

Chapter 16

Statistical Perspectives and Machine Learning Algorithms: Research Analysis of Technological Support for Autism Diagnosis

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ABSTRACT

Autism unlike other diseases has peculiar symptoms and pre-causes. The symptoms and suspicions are found especially in newly born children, preterm born infants, and children below 12 years. These children have peculiar attributes such as inability to communicate with fellow children, poor speech ability, difficulty in dealing with daily routines and procedures and being oversensitive. This study correlates with the existing work on autism diagnosis techniques by using machine learning methodologies. It further provides the summary of the relevant techniques to validate the existence of autism disorder and strategies used for diagnosis. Various diagnostic methods include behavioural analysis, eye tracking, and neural or brain imaging. The key objective of the chapter is to assess and understand the preliminary causes of the autism spectrum disorder, including analyzing technological support that can be rendered for the early diagnosis of autism.

INTRODUCTION

In the current scenario, detecting of ailments in human has become much easier by the use of modern equipment. There are some diseases and disorders which are typically tedious to detect and diagnose. Since the children are too young and not in a state to communicate anything, it is much harder to diagnose autism in children.

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Pervasive Developmental Disorder (PDD) is a criterion which lists 5 disorders. One among the PDD is the Autism Spectrum Disorder. This developmental disorder affects the behavioural and communicational aspects of the patient concerned. There are various symptoms for the presence of autism in which lack of speech and interaction with others (social aspects) are considered to be as the early symptoms.

JA Kosmicki states that the prevalence of autism in a child can be examined only by a behavioural examination (JA Kosmicki, 2015). Various interests and behaviours such as social interaction, communication and repetitive behaviours are analysed and recorded as a part of this behavioural examination.

Kang denotes that autism is a heterogeneous neural developmental disorder which in turn denotes that the disorder may be as a part of heredity in many cases (Kang, 2018). A child whom is affected by autism spectrum disorder will exhibit typical characteristics such as repetitive behaviours and get committed to stick on specific habits (such as throwing something towards others).

Mayo clinic organisation (2018) narrates that the autism can be observed using various functionalities of the concerned patient. In general the symptoms of autism can be found at the age of 2 years. Some common signs include lack of eye contact, poor preference towards food and speech with abnormal tone. Retrieved from <http://mayoclinic.org/diseases-conditions/autism-spectrum-disorder/symptoms-causes/syc-20352928>. Wiggins denotes that in many cases the parents make their children to undergo autism diagnosis only after 13 months (Wiggins, 2006). Bernier states that when the children are from poor economic background, it is not possible for them to undergo diagnosis even after 13 months (Bernier, 2010). Shattuck narrates that the age of diagnosis in United States is around 4 years (Shattuck, 2009). This states that diagnosis is possible only when the child becomes enough mature to undergo various treatment practices.

Autism is a complex neural behavioural disorder which should be given more importance since the prediction of disease involves more complex practices. Various cognitive methods can be used for the autism detection and necessary ministrations can be made on the patients as a part of their treatment. Though autism is not perfectly curable, behavioural analysis based therapy can help the patient to carry out some day-to-day tasks and to lead a life with the help of a caretaker.

OBJECTIVES

The objective of the current chapter is to conduct literature review of various studies carried out in the area of autism. This chapter further discusses the following:

- Investigating the background of autism spectrum disorder.
- Analysing various cognitive methods to diagnose autism in children.
- Understanding the symptoms and causes of autism.
- Exploring how technological support can be rendered to the diagnosis of autism by using machine learning techniques.
- Devising a frame work which can be extended to provide as a tool for early diagnosis of autism.

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