

Artificial intelligence is providing a new approach for health promotion of children with autism

According to the report^[1] based on 11 different regions from the U.S. Department of Health and Human Services Centers for Disease Control and Prevention(CDC) issued on December 3th, 2021, 2.27% of 8-year-old children in the United States suffered from autism spectrum disorder(ASD) in 2018. In other words, on average, among every 44 kids, there would be one suffering from ASD. This is an increase of 23% over the past two years (1 / 54 in 2016). The new prevalence rate is 3.39 times of that reported by CDC in 2000.

ASD is a developmental disability that can cause a wide range of challenges in social interaction, communication, and behavior. Since children with ASD lack basic interaction and communication abilities, they cannot receive regular education as other normal, healthy peers. Not to mention personal development in social life. Children with ASD may be considered as mentally retarded, further isolated from the rest of the society. Therefore, education equality is of vital importance for children with ASD, which may be the path leading them out of the darkness towards a brighter future.

Recently, some research groups have directed their goals toward the accurate assessments for ASD patients with the assistance of artificial intelligence (AI), as well as using Human-Computer Interaction games and Multimodal sensing technology to realize personalized and adaptive learning^[2-5]. Although autistic patients often refuse to interact with people, research shows that they can easily accept the information brought by simulations of these electronic devices. These advanced technologies provide natural and friendly interaction, immersive learning scenes, and deep integration of education and entertainment.

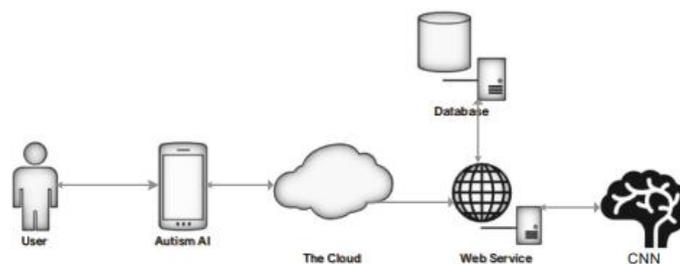


Figure 1 Architecture of AI-enabled autism assessment (cited from Ref 2)

In addition, the effectiveness of AI technology may enable a personalized education and therapy for autistic patients. The traditional individualized evaluation and rehabilitation rely on an experienced special education teacher or rehabilitation teacher who evaluates and teaches according to the child's behavior. Today, AI and digital technology have brought great possibilities. Under the scenario of autism diagnosis and rehabilitation, binary situation commonly exists, for example, whether children have eye responses during the interaction, have language feedback when being asked questions, and could answer correctly. These all or none activities are very similar to the computer language of 0 or 1. Computers are good at simple logic, structured problems, and fast calculations. Capturing, observing, comparing, and making comprehensive

judgments of these behavior signals could be done by the computer easily. Even now, some of the research teams are developing and utilizing these functions. Like other fields, autism screening, diagnosis, evaluation, and rehabilitation are transforming from labor-intensive tasks to technology or data-driven workflow.

AI is also launching a new round of educational revolution. The deep integration of AI and special education brings new hope to special children. AI provides reliable technical means for special children to obtain "inclusive" and "fair" education, which is expected to completely break the obstacles restricting special children's access to educational resources.

Autism rehabilitation education is developing towards intelligence and integration, but we need understand the changes brought by AI technology dialectically. First of all, the main problem of autism is the lack of social ability, the rehabilitation effect brought by human-computer game interaction equates to real-life scenes or not, it is still in the exploratory stage. Secondly, great efforts are needed to improve network security, data privacy, technical ethics, and other relevant regulations because of the particularity of autistic groups.

In summary, AI brings new approach to the diagnosis and treatment of autism. It not only helps health promotion but also facilitates education fairness. Technical guidance of such products deserves further study.



References

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