.org/10.1007/s00296-021-04813-7

Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. Personal and Ubiquitous computing, 16, 105-114. DOI 10.1007/s00779-011-0412-2

Paudi, M. H., Din, R., & Othman, N. (2022). Agricultural Video as A Learning Medium for Young Farmer. International Journal of Academic Research in Progressive Education and Development, 11 (1), 729-742. http://dx.doi.org/10.6007/IJARPED/v11-i1/12142

Pratiwi, M. A., Wahyu, H. R., & Normande, B. E. (2023). Understanding knowledge acquisition, adaptive strategies, challenges, and preservation methods among traditional fishermen in a digital age. In BIO Web of Conferences (Vol. 70, p. 05008). EDP Sciences. https://doi.org/10.1051/bioconf/20237005008

Raj, S. A. S., Ann, W. H. T., Subramaniam, P. A., & Yunus, M. M. (2019). Using YouTube as a platform to learn social expression. Creative Education, 10(2), 288-296. DOI: 10.4236/ce.2019.102023

Roth C, Mazières A, Menezes T (2020) Tubes and bubbles topological confinement of YouTube recommendations. PLoS ONE 15(4): e0231703. https://doi.org/10.1371/journal.pone.0231703

Rumpf, H. J., Effertz, T., & Montag, C. (2022). The cost burden of problematic internet usage. *Current Opinion in Behavioral Sciences*, 44, 101107.

Schalkwyk, J., Beeferman, D., Beaufays, F., Byrne, B., Chelba, C., Cohen, M., ... & Strope, B. (2010). "Your word is my command": Google search by voice: A case study. *Advances in Speech Recognition: Mobile Environments, Call Centers, and Clinics*, 61-90.

Schultz, T., & Waibel, A. (1998, February). Multilingual and crosslingual speech recognition. In Proc. DARPA Workshop on Broadcast News Transcription and Understanding (pp. 259-262).

Seo, W., & Jung, H. (2022). Challenges and opportunities to improve the accessibility of YouTube for people with visual impairments as content creators. Universal Access in the Information Society, 21(3), 767-770. https://doi.org/10.1007/s10209-020-00787-8

Shahrzadi, L., Mansouri, A., Alavi, M., & Shabani, A. (2024). Causes, consequences, and strategies to deal with information overload: a scoping review. *International Journal of Information Management Data Insights*, 4(2), 100261.

Shokouhi, M., Ozertem, U., & Craswell, N. (2016, April). Did you say U2 or YouTube? Inferring implicit transcripts from voice search logs. In Proceedings of the 25th International Conference on World Wide Web (pp. 1215-1224).

Shoufan, A., & Mohamed, F. (2022). YouTube and education: A scoping review. IEEE Access, 10, 125576-125599.

Shuva, N. Z. (2017). The information practices of the fishermen in the Bay of Bengal, Bangladesh. *Open Information Science*, 1(1), 21-40. DOI 10.1515/opis-2017-0003

Sui, W., Sui, A., & Rhodes, R. E. (2022). What to watch: Practical considerations and strategies for using YouTube for research. Digital Health, 8, 20552076221123707. DOI: 10.1177/20552076221123707

Vybihal, J., & Desblancs, M. (2023). Analysis of the Impact of Algorithms on Siloing Users: Special Focus on YouTube. In AI and Society (pp. 51-69). Chapman and Hall/CRC.

Whitley, A. (2024, January 17). How Much Data Does YouTube Use? airalo. Retrieved September 14, 2024, from https://www.airalo.com/blog/how-much-data-does-youtube-use

Yi, J., & Maghoul, F. (2011, March). Mobile search pattern evolution: the trend and the impact of voice queries. In Proceedings of the 20th international conference companion on World wide web (pp. 165-166).

YouTube. (n.d.). Find videos with Voice Search. YouTube Help. https://support.google.com/youtube/answer/9372650?hl=en&co=GENIE.Platform%3DAndroid