HAID: Human-AI Interaction for Dementia Care

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ABSTRACT

Caring for individuals living with dementia can be a challenging and emotionally taxing experience, especially for caregivers who are often spouses or partners. Many caregivers lack prior experience in providing care and would greatly benefit from training and support. With the advancements in AI techniques, human-centered AI interaction approaches have shown promise in enhancing dementia care. As the 1st edition, this workshop focuses on the intersection of human-computer interaction (HCI) and artificial intelligence (AI) to address the unique challenges associated with dementia care. Dementia presents multifaceted cognitive and emotional hurdles, and the workshop aims to explore how AI technologies can improve the quality of life for individuals with dementia while also supporting their caregivers. By bringing together researchers, practitioners, caregivers, and stakeholders, the workshop seeks to foster collaboration and innovation in the design, development, and implementation of human-centered AI solutions for dementia care.

CCS CONCEPTS

• **Do Not Use This Code → Generate the Correct Terms for Your Paper**; *Generate the Correct Terms for Your Paper*; Generate the Correct Terms for Your Paper; Generate the Correct Terms for Your Paper.

KEYWORDS

Dementia Care, Human-AI Interaction, HCI, AI

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1 INTRODUCTION AND BACKGROUND

Dementia presents itself as a clinical syndrome marked by a gradual decline in cognitive abilities, memory, and daily functioning, often necessitating specialized care and support for affected individuals [5]. Traditional approaches to dementia care typically focus on symptom management, caregiver support, and access to healthcare services. However, these approaches are often limited in their ability to provide personalized, holistic care that addresses the diverse needs and preferences of individuals living with dementia.

As AI techniques continue to advance, they bring forth innovative approaches that have the potential to revolutionize traditional dementia care practices. These technologies offer a range of capabilities, from predictive analytics to personalized interventions and remote monitoring, which can significantly enhance the quality of care provided to individuals living with dementia. For example, the utilization of 6G and AI applications has the potential to effectively and efficiently address dementia care needs, encompassing memory and cognitive support, enhancing speech and social interactions [13]. These AI techniques, including computer vision (CV), natural language processing (NLP), speech signal processing (SSP), etc., can be integrated into assistive technologies to provide support and assistance for people with dementia. For instance, assistive robots equipped with these technologies can identify facial expressions and gestures from people with dementia, enabling positive social interactions [1]. Furthermore, assistive technologies integrated with AI techniques can offer memory support, enhance safety and security, facilitate social interaction, and further enhance the quality of life for people with dementia [9, 11, 12], such as assistive robots [3, 16] and wearable sensors [14], etc. Utilizing NLP

and SSP techniques, assistive technology can also support the independence and well-being of people with dementia through voice interactions, such as conversational social robots [7, 8, 15] and Alzheimer's disease monitoring systems [2, 4]. Moreover, assistive technologies employing AI can help regulate the behavioral and psychological symptoms of dementia, thereby improving dementia care [6, 10]. These innovative solutions can empower individuals with dementia to live more independently while providing support and assistance when needed.

However, realizing the potential of AI in dementia care necessitates resolving a range of complicated challenges, including ethical considerations, privacy concerns, user acceptance, and the necessity for human-centered design approaches. Our workshop aims to serve as a platform for researchers from the HCI community to explore and discuss these challenges, opportunities, and best practices in leveraging AI to enhance dementia care through human-centered approaches. Through a combination of keynote and paper presentations, breakout sessions, and interactive discussions, our workshop seeks to advance our understanding of how AI can be effectively integrated into dementia care, with a focus on promoting meaningful human-AI interaction, ensuring ethical and responsible deployment of AI technologies, and addressing the diverse needs and preferences of individuals with dementia and their caregivers. Ultimately, our workshop aims to drive the development and adoption of innovative, human-centered AI solutions capable of supporting well-being of individuals with dementia and their caregivers.

2 WORKSHOP OVERVIEW

During this workshop, we will delve into the challenges and opportunities presented by human-AI interaction within dementia care, sharing insights to deepen our understanding and application. Our discussions will revolve around four key themes: **Deployment:** What strategies can be employed to apply human-AI interaction techniques effectively in improving dementia care? **Challenges:** What potential obstacles exist in integrating these technologies into supportive care environments? **Ethics:** What ethical considerations and dilemmas may arise from human-AI interactions in dementia care? **Learning:** What valuable lessons can the HCI community glean from these explorations? The insights gathered from these discussions will guide us in crafting a comprehensive report that outlines future action points and recommendations for advancing this crucial area of research.

2.1 Format

In order to enhance engagement and accessibility, our half-day workshop will be conducted in a hybrid format, accommodating both in-person and Zoom attendance. This approach ensures that speakers and participants unable to physically attend the conference can still contribute and engage in discussions. To facilitate remote participation, a dedicated member of the organizing committee will oversee chat interactions, encouraging remote attendees to actively participate and assisting with any in-person tasks as necessary. The workshop will start with an opening keynote presentation immediately following the introduction session, ensuring a seamless beginning. This will be followed by an interactive Q&A session to facilitate engagement and clarification of key concepts. Then, those who have submitted extended abstracts will then have

the opportunity to present their work, fostering additional discussion and networking opportunities within the group. Following the second keynote, an interactive session will commence. Participants will be divided into several small groups based on the number of attendees, with each group led by an organizer. Discussion topics for these groups will be customized according to participant submissions and keynote presentations, fostering engaging dialogue and collaboration.

2.2 Call for Participation

Participants will be invited to submit extended abstracts focusing on research related to the central theme and various topics of the workshop. Submissions should follow the ACM single-column format, with a maximum page length of four pages, excluding references. We will encourage the submission of papers describing work-in-progress, preliminary results, or position papers to foster discussion and peer review of emerging ideas. Furthermore, we will also support participants in sharing their papers on platforms like arXiv [1] or other open repositories. Selected submissions will be invited for oral presentations at the workshop, providing authors with a valuable opportunity to showcase their insights and findings to the audience.

2.3 List of Topics

Topics of interest include, but are not limited to:

- Human-AI collaboration in dementia care
- Human-centered design for AI solutions in dementia care
- Intelligent assistive technology applications for dementia care
- Real-world applications and case studies of AI in dementia care
- The role of caregivers and end-users in human-centered AI powered dementia care solutions
- Ethics in human-AI interactions for dementia care
- Societal impact and implications of human-centered AI in dementia care
- Interactive AI interfaces for dementia care
- Collaborative works for human-AI interaction in dementia care
- Interpretable and explainable AI for dementia care decision-making support
- Multimodal interaction design for human-centered AI systems in dementia care

2.4 Planned Schedule

We plan to organize an half-day workshop and the schedule is as follows:

(1) Welcome and Introduction (15 minutes)
(2) Keynote Presentation (25 + 5 Q/A) (30 minutes) **Arvid Rongve**
(3) Paper Presentations (60 minutes)
(4) Coffee Break (40 minutes)
(5) Keynote Presentation (25 + 5 Q/A) (30 minutes) **Pin Sym Foong**
(6) Breakout Sessions (45 minutes)
(7) Concluding Remarks (10 minutes)

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[1]https://arxiv.org/

3 PRE-WORKSHOP PLANS

Before the workshop, we'll create a website with detailed event information, including an introduction to Human-AI Interaction for dementia care, workshop schedules, important dates, keynote speaker details, and paper submission instructions. This website will also be used to advertise the event and attract potential participants through social media platforms. Additionally, we'll distribute a call for participants via email lists in the HCI and dementia care communities.

Prospective participants are encouraged to submit papers as outlined in the call for participants section. Selected contributors will have the opportunity to present orally during the workshop. We welcome researchers interested in joining the workshop. We have Prof. Arvid Rongve, a clinical doctor and dementia researcher from University of Bergen specializing in diagnosis, treatment, and therapy, as a keynote speaker. We've also invited Dr. Pin Sym Foong, a human-computer interaction researcher from National University of Singapore focusing on patient-centered digital health, to join us as another keynote speaker.

4 POST-WORKSHOP PLANS

After the workshop, we'll share outcomes like main findings and conclusions on our website. We'll also aim to submit collaborative papers to an ACM conference or journal based on workshop outcomes. Additionally, we'll work to strengthen the community in human-centered AI for dementia care, possibly through follow-up workshops or joint research. Authors are encouraged to refine their papers based on workshop feedback and submit them to arXiv or other repositories, or on our website.

5 ORGANIZERS

Yong Ma currently works as a postdoctoral researcher at the University of Bergen in Norway. He obtained his Ph.D. degree from LMU of Munich. His research interests include speech signal processing, voice interface, human-machine interaction, machine learning, dementia diagnosis, and healthcare.

Yuchong Zhang is currently a postdoctoral fellow at KTH Royal Institute of Technology in Sweden. He obtained his Ph.D. degree from Chalmers University of Technology in 2023 and MSc. degree from Nanyang Technological University in Singapore in 2017. human-robot interaction with human-centered design, interactive AI, VR/AR/MR, and human perception. He was previously working as a Marie Curie Early Stage Researcher (MSCA Horizon 2020 ITN) from 2018 to 2022.

Di Fu is an assistant professor (UK lecturer) at the Department of Psychology, University of Surrey. Her research group focuses on crossmodal learning and human-robot social interaction. Before that, she worked as a postdoctoral research associate at the Department of Informatics, University of Hamburg. She completed her doctoral training in human-robot interaction with Prof. Stefan Wermter from 2017 to 2020 and cognitive neuroscience at the Institute of Psychology, Chinese Academy of Sciences (CAS) with Prof. Xun Liu from 2014 to 2020. She had been honored as an outstanding graduate of CAS and an outstanding doctoral graduate of Beijing. She has been awarded the Kavli Summer Institute in Cognitive Neuroscience fellowship, the International Postdoctoral Exchange fellowship, the CAS-DAAD joint doctoral student fellowship, and the Chinese National Academic Scholarship. Her work has been published in the International Journal of Social Robotics, Public Administration Review, IEEE IROS, ACM/IEEE HRI, IEEE RO-MAN, IEEE IJCNN, etc. She also serves as a committee member of the Chinese Association for Psychological & Brain Sciences and the Chinese German Association for Biology and Medicine.

Mahya Jahanshahi is currently a PhD student at the University of Bergen in Norway. Her research interests focuses on dementia diagnosis, AI, medical data processing.

Andrii Matviienko is an Assistant Professor in Computer Science specialized in Human-Computer Interaction at KTH Royal Institute of Technology, Sweden. He works at the Department of Media Technology and Interaction Design (MID) which is part of the School of Electrical Engineering and Computer Science. His research focuses on assisting technology in urban environments. He designs, constructs, and evaluates multimodal and mixed reality interfaces for vulnerable road users. In particular, he investigates how to make evaluation environments for micro-mobility safe and realistic and what future micro-mobility, e.g., self-driving bicycles, can look like. Additionally, he focuses on how adult and child cyclists interact with assistance systems designed for collision prevention, navigation, and traffic behavior recommendations. Previously, he investigated ambient light displays for car navigation, tangible awareness systems for work colleagues, and educational systems for children.

Miroslav Bachinski is an associate professor in Information Science focusing on data-driven methods for HCI and interaction beyond the desktop. He has experience designing and developing diverse post-desktop interactive systems, as well as with their analysis and modelling.

Morten Fjeld is a professor of Human-Computer Interaction at the University of Bergen (Norway) and Chalmers University of Technology (Sweden). His research activities are situated in the field of Human-Computer Interaction with a focus on tangible and tabletop user computing. In 2005, he founded the t2i Interaction Lab at Chalmers, Sweden. He holds a dual MSc degree in applied mathematics from NTNU (Trondheim, Norway) and ENSIMAG (Grenoble, France), and a PhD from ETH (Zurich, Switzerland). In 2002, Morten Fjeld received the ETH Medal for his PhD titled "Designing for Tangible Interaction". In 2011, he was a visiting professor at NUS Singapore, in 2016 and 2017 at Tohoku University, Japan, and in 2019 to 2020 at ETH Zurich. Morten Fjeld also has extensive industrial experience in the areas of fluid mechanics, simulators, and user interface design.

Danica Kragic is a Professor at the School of Computer Science and Communication at the Royal Institute of Technology, KTH. She received MSc in Mechanical Engineering from the Technical University of Rijeka, Croatia in 1995 and PhD in Computer Science from KTH in 2001. She has been a visiting researcher at Columbia University, Johns Hopkins University and INRIA Rennes. She is the Director of the Centre for Autonomous Systems. Danica received the 2007 IEEE Robotics and Automation Society Early Academic Career Award. She is a member of the Royal Swedish Academy of Sciences, Royal Swedish Academy of Engineering Sciences and Young Academy of Sweden. She holds a Honorary Doctorate from the Lappeenranta University of Technology. She chaired IEEE RAS

Technical Committee on Computer and Robot Vision and served as an IEEE RAS AdCom member. Her research is in the area of robotics, computer vision and machine learning. In 2012, she received an ERC Starting Grant. Her research is supported by the EU, Knut and Alice Wallenberg Foundation, Swedish Foundation for Strategic Research and Swedish Research Council. She is an IEEE Fellow.

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