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Keynote

Intelligent Tools and Technologies for Healthcare

Markus Wenzel, Constructor University and Fraunhofer Institute for Digital Medicine MEVIS, Bremen

Abstract

Under this very broad title, I want to construct a thought network that links several key components of a rapidly evolving environment:

- Intelligently designed tools allow collaborative data-driven research into pressing health- and care-related questions, like response to pandemics, privacy-preserving data sharing for multi-centric research, and decentralized data collection for large-scale AI training.
- Human-in-the-loop tools enable quick curation of large amounts of data and knowledge, utilizing AI models that evolve from human feedback.
- Technologies and algorithms quantifying the uncertainty of AI models can be integrated with those tools to speed up the workflow and make the output trustworthy.
- Integration of metrics that evaluate the potential biases of those emerging AI tools can steer the selection of training and validation data and thus safeguard against AI that discriminates unfairly.

In a broader vision, this leads to a framework that integrates semantic knowledge with statistical models, enabling multi-level reasoning and justifiable decision-making in the sensitive healthcare environment.

Markus Wenzel has worked at the Fraunhofer Institute for Digital Medicine for almost 20 years, researching machine-learning-driven algorithms for a large variety of medical data. Amongst these were whole-body computed tomography, specialized magnetic resonance spectroscopy methods and more, but most of his research went into the field of computer-based decision support for breast cancer care. This encompassed early detection, diagnostic algorithms, risk estimation, and also workflow support for surgery preparation and intervention. He wrote and headed several large-scale, international research projects as well as industry-driven development projects in this area and is currently involved in three breast cancer-related projects. He is responsible for the institute's strategic development regarding high-risk early research. Markus is also Assistant Professor for Medical Cognitive Computing at Constructor University, where his main interest lies in non-imaging data combined with medical images, particularly to foster multi-source AI models that can harvest semantic knowledge sources or themselves extract semantic data that encodes medical knowledge.