Detailed literature review on the information and artificial intelligence technologies for autism

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I. Related Work

In this section, we provide a detailed literature review on the information and artificial intelligence technologies for autism education. Firstly, we will introduce some information technologies applied in autism education. Secondly, the artificial intelligence methods have used in autism rehabilitation and education will be introduced. Finally, we will review the structure of MobileNet and transfer learning.

A. Information Technology for Autism Education

Applying information technologies to autism education has always been a research direction. As early as 1973, Colby intervened in the form of computer games on autism children with weak language ability, and achieved good results [1]. At the same time, the application (APP) has been proved to be able to improve the academic participation and social adaptability of autism patients, and promote the implementation of early intervention and health management [2], [3].

B. Artificial Intelligence for Autism Education

The combination of artificial intelligence and autism education was mainly for family education and rehabilitation system, which provides a better teaching environment for autism children and their parents [4]. Artificial intelligence technologies relayed on wearable motion sensors to collect atypical postural or motor behaviors data from autism children and uploaded it to cloud server, and then applied deep learning models to detect stereotypical motor movement [5]. Robots also have played an important role in autism education, which automatically selected personalized learning courses suitable for different children through deep learning models [6], [7].

C. Overview of MobileNet and Transfer Learning

The mainly difference between MobileNet and other deep neural networks was that it transformed standard convolution into depthwise and pointwise convolution [8]. The number of parameters in standard convolution was $D_K \times D_K \times M \times N$, while the number of parameters of depthwise and pointwise convolution was $D_K \times D_K \times M + M \times N$ which becomes $1/N + 1/D_K^2$ times of the standard one [8]. Such massive reduction of parameters in MobileNet structure was the mainly reason for it to be an efficient network and easy to be embedded into various mobile devices [9].

It is very difficult to train MobileNet from blank by our own data set because of computing source or storage. When the distribution of data on source and target task were close to each other, sometimes even they were completely unrelated, we can use transfer learning to build deep learning model in short time [10]. The MobileNet trained on the $ImageNet$ performed excellent, and we can transferred the prior knowledge it has learned to the classification task we have to complete [11].

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