Fighting Executive Function Disorders via Artificial Intelligence with Facial Movement Data

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Executive functions (EF) belong to cognitive processes that focus on cognitive control of behaviors. EF skills are inhibition, shift, emotional control, initiation, working memory, planning, organization of materials, and self-monitoring. A lack of EF skills can lead to EF disorders, or executive dysfunctions. Because different types of executive dysfunctions are treated differently, an accurate diagnosis is vital. Compared to current clinical practices, my anticipated research outcome is a convenient, accurate, and low-cost approach in predicting a particular type of executive dysfunction. My key hypothesis is that high frequency facial/eye movements have a strong indication of executive function disorders. The research methods are composed of facial recognition in finding action units, EF calculations for all training data, and a neural network model relating action units and EF disorders. Furthermore, a low cost software was designed and programmed to simplify functionalities such as video recording, video processing, and prediction of EF disorders. To the best of my knowledge, this tool is the first of its kind. It is convenient (with current treatment limited by the number of available medical professionals) and low-cost (current private sessions can easily be a couple hundred of dollars per hour). With lots of data used in the training, validation, and testing of the software, the accuracy of the model is high; thus, the relationship between facial movements and the predicted occurrence of an EF disorder is high.

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