CHI Conference Analysis

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HCI Topic

The sub-area I wanted to focus on was human-centered AI in the field of medicine with clinical and mental health being a focus. The reasoning is as a society with a growing connection to our technology and a growing usage of AI, I am interested in the intersection AI and its use in the medical field. There are many real world application which would allow people to use technology and AI to get access care which previously they were limited to this is the overall aspect that peeked my interest in this sub-area.

Keywords

The keywords I selected for my search are “Human-centered”, “AI”, “Medical”, “Clinical”, “Mental”, and “Health”

Database Access and Search

For my search I used the above Keywords in a OR search on the database, with the initial idea of a more general search to make sure there was enough articles to create an analysis with this sub-area. Upon the search I found 1060 results, narrowing down the selection to research articles the results were limited 448 papers and then further selecting the date range of the last 5 years narrowed down to 268. From there I scanned through the pages looking for titles that rose my interested and selected 21 papers I further refined the papers down to a list of 9 and selected those as my shortlisted papers.

Annotated Bibliography

Paper 1:

Citation

> Dakuo Wang, Liuping Wang, Zhan Zhang, Ding Wang, Haiyi Zhu, Yvonne Gao, Xiangmin Fan, and Feng Tian. 2021. “Brilliant AI Doctor” in Rural Clinics: Challenges in AI-Powered Clinical Decision Support System Deployment. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 697, 1–18. DOI:https://doi.org/10.1145/3411764.3445432

Annotation

> The paper discusses the adoption of Artificial Intelligence Clinical Decision Support System(AI-CDSS) in rural areas through looking at the implementation of a system in rural areas of Beijing, China. The researchers use different methods of collecting data, (observations, interviews and inquiries), from six different clinics in Beijing to discuss the advantages and disadvantages of the system as well as challenges to adoption. Two different methods of inputing patient info were explored as well as how the users (clinicians) engage with the AI-CDSS. Two of the biggest challenges pointed out in the paper were interpretability and professional autonomy which were further expanded upon in greater detail. Furthermore the paper put forward different ideas such as redesigning the system as a “Doctor’s Assistant” and using the AI-CDSS as on-premise “Medical Wikipedia” which can be further researched to increase adoption of the system. Overall the paper gives good insight into the currently available human-centered AI systems within the medical field. While this paper is specifically targeted at the deployment in rural areas, the AI system and the concerns are still good examples of the broader picture of these systems and their implementations.

HCI Method

in-situ observations, semi-structured interviews, and contextual inquiries.

Paper 2:

Citation

Chinasa T. Okolo, Srujana Kamath, Nicola Dell, and Aditya Vashistha. 2021. “It cannot do all of my work”: Community Health Worker Perceptions of AI-Enabled Mobile Health Applications in Rural India. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 701, 1–20. DOI:https://doi.org/10.1145/3411764.3445420

Annotation

This paper explores the interaction between community healthcare workers (CHWs), which work locally as a front line of the health care industry in developing countries such as India, and AI health applications. Through interviews of current CHWs the researchers describe limitations in deploying systems in developing areas. The biggest limitations proposed by the paper include AI literacy and as well as infrastructure in remote areas and patient trust in the technologies. The researchers also described differences between the global-north and the global-south in terms of adoption and use of AI systems and the necessarily different methods needed to deploy them. The researchers defined several questions which need to be further investigated in order to come to a greater conclusion while still providing meaningful conclusions about deployment and adoption of human-centered AI systems in the healthcare field in the global-south. Questions about how to expand AI explainability to novice technology users as well as insuring that AI systems accommodate minority groups which are not represented in the global-north where many of these systems are developed were a few of the chief concerns of the researchers. This paper provides insights into the current challenges in the sub area of human-centered AI in the healthcare field specifically when looking at the global-south.

HCI Method

Semi-Structured Interviews, Video Provocations

Paper 3:

Citation

Hyanghee Park and Joonhwan Lee. 2021. Designing a Conversational Agent for Sexual Assault Survivors: Defining Burden of Self-Disclosure and Envisioning Survivor-Centered Solutions. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 634, 1–17. DOI:https://doi.org/10.1145/3411764.3445133

Annotation

Park and Lee explore a conversational agent (CA) and its usefulness in lowering the burden of sexual assault survivors. In their paper they interviewed multiple stakeholders, professionals on the reporting side of this issue, to design the initial CA. They then presented the CA to sexual assault survivors and interviewed them on their experience with it. They gathered insights and found nine key aspect in which the CA helped lower the burden on sexual assault survivors including ‘privacy and security’, social, and emotional. By lowering these burdens the survivors felt more comfortable reporting their sexual assault. Despite the overall lowering of these burdens some new burdens were introduced with the introduction of the CA especially when the perpetrator had access to the CA. The new burdens were addressed in the discussions with the participants and methods of tackling them were introduced as further research topics. This paper and the insights it give

on the usefulness of AI driven CAs in the sub area of mental health and sexual assault link it to the sub area of research which this analysis is focused on.

HCI Method

User interviews, prototyping, formative evaluation, thematic analysis, brainstorming, sketching

Paper 4:

Citation

Maia Jacobs, Jeffrey He, Melanie F. Pradier, Barbara Lam, Andrew C. Ahn, Thomas H. McCoy, Roy H. Perlis, Finale Doshi-Velez, and Krzysztof Z. Gajos. 2021. Designing AI for Trust and Collaboration in Time-Constrained Medical Decisions: A Sociotechnical Lens. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 659, 1–14. DOI:https://doi.org/10.1145/3411764.3445385

Annotation

Jacobs et al. presented insights gained from their process of designing a clinical decision support tool (DST) which used AI to help primary care providers (PCPs) decide on a treatment plan to help patients deal with major depressive disorder (MDD). The researches conducted an interview with PCPs with a varying degree of experience to help guide the initial design of the DST. Following the creation of a low-fidelity prototype the authors interviewed a second set of PCPs after they had tested the prototype. From the two sets of interviews they were able to then generalize the information for DSTs within the healthcare industry as a whole. Recommendations for future designing and research of DSTs for clinical usage include moving focus from the idea that these systems are single user systems where just the clinician interacts with the system to a multi-user system where the patient is included in the decision making process. Another recommendation included being aware of time constraints that the clinician has to engage and interact with their patients, this constraint was identified as the most salient for the mass adoption of systems such as the one designed in this paper. Overall the insights gained in this paper are useful for the general adoption of DSTs in the medical field and in clinics around the world.

HCI Method

Iterative design, semi-structured interviews, focus groups, low-fidelity prototyping

Paper 5:

Citation

Jin Chen, Cheng Chen, Joseph B. Walther, and S. Shyam Sundar. 2021. Do You Feel Special When an AI Doctor Remembers You? Individuation Effects of AI vs. Human Doctors on User Experience. *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 299, 1–7. DOI:https://doi.org/10.1145/3411763.3451735

Annotation

Chen et al. investigate the effect of individualism on patients when looking at chatbots used in the medical field. The paper described the design of several prototypes which were tested using two interactions with patients. The bots were then given one of two different levels of individualism and the patients were then interviewed to acquire the sentiment of their interactions with the chatbots. Overall the paper found that as long as the users did not think they were solely communicating to an AI the injection of individualism overall improved clients willingness to follow any recommendations from the chatbot. This showcases some of the limitations of human computer interaction in the medical field when it comes to patient adoption of such systems. Investigation of these systems is then further hypothesized talking about the limitations of the papers implementation of the chatbots and how the research may be added on to in the future.

HCI Method

Prototyping, semi-structured interviews

Paper 6:

Citation

Upol Ehsan, Q. Vera Liao, Michael Muller, Mark O. Riedl, and Justin D. Weisz. 2021. Expanding Explainability: Towards Social Transparency in AI systems. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 82, 1–19. DOI:https://doi.org/10.1145/3411764.3445188

Annotation

Ehsan et al. look at explainability of AI (XAI) and how the current paradigm fails to provide certain benefits. The authors does this by introducing a concept called social transparency (ST). ST is the idea of incorporating previous user decisions in conjunction with the outcome of that decision when explaining the decisions presented by an AI decision support tool (DST). The researchers laid out four different questions which could help allow future users to decide on how to move forward with decisions presented by DSTs. These questions, known as the 4W (Who, What, When, Why), describe different aspects of the decision making process where the human element is necessary. Ultimately the introduction of the ST allowed for stakeholders to better understand the position of the AI DST in the decision making process, making the human users more comfortable with their choices. While overall ST made users more comfortable using the AI systems the paper also pointed out several problems which arise when adding this to existing systems. The problems included security, human bias, information overload and incentive to contribute, these problems present new obstacles to overcome specifically in time sensitive decision systems such as clinical DSTs. Overall this builds onto the sub-area because of the overt need for XAI in clinical DSTs and explores specifically some of the applications of the ST in these clinical applications.

HCI Method

Formative study, scenario based design, brainstorming, sketching, semi-structured interviews, qualitative analysis, design walk-through

Paper 7:

Citation

S. Shyam Sundar and Jinyoung Kim. 2019. Machine Heuristic: When We Trust Computers More than Humans with Our Personal Information. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Paper 538, 1–9. DOI:https://doi.org/10.1145/3290605.3300768

Annotation

Sundar et al. look into the idea of the machine heuristic described as a ‘rule of thumb’ which prescribes that people will attribute machine characteristics or machine-like operation when making judgments about the outcome of an interaction. This heuristic is a very important aspect in human-centered AI and is explored in all the other papers in this analysis. This paper specifically looks at the machine heuristic in the context of users willingness to give up personal info which is specifically important in clinical applications of AI decision support tools. The paper found that when people perceive they are talking to a machine agent they are more willing to give up personal information, this is explained due to the fact users believe that machines are less likely to misuse sensitive information because their performance is generally associated with precision and low error rates. This heuristic is likely to play an affect in all systems within the clinical field but specifically in patient facing systems.

HCI Method

structured interview

Paper 8:

Citation

Yue You, Yubo Kou, Xianghua(Sharon) Ding, and Xinning Gui. 2021. The Medical Authority of AI: A Study of AI-enabled Consumer-Facing Health Technology. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Article 207, 1–16. DOI:https://doi.org/10.1145/3411764.3445657

Annotation

You et al. looked at how AI agents, specifically clinical patient facing systems known as AI symptom checkers (AISC), gain authority for their decisions. The researchers conducted semi-structured interviews on thirty different users who have used AISC in China and found common themes among the interview to draw their conclusions. Among the reasons AISCs gain authority are its relationship to already existing authorities, its ability to be cross-validated and confirmed based on either other applications or already existing authorities, and the language and anthropomorphic qualities of the agent. Overall the ideas presented in this paper were not evaluated in any empirical way but were qualitatively arrived at. The paper also found some feature of the AISC to avoid in order to maximize the ability of the user to trust the authority of the AISC. Some of the features brought up were using "cute" tones and trying to maximize user experience at the cost of efficiency. The paper further makes prescriptions in ways which AISCs can design themselves in order to maximize the authority they have. The usefulness of the authority given to these systems is that users, in this case patients, will more likely listen to the decisions the AISC makes.

HCI Method

semi-structured interviews, thematic analysis

Paper 9:

Citation

Qian Yang, Aaron Steinfeld, and John Zimmerman. 2019. Unremarkable AI: Fitting Intelligent Decision Support into Critical, Clinical Decision-Making Processes. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, Paper 238, 1–11. DOI:https://doi.org/10.1145/3290605.3300468

Annotation

Yang et al. present the idea of an unremarkable AI which is taken from earlier works of making 'unremarkable systems' which meet the criteria that it augment people's actions in ways that have a wealth of significance but seem unremarkable, because its interactions are so natural. The unremarkable AI was preposed to solve many of the adoptability issues of clinical decision support tools (DSTs), including the idea that current systems required stakeholders to know when they are in need of assistance. Through interviews from three different hospitals which were at different levels of technological adoption the researchers were able to find where their new preposed system failed and succeeded. What they found was that many stakeholders including high level and mid level clinicians found that the DST was able to help them make decisions but ultimately there was a lot of skepticism in the decision making ability of the DST. Most interviewees aired some level of concern with the ability of the DST and how the decision was arrived at showcasing that the factor which seemingly kept the DST from adoption was actually explainability rather than the integration of the system as 'unremarkable'. Overall this paper showcases the challenges of mass adoption of clinical DSTs.

HCI Method

field study, interactive design, sketching, interviews, observations, affinity diagrams, thematic analysis

Synthesis

Human-centered AI seem to be a rising field of study in the HCI and the implications of adoption of these systems in the medical field will be wide reaching. Across the nine papers there were several themes which were raised as challenges for adoption of human-centered AI in the clinical fields. While there have been many leaps and bounds in human-centered AI the challenges still raise many concerns from different stakeholders. Clinical decision support systems, otherwise known as clinical decision support tools, seem to still have major problems with explainability. Professional stakeholders such as clinicians have trouble trusting systems in which they can not understand how its decision was arrived at. This seemed to be consistent across all of the papers but seemed less prevalent when looking at systems which faced patients directly but these systems inherited some authority from professionals. The lack of trust and willingness to adopt from professionals will effect even patient facing systems. Another big challenge facing these systems seems to be their usability in terms of time consumption in ever paper users complained about some level of extra time consumption added because of the incorporation of these systems. Patients complained about being asked questions which seemed unnecessary for their issues and clinicians complained about the extra work these systems put on them. These complaints showcase a need for these systems to be as non-intrusive as possible and opening up new research opportunities in the future when looking at these human-centered systems. Beyond just explainability there seemed to be a consensus that there was a human element missing in the decision making process when the decision was left to just an AI and that these system should work in tandem with a human. This seemed to improve a lot of the sentiment about these systems across the board whether that be on the clinicians end or the patients. Overall I think there is a lot to explore in this sector of HCI research whether its the ways clinicians interact and engage with systems to augment their decision making process or if its patients being able to have access to information at their fingertips with clinical support systems which directly engage with them. The implications from these types of systems can alter the way we interact with our healthcare systems and have far reaching implications in the success and robustness of our decision making, either personal or professional, in the future.