Diagnostic Classification of ADHD Versus Control - Support Vector Machine Classification Using Brief Neuropsychological Assessment

Jesse C. Bledsoe; Danica Xiao; Art Chaovalitwongse; Sonya Mehta; Thomas J. Grabowski; Margaret Semrud-Clikeman; Steven Pliszka; David Breiger


Abstract

Objective: Common methods for clinical diagnosis include clinical interview, behavioral questionnaires, and neuropsychological assessment. These methods rely on clinical interpretation and have variable reliability, sensitivity, and specificity. The goal of this study was to evaluate the utility of machine learning in the prediction and classification of children with ADHD–Combined presentation (ADHD-C) using brief neuropsychological measures (d2 Test of Attention, Children with ADHD-C and typically developing control children completed semi-structured clinical interviews and measures of attention/concentration and parents completed symptom severity questionnaires.

Method: We used a forward feature selection method to identify the most informative neuropsychological features for support vector machine (SVM) classification and a decision tree model to derive a rule-based model.

Results: The SVM model yielded excellent classification accuracy (100%) of individual children with and without ADHD (1.0). Decision tree algorithms identified individuals with and without ADHD-C with 100% sensitivity and specificity.

Conclusion: This study observed highly accurate statistical diagnostic classification, at the individual level, in a sample of children with ADHD-C. The findings suggest data-driven behavioral algorithms based on brief neuropsychological data may present an efficient and accurate diagnostic tool for clinicians.