

Social Media as a Design and Research Site in HCI: Mapping Out Opportunities and Envisioning Future Uses

Ferran Altarriba Bertran
Social Emotional Technology Lab,
University of California Santa Cruz

Soomin Kim
Department of Communication, Seoul
National University

Minsuk Chang
School of Computing, Korea
Advanced Institute of Science and
Technology / Naver AI Lab

Ella Dagan
Social Emotional Technology Lab,
University of California Santa Cruz

Jared Duval
Social Emotional Technology Lab,
University of California Santa Cruz

Katherine Isbister
Social Emotional Technology Lab,
University of California Santa Cruz

Laia Turmo Vidal
Department of Informatics and Media,
Uppsala University

ABSTRACT

In this workshop, we will explore the emergent methodological space of social media based HCI design and research. We will gather scholars and practitioners from different areas within HCI to discuss how social media platforms might support their practice. Through short presentations, open discussions, and design-led activities, we will examine the affordances of existing social media platforms and speculate future developments in this methodological space. The outcome of the workshop will be an interactive data visualization of existing social media platforms, their main characteristics, and their affordances for HCI design and research. Overall, we will begin to characterize the methodological space of social media based HCI design and research, setting the foundation for future developments in this space.

CCS CONCEPTS

• **Human-centered computing** → Human computer interaction (HCI); HCI design and evaluation methods.

KEYWORDS

Social media, design, research, methods, Facebook, Instagram, Snapchat, TikTok, Pinterest, Twitter, YouTube

ACM Reference Format:

Ferran Altarriba Bertran, Soomin Kim, Minsuk Chang, Ella Dagan, Jared Duval, Katherine Isbister, and Laia Turmo Vidal. 2021. Social Media as a Design and Research Site in HCI: Mapping Out Opportunities and Envisioning Future Uses. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI '21 Extended Abstracts)*, May 08–13, 2021, Yokohama, Japan. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3411763.3441311>

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

CHI '21 Extended Abstracts, May 08–13, 2021, Yokohama, Japan

© 2021 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-8095-9/21/05.

<https://doi.org/10.1145/3411763.3441311>

1 INTRODUCTION

Social media is rife with raw instances of people's behaviors, beliefs, actions, and feelings. As such, it can be a great source of data and inspiration for HCI design and research. In fact, it is an increasingly commonplace research tool and data source in HCI. Over the years, scholars and practitioners have developed strategies for leveraging such rich, in-the-wild medium to conduct research and/or to support design practice. Examples of well-known uses are: conducting online focus groups (e.g. [13]), doing social media mining (e.g. [9][7][8]), and inspiring visual design (e.g. [5]), among others. Here we argue that the potential of social media transcends those existing use cases.

Social media is not limited to a single platform or data already on the platform. Widely recognized social media include: blogs (e.g. Tumblr), social networking services (e.g. Facebook, Twitter, Instagram, LinkedIn), content sharing services (e.g. YouTube), messaging applications (e.g. WhatsApp, WeChat), and discussion sites (e.g. Reddit). Because those platforms are a relatively new phenomenon that evolves rapidly, the methodological space they enable is currently in expansion. On the one hand, we see the emergence of new social media platforms and providers (e.g. TikTok) that present us with new affordances (e.g. live streaming) that, in turn, provide us with new opportunities for conducting research and inspiring design. On the other hand, we see that HCI scholars and practitioners are increasingly experimenting with forms of research and design that require remote engagement between researchers and stakeholders, and social media can be a useful mechanism for establishing those kinds of connections.

In times of a pandemic that dramatically changes the playground of HCI design and research, many scholars will be forced to adapt and evolve their practices and methodologies. Here we argue that, due to its remote-yet-still-situated nature, social media can open up new possibilities in this space—possibilities that support novel design and research practices that are useful during the pandemic and beyond. Therefore, we suggest it is a timely idea to bring together a multi-disciplinary group of HCI scholars to reflect on what social media can do to support our design and research practices. In the workshop, we plan to address the following questions: **What**

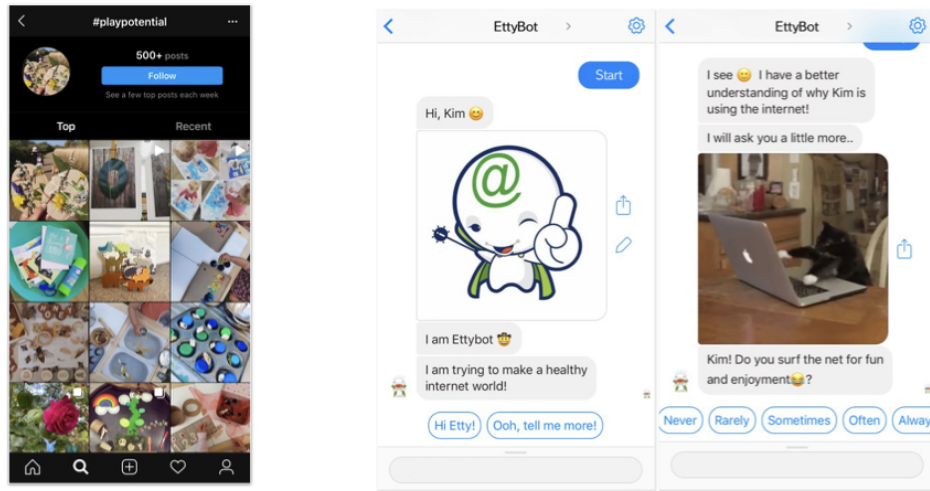


Figure 1: Illustrative examples of using social media to inspire playful design (left) and to engage users in an online survey (right).

is the diversity of social media platforms available to us? What are the differences between them? What kinds of research/design practices could they afford? And, most importantly, how can we leverage those affordances in our work?

In this workshop, our aim will be to examine the landscape of social media platforms available for HCI designers and researchers, to: (1) define what makes a service/platform a social media, and (2) build a foundation and collection of available platforms, their affordances, and how they can be used for design/research. To that end, we will invite participants to share their best practices of using social media for design and research purposes. We will also speculate new uses for social media platforms. Collectively, we will produce a visual map of social media platforms based on their characteristics, their affordances, and their potential to support design and/or research in HCI. We hope to initiate an expansive conversation about new ways in which social media might help us to do our work, setting a foundation for researchers and practitioners to share and evolve their best practices in the future.

2 BACKGROUND AND MOTIVATIONS

HCI researchers and designers have been using social media to support their practice for a while, in different ways and for different purposes. A widely known use case is using social media as an alternative channel for performing traditional face-to-face focus groups [5][15]. Since a large number of distributed users can easily gather, social media can function as an easy-to-use research channel without time and place restriction for social science researchers [20]. Another strategy is social media mining. Researchers have used social media to characterize both the landscape of its usages [9], and the characteristics and effects of interaction feature usages [8][18]. Social media has also been a useful repository of user perceptions and trends [6][11][16][19]. Also, researchers have built interactive agents that engage with social media users to gather new facts about

the data being used in machine learning algorithms [12]. We also see well-established social media-based research practices in design, where designers in fields with a strong focus on the visual aesthetics use platforms like Pinterest to produce mood-boards that inspire the visual language of their work (e.g. [5]).

Aside from those well-established uses of social media in design and research, scholars are starting to experiment with new ways of leveraging it in HCI. An example is Altarriba Bertran et al.'s explorations of using Instagram to capture raw instances of mundane playful behavior in order to inspire playful design [1] (see Figure 1, left). Here, the focus is not to collect large datasets of people's playful behavior in order to produce generalizable knowledge, but rather to collect a smaller yet rich set of data that can be manually examined by designers to empathize with their stakeholders' playful cravings. Another example of an emergent application of social media-based research uses messaging applications for ethnography, survey, and crowdsourcing, e.g. Tallyn et al.'s [21] study that attempted to gather users' ethnographic data through the avenue of text-based messaging apps. The chat interface has also been presented as an alternative method to that of the deployment of web surveys [10] as well as interviews [22] (see Figure 1, right).

Furthermore, a crowdsourcing system which adapts conversational interaction can, in fact, yield high quality data. A multi-turn argumentation system for crowd workers improves data accuracy [4] along with worker engagement [17].

In times when it is more and more common to do HCI work remotely—during the pandemic and beyond—social media seems an interesting platform to support design and research. To respond to this growing reality, and to consolidate and combine existing practices, in this workshop we will characterize the landscape of social media based design and research methods. We will begin by exploring the kinds of practices people already do with social media, and we will follow up with a speculation of novel functions

we might find for such a rich medium. The overall aim is to start articulating the full breadth of possibilities social media provides us with, as designers and researchers, and to map out those potentials so we can start to develop best practices that enhance the palette of methodological possibilities available in HCI.

3 WORKSHOP AIMS AND STRUCTURE

The aim of the workshop is to characterize the emerging space of social media based HCI methods and best practices. Through presentations, discussions, and design-led activities we will examine existing social media sites and discuss their affordances when it comes to doing HCI research and design. The end goal will be to create an interactive visual map of the current state of the art of social media platforms, clustered according to different parameters such as: the kinds of design/research practices they afford, the media forms they privilege, the historical context of their launch, the type of content users often post in them, the populations that use them. . . We will also use this characterization of the space of social media based HCI methods to push its boundaries, discussing future uses and best practices. Overall, our aim will be to discuss how can we make use of the possibilities existing social media present us with, and what new platforms or functionalities we might want to develop to better support our design and research work. To inform the choice of variables we look at during the workshop, we will build on our own experience of using social media for design and research purposes in our own work. We will also invite prospective participants to submit a position paper describing their own practices and use that information to feed our list of analysis items for examining social media platforms.

We expect to host between 15 and 25 participants. Given the theme of the workshop, we do not see the current social distancing scenario as a limitation; rather, we believe it presents an interesting opportunity to explore the potential of using social media to facilitate remote design and research in HCI. To leverage that opportunity, the workshop will take place online, using the organizers' institutional Zoom room and Miro. It will span over two days, during the weekend before the conference (May 8-9), including a 3h section each day. The workshop schedule will be informed by participants' submissions; we will do our best to schedule the workshop at a time that works best for most participants. Here we describe the activities included in each of the two workshop sections:

Day 1

0 - 0.15h / Introduction: Presentation of workshop aims and agenda.

0.15 - 1.25h / Participant presentations: Each participant will have 3-5 minutes (depending on amount of participants) to introduce themselves and share their experience with using social media to support their work.

1.30 - 2h / Discussion: We will allow space for Q&A and facilitate a discussion about the synergies and differences between participants' social media-based design & research practices and about potential gaps and opportunities.

2 - 2.15h / Break.

2.15 - 2.45h / Foraging social media platforms: We will invite participants in breakout rooms of 3-4 people. We will invite

them to look for examples of existing social media platforms of all kinds, and to create digital cards on a Miro board for each platform they find. The aim will be to create an as comprehensive as possible list of social media platforms.

2.45 - 3h / Populating the map: Back in the main Zoom room, groups will share the social media platforms they found and post the corresponding cards on the shared Miro board.

*Between the day 1 and day 2 sections, participants will be invited to (voluntarily) continue to find and experiment with social media platforms, and to reflect their explorations on the emergent Miro map.

Day 2

0 - 0.15h / Familiarizing with the map: Participants will be given time to explore the emerging map of social media platforms and informally ask each other questions about the platforms they contributed.

0.15 - 1.45h / Experimenting with social media platforms: In breakout rooms of 3-4 participants, we will experiment with social media platforms to explore in which ways they can support HCI design & research. Groups will be encouraged to examine more than one platform, to ensure that we cover as many of them as possible. Participants will be encouraged to use the fact that they are participating remotely to their advantage, e.g. to take time to move around their homes, workplaces, or even neighborhoods if they feel that that will be the best way to explore the potential of a particular social media platform. To support participants to think critically and analytically about the social media platforms' potential, we will provide an analysis template on the shared Miro board featuring important parameters participants can think about. Those parameters will then be used to create clusters in the emerging map of social media platforms for HCI practice.

1.45 - 2h / Break.

2 - 2.20h / Presentations: Groups will share their analyses of social media platforms (3-5 minutes per group, depending on the amount of groups).

2.20 - 2.50h / Discussion: We will cluster the social media platforms on the emerging map by affinity, based on the parameters used in the analysis. Taking the map as a starting point, we will discuss the current state of social media-based design and research. We will also speculate future directions in this methodological space. We will ask ourselves questions such as: Are we making use of the full potential of current social media for research and design? What might be design/research needs that are not covered by current platforms? What should be the next moves in social media-based methods research?

2.50 - 3h / Future work: We will propose our agenda for moving forward with this line of research and invite participants to join and propose new interventions.

3h / Farewell.

4 PRE-WORKSHOP PLANS

We will invite an array of HCI designers, researchers, and practitioners who might be interested in using social media to support their practice, with a view towards shaping the HCI future research agenda in this space. We will include both academic researchers and practitioners, to bridge the divide between theoretical concepts

and design practices. We will accept both expert participants (i.e. with prior experience using and/or developing social media-based HCI strategies) and participants with no prior experience, but with an interest in exploring the use of social media in their work. Our aim is to gather a group of multi-disciplinary HCI practitioners that can provide different perspectives on social media-based methods towards enabling us to create a mapping of this space that is representative of the diversity of HCI as a field. Our first step in this direction was bringing together a group of organizers who have radically different foci within HCI, come from diverse cultural backgrounds, and are at different stages in their design and research careers.

To recruit participants, we will use a dedicated workshop website: <https://tinyurl.com/SocialMediaInHCI>. We will distribute a call for participation in our professional networks and in the numerous CHI-related social media pages (e.g. CHI meta on Facebook; @ACM_SIGCHI, @Chi2021Yokohama on Twitter). We will also contact researchers whom we are aware of having experience with using social media-based research methods, and share the call for participation with them directly. Overall, we are hopeful that the workshop theme is timely and will attract participants—even those without prior experience with using social media in their design/research practice might feel compelled to learn about these methods and use them to navigate new challenges as they emerge. Examples of audiences that might be interested in our workshop are: 1) interaction designers interested in using social media to learn about and interact with stakeholders through channels that feel natural for them, or those searching new modes of inspiration to inform their work and/or use social media as design material; 2) HCI researchers looking to incorporate social media in their methods repertoire, or expand them; 3) designers and social scientists interested in using social media to support first-person research methods; or 4) developers and researchers of social media analysis and algorithms. Importantly, in the workshop we will welcome both scholars with prior experience using or developing social media-based methods, and novice designers and researchers with no prior experience who might be interested in starting to explore this emerging methodological space.

5 POST-WORKSHOP PLANS

After the workshop, we will consolidate the mapping of social media platforms and their design/research affordances into an interactive data visualization. The map will feature the available social media platforms clustered by its characteristics, and by ways in which they could support HCI practice. The organizers have prior experience developing these kinds of interactive data visualizations, e.g. the *HFI Lit Review* app¹ [2] or *RecipeScape*² [3]. We will make this visualization available to the HCI community on a website. We will also write an Interactions article to share the visualization and the associated reflections, to begin to characterize the methodological space of social media-based HCI design and research. We will invite all workshop participants to co-author this piece.

Potentially, depending on the participants' interest, we will consider working towards opening a journal special issue call about

the methodological space of social media-based HCI design and research. The aim of the special issue will be to gather a number of case studies that serve as detailed accounts of the breadth of use cases, and potential uses of social media, to support HCI practice. Workshop participants will be invited to submit a paper describing their social media-based practices and/or reflecting on the challenges and opportunities that social media affords in HCI design and research. Finally, since we will also use the workshop as an opportunity to network and bring together researchers interested in a similar methodological space, we are hopeful that we will collectively envision new spaces for extended academic conversations about this topic. We see this workshop as an attempt at exploring a rather new methodological space, and we hope that it will lead to follow-up conversations.

6 ORGANIZERS

Ferran Altarriba Bertran is a PhD candidate in the Social and Emotional Technology Lab at the University of California, Santa Cruz. His research explores how future everyday-use technologies could support increasingly playful relationships with one another, and how situated co-design design methods could be leveraged to develop them. ferranaltarriba.com

Soomin Kim is a PhD candidate in the Communication department at Seoul National University, working in the Human-Computer Interaction & Design Lab. Her research on Human-Computer Interaction (HCI) and User Experience (UX) focuses on human-AI interactions, intersecting UX/HCI perspective in AI/ML expanded to meaningful and synergistic results in both communities. [k-soomin.github.io](https://github.com/k-soomin)

Minsuk Chang is a research scientist at Naver AI Lab. His research explores machine learning and human computation techniques for building interactive representations of naturally crowd-sourced knowledge on the internet. He also builds novel interfaces for augmenting people's ability to access context-rich information using the computational representations building blocks in designing. minsukchang.com

Ella Dagan is a doctoral student in Computational Media at the University of California Santa Cruz, working in the Social Emotional Technology Lab. Ella's research focus is on unpacking social affordances of future technology designs and their potential to impact the social experience. Ella designs and creates interactive artifacts and experiences at the intersection of play, fashion, technology, social psychology, storytelling, remembrance, and wonder. elladagan.com

Jared Duval is a PhD candidate in the Computational Media department at University of California Santa Cruz. He works in the ASSIST Lab and the Social Emotional Technology Lab. Jared designs and researches playful technology with and for people with disabilities. He has used TikTok to access populations of people with disabilities being playful to inspire novel technology designs. jareduval.com

Katherine Isbister is a professor of Computational Media at the University of California Santa Cruz, where she directs the Social Emotional Technology Lab and the Center for Computational Experience. Isbister's research focuses on broadening the social

¹The HFI Lit Review app can be accessed at: <https://www2.ucsc.edu/hfi/>

²More information about RecipeScape: <https://recipescapexixlab.org/>

and emotional palette of technology, using a research-through-design process to create and evaluate prototypes of possible future experiences. *katherineinterface.com*

Laia Turmo Vidal is an Interaction Design PhD Candidate at Uppsala University, Sweden. In her research, she studies and designs technology to support movement teaching and learning, both in physical and online environments. Her research interests include technology design for health and wellbeing, embodied design methods, co-operative social computing, and play. *laiaturmovidal.com*

7 CALL FOR PARTICIPATION

Social media is rife with raw instances of people's behaviors, beliefs, and feelings. As such, it can be a great source of data and inspiration in HCI. We suggest that, in times of a pandemic that dramatically challenges in-person HCI practices, there is an opportunity to further explore the potential of social media to support design and research. Our workshop will bring together a multi-disciplinary group of HCI scholars to reflect on what social media can do to support our practices, with the aim of beginning to characterize this emergent methodological space.

In a two-day online workshop, comprised of two 3h sections, will examine the current landscape of social media platforms and their affordances. We will invite participants to share their experience of doing social media-based design and research and discuss best practices in this space. We will also experiment hands-on with existing social media platforms and speculate new uses for them. Collectively, we will produce an interactive map of social media platforms based on their characteristics, affordances, and potential to support HCI practice. We hope to initiate a conversation about how social media might help us to do our work and set a foundation for new social media based HCI methods.

The workshop is open to any scholar or practitioner interested in using social media to support design and research—both experts and novices, and from any area within or around HCI. We invite interested participants to submit a position paper (1-3 pages) to before February 21st 2021, including:

1. Name, affiliation, time zone, and design/research focus.
2. Perspectives on the potential of social media to support HCI design and/or research; experience with using social media for that purpose; and/or any methods/strategies they may have developed.
3. (optional) Ideas of variables to take into account when analyzing existing social media platforms (e.g. the types of media they privilege or their target audience).

More information: <https://tinyurl.com/SocialMediaInHCI>

REFERENCES

- [1] Ferran Altarriba Bertran, Laia Turmo Vidal, Ella Dagan, Elena Márquez Segura, Jared Duval, and Katherine Isbister. 2020. Chasing Play with Instagram: How Can We Capture Mundane Play Potentials to Inspire Interaction Design?. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–8. DOI:<https://doi.org/10.1145/3334480.3382913>
- [2] Ferran Altarriba Bertran, Samvid Jhaveri, Rosa Lutz, Katherine Isbister, and Danielle Wilde. 2019. Making Sense of Human-Food Interaction. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, Paper 678, 1–13. DOI:<https://doi.org/10.1145/3290605.3300908>
- [3] Minsuk Chang, Vivian M. Hare, Juho Kim, and Maneesh Agrawala. 2017. RecipeScape: Mining and Analyzing Diverse Processes in Cooking Recipes. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '17)*. Association for Computing Machinery, New York, NY, USA, 1524–1531. DOI:<https://doi.org/10.1145/3027063.3053118>
- [4] Quanze Chen, Jonathan Bragg, Lydia B. Chilton, and Dan S. Weld. 2019. Cicero: Multi-Turn, Contextual Argumentation for Accurate Crowdsourcing. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, Paper 531, 1–14. DOI:<https://doi.org/10.1145/3290605.3300761>
- [5] Julienne Chen & Pearlyn Neo. 2019. Texting the waters: An assessment of focus groups conducted via the WhatsApp smartphone messaging application. *Methodological Innovations*, 12(3), 2059799119884276.
- [6] Julia Deeb-Swihart, Christopher Polack, Eric Gilbert & Irfan Essa. 2017. Selfie-Presentation in Everyday Life: A Large-Scale Characterization of Selfie Contexts on Instagram. *ICWSM*.
- [7] Eugenia Ha Rim Rho and Melissa Mazmanian. 2020. Political Hashtags & the Lost Art of Democratic Discourse. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–13. DOI:<https://doi.org/10.1145/3313831.3376542>
- [8] Yu-I Ha, Jeongmin Kim, Donghyeon Won, Meeyoung Cha & Jungseock Joo. 2018. Characterizing Clickbaits on Instagram. *ICWSM*.
- [9] Yuheng Hu, Lydia Manikonda & Subbarao Kambhampati. 2014. What We Instagram: A First Analysis of Instagram Photo Content and User Types. *ICWSM*.
- [10] Soomin Kim, Joonhwan Lee, and Gahgene Gweon. 2019. Comparing Data from Chatbot and Web Surveys: Effects of Platform and Conversational Style on Survey Response Quality. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, Paper 86, 1–12. DOI:<https://doi.org/10.1145/3290605.3300316>
- [11] Sasha Koustuv, John Torous, Eric D. Caine, and Munmun De Choudhury. 2020. *Social Media Reveals Psychosocial Effects of the COVID-19 Pandemic*. medRxiv.
- [12] Ranjay Krishna, Donsuk Lee, Fei-Fei Li, and Michael Bernstein. 2018. Engagement Learning: Expanding Visual Knowledge by Engaging Online Participants. In *The 31st Annual ACM Symposium on User Interface Software and Technology Adjunct Proceedings (UIST '18 Adjunct)*. Association for Computing Machinery, New York, NY, USA, 87–89. DOI:<https://doi.org/10.1145/3266037.3266110>
- [13] Daniel Lambton-Howard, Patrick Olivier, Vasilis Vlachokyriakos, Hanna Celina, and Ahmed Kharrufa. 2020. Unplatformed Design: A Model for Appropriating Social Media Technologies for Coordinated Participation. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1-13).
- [14] Kendra Lapolla. 2014. The Pinterest project: Using social media in an undergraduate second year fashion design course at a United States University. *Art, Design & Communication in Higher Education*, 13(2), 175-187.
- [15] Anastasia Aldelina Lijadi & Gertina Johanna van Schalkwyk. 2015. Online Facebook focus group research of hard-to-reach participants. *International Journal of Qualitative Methods*, 14(5), 1609406915621383.
- [16] Ferda Ofli, Yusuf Aytar, Ingmar Weber, Raggi al Hammouri, and Antonio Torralba. 2017. Is Saki #delicious? The Food Perception Gap on Instagram and Its Relation to Health. In *Proceedings of the 26th International Conference on World Wide Web (WWW '17)*. International World Wide Web Conferences Steering Committee, Republic and Canton of Geneva, CHE, 509–518. DOI:<https://doi.org/10.1145/3038912.3052663>
- [17] Sihang Qiu, Ujwal Gadiraju, and Alessandro Bozzon. 2020. Improving Worker Engagement Through Conversational Microtask Crowdsourcing. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–12. DOI:<https://doi.org/10.1145/3313831.3376403>
- [18] Rho, E. H. R., & Mazmanian, M. (2020, April). Political Hashtags & the Lost Art of Democratic Discourse. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1-13).
- [19] Luca Rossi, Eric Boscaro & Andrea Torsello. 2018. Venice through the Lens of Instagram: A Visual Narrative of Tourism in Venice. *Companion Proceedings of the The Web Conference 2018*.
- [20] Kate Stewart & Matthew Williams. 2005. Researching online populations: the use of online focus groups for social research. *Qualitative Research*, 5(4), 395-416.
- [21] Ella Tallyn, Hector Fried, Rory Gianni, Amy Isard, and Chris Speed. 2018. The Ethnobot: Gathering Ethnographies in the Age of IoT. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Paper 604, 1–13. DOI:<https://doi.org/10.1145/3173574.3174178>
- [22] Ziang Xiao, Michelle X. Zhou, Wenxi Chen, Huahai Yang, and Changyan Chi. 2020. If I Hear You Correctly: Building and Evaluating Interview Chatbots with Active Listening Skills. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–14. DOI:<https://doi.org/10.1145/3313831.3376131>