

Artificial intelligence – Opportunities and challenges of smart health

Smart health refers to the digitalization and use of AI applications in medicine. These AI applications are intended to support caregivers and doctors in their work and replace them in selected areas. Learning systems are used in the areas of preventive medicine, diagnosis, and care and treatment. AI can provide support in diagnosing illnesses during imaging processes. For example, there are AI systems that detect certain heart diseases when the retina is scanned. Another example of such AI applications are chatbots that support sick persons or medical personnel in diagnosis. Moreover, new smart medical wearables are constantly being launched. Patients wear these devices directly on the body. These wearables automatically measure vital signs such as a person's blood pressure or blood sugar level. In addition, sensors used in therapy and health care help monitor a patient's condition. For example, a smart floor can detect when a person falls and automatically call for help.

These and other applications are linked with extensive opportunities. They are contrasted with challenges that must be resolved in order for the opportunities to really be exploited.

Opportunities

- **Taking over simple, time-consuming or unpleasant activities:** When learning systems take over some tasks for which they are particularly suited, medical personnel have more time for other important activities. For instance, a doctor can concentrate on a patient consultation about an important X-ray while an AI system analyzes 100 images of other patients.
- **Reducing discrimination:** Evaluations, for example, during diagnosis, are made more independently of the respective person and the patient's features, appearance or demeanor, which may possibly be evaluated as positive or negative by people and influence their decision.
- **Boosting efficiency and speed:** AI applications can process certain information more quickly than people since they have greater computing capacities than the human brain. Therefore, AI applications can make a medical diagnosis faster than a doctor.
- **Processing large volumes of data:** An AI system can integrate substantially more data than a human can and, as a result, can consider many more symptoms in order to make a diagnosis.
- **Recognizing unknown or obscure correlations and illnesses:** There is another item connected with computing capacity: AI applications recognize unknown or obscure correlations that often remain hidden to people. For instance, it is possible using AI to identify rare diseases at an early stage or to establish connections between different symptoms.

Challenges

- **Unsuitable objectives:** The objectives provided to AI must be well thought out. For instance, the objective "display the most probable diagnosis" may hide improbable yet possible diagnoses.
- **Increasing discrimination:** If the AI training data are flawed or unrepresentative for all members of society, discrimination occurs. An example of this is that AI applications detect skin cancer in people with light skin better than in people with dark skin because the corresponding AI was trained mainly with data from lighter-skinned people.

- **Ambiguous implementation of the output:** Medical personnel must be trained to correctly interpret the results of AI applications. Otherwise, there is a risk that they might disregard possible diagnoses or accept the AI recommendations without question.
- **Necessary digitalization of extensive personal information:** For learning systems to work well, they need extensive data that must be available in digital format. This includes very personal data of sick people. The data must also be quantifiable, that is, measurable and countable. For instance, AI reaches its limits with psychological diseases because these are not easy to quantify.
- **Greater trust in people:** Especially in the medical area, but also in other sensitive application areas, people are more apt to trust other people than machines. Surveys reveal that many people would feel uncomfortable having AI diagnose their condition.

According to studies conducted in 2018 and 2019, the best treatment results are achieved jointly by people and artificial intelligence. Diagnoses are most accurate, for example, when AI suggests a diagnosis that people verify and then use to make a decision.