Data-driven shared decision making in oncology

Summary

This thesis titled "Data-Driven Shared Decision Making in Oncology: Addressing Preference-Sensitive Scenarios," revolves around the objective of improving the incorporation of AI in shared decision-making, with a specific focus on breast and prostate cancer. The thesis is structured into two parts: one dedicated to patient-centric AI and the other focusing on development of AI prediction models. Each section is designed to contribute meaningfully to the overarching goal.

Patient-Centric AI in Healthcare Decision-Making

The first part of the thesis focuses on understanding patients' perspectives on decision aids, particularly in the context of shared decision-making in treatment choices. This research explores patients' thoughts on technology, specifically AI, recognizing the diversity in individual responses. The goal is to make AI tools not just intelligent, but also user-friendly by considering patients'unique perspectives and needs. This way, when AI is used in healthcare, it can better connect with and assist the people it aims to help. While the existing body of research on this aspect is limited, delving into patients' feelings is essential for fostering a deeper understanding of their experiences and perspectives. Many studies focus on the technical side of AI, but few dig into how patients experience and relate to these tools. This knowledge is paramount for tailoring interventions and to improve patient outcomes. Therefore, the emphasis of this part of the thesis on the human side of healthcare decision-making fills a gap in existing research, providing essential insights to tailor interventions and improve patient outcomes. This approach ensures that AI tools are developed with a profound understanding of the people they aim to assist.

In *chapter 3*, our attention turned specifically to breast cancer patients, revealing pivotal themes for a radiotherapy decision aid. The findings emphasized the importance of enhanced shared decision-making, personalized medicine, and the transformative potential of AI in improving patient experiences and outcomes. Building on these insights, *chapter 4* delved into the attitudes of former breast cancer patients toward AI-based decision aids, uncovering perceptions shaped by decision context severity, the perceived role of AI, and trust in medical professionals. This study highlighted the critical importance of addressing trust and transparency issues in integrating AI as a supportive tool. Navigating beyond patient perspectives, *chapter 2* investigated the impact of Health Literacy on the effective use of technologies, with a focus on enhancing patient engagement and decision-making in cancer care. This inquiry specifically addresses how eHealth interventions, including AI-powered solutions, can help patients overcome challenges related to limited health literacy.

The study outlines strategies such as health literacy screening, emphasizing their role in engaging patients in meaningful medical decision-making.

Development of AI prediction models

In parallel, the integration of AI into healthcare decision-making offers a powerful enhancement to shared decision-making (SDM), particularly in the context of breast and prostate cancer treatment. Patients navigating these treatments face intricate choices, and SDM emerges as an invaluable approach, fostering collaboration between patients and healthcare providers. AI's capacity to analyze vast amounts of data and provide accurate predictions enables a higher level of personalization in treatment recommendations, sifting through clinical studies and individual patient data to distill actionable insights. However, the true value of AI lies in synergy with SDM. While AI provides data-driven insights and personalized recommendations, SDM offers the framework for incorporating these insights into a patient-centered approach. The thesis, focusing on breast and prostate cancer treatment, delves deep into this integration, exploring the transparency of AI systems and the crucial aspect of patient preferences.

Chapters 5 and 6 illuminate the potential of non-black box models, specifically logistic regression, in augmenting shared decision making processes. Focused on predicting side effects of prostate cancer treatment, these models showcase significant potential in empowering patients to make well-informed, patient-centered choices. They serve as a transparent tool for clinicians, aiding in the tailoring of personalized treatment strategies.

The study's findings underscore the transformative role of non-black box models in healthcare, addressing concerns about the complexity and lack of transparency in traditional AI models.