

A system for automatic assessment of child mental health

Unmet Need

Behavioral disorders such as autism, an anxiety disorder, an aggressiveness disorder, or attention deficient and hyperactivity disorder (ADHD) affect many people throughout the world. Research has shown that treatments for these behavioral disorders can be more effective when diagnosed and treated early. However, many children are not diagnosed as early as possible and do not receive adequate care after diagnosis.

Most behavioral disorders assessment techniques generally require trained clinicians and expensive equipment that can be very time intensive. Therefore, there is a need for a behavioral assessment that overcomes the aforementioned limitations.

Technology

The present invention describes automated behavioral assessment that includes behavioral analysis such as identifying user responses and coding them into quantitative metrics. This is performed by a behavioral assessment application executing on a smartphone, a tablet, or a computer. The camera of the smartphone executes the application that provides stimuli, such as via a short video, image, text, sound, or color, to elicit a response from a user of the smartphone and record the user's responses to the stimuli via the camera.

The application is configured to record and then process the user's responses by identifying facial expressions in the recorded responses and scoring or coding the facial expressions into quantitative metrics. A behavioral assessment is then determined based on whether the user's responses and the quantitative metrics are indicative of one or more behavioral disorders e.g., autism, an anxiety disorder, an aggressiveness disorder, or attention deficient and hyperactivity disorder (ADHD).

Further, based on the identified behavioral disorder, the application provides follow-up information on the smartphone for contacting a service provider (doctor or hospital) such as a list, a hyperlink, an email address, a chat identifier, a phone number, a name, an address, or a website of the service provider.

The present invention takes ownership of the full system (end-to-end) going from the design of the stimuli to the automatic facial expression analysis and recommendations. School, clinics, and parents can simply download the application and use it without any training. The whole test takes less than 5 minutes.

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Advantages

- Less time intensive – Diagnosis and treatment for various behavioral disorders can be performed quickly and efficiently.
- Low cost of equipment involved – Software executing on mobile devices or other relatively inexpensive devices.
- Less dependence on trained clinicians – Mechanism alleviates human expertise associated with conventional methods of diagnosis.
- Improved consistency of assessment over conventional methods, e.g., by utilizing automated techniques and precise measurements.
- Early diagnosis (in young children for ages 1-5) beneficial both for intervention evaluation and for assessing longitudinal changes.

Publications

- [Computational Methods to Measure Patterns of Gaze in Toddlers With Autism Spectrum Disorder \(JAMA Pediatrics, 2021\)](#)
- [A scalable computational approach to assessing response to name in toddlers with autism \(The Journal of Child Psychology and Psychiatry, 2021\)](#)
- [Digital Behavioral Phenotyping Detects Atypical Pattern of Facial Expression in Toddlers with Autism \(Autism Research, 2020\)](#)
- [Computer Vision Tools for Low-Cost and Noninvasive Measurement of Autism-Related Behaviors in Infants \(Autism Research and Treatment, 2014\)](#)

Patents

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Title: METHODS, SYSTEMS, AND COMPUTER READABLE MEDIA FOR AUTOMATED BEHAVIORAL ASSESSMENT

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