# Autism Spectrum Disorder and its Screening using Computer Technologies

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*Abstract* - **Challenging problems are faced by Parents and doctors while detecting and treating autism spectrum disorder (ASD) in children. It is essential to diagnose ASD at early stage in a child's development. For the Autistic people Making of decision is rigid; Perceiving the danger and examination of people's intentions is difficult. In this paper, discussion is done how the life value of the people with the Autism can be recovered by use of computer technologies. In what ways, the lives of autistic people can be sorted by latest technologies like Machine Learning, Artificial Intelligence and image processing. Diverse visual systems, for example photographs, objects, realistic drawings and words, can be used with these technologies, with the proviso that the visual representation can be easily recognized by the child. Many researchers have technologically advanced pre-diagnosis screening approaches to support the pinpoint autistic activities at an initial phases, accelerate the clinical diagnosis referral procedure, and advance the understanding of ASD for the diverse participants involved, such as teachers , caregivers , parents, and family members.**

*keywords* - **Autism, ASD, Autism spectrum Disorder, Machine learning**
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## I.    INTRODUCTION

Autism spectrum disorder is a developmental and neurological illness that initiates in the juvenile, grow up within initial age and retains during the passage of a person's life. It has emotional impact by the way a person behaves and intermingles with others, converses, and learns. The communication and behavior of individual person got distressed by this disorder. The children with autistic symptoms faces problem in communication, social connections, compulsive interests and monotonous behaviors. Psychological condition challenges such as anxiety, depression and attention concerns are also faced by them. Autism means by range of circumstances categorized by public abilities, repetitive actions, nonverbal and speech communication challenges there is no standard treatment for ASD currently available. To enhance child's ability to nurture and acquire firsthand skills, many ways are introduced. For better results, start them at early stages. To control the symptoms there is Number of treatments including conduct and communiqué therapies, medicines and skill training. "*Estimates of sixty two cases over ten thousand people with autism spectrum disorders found were found by review of global prevalence in 2012.*"

## II.    AUTISM

Autism is a Greek term invented from word "autos," means "self." It defined by the situations in which an individual is aloof from social communication. In simple words, he/she becomes an isolated. Autism spectrum disorder is a long-term brain development disability where many   difficulties such as public interactions, compulsive interests and monotonous behaviors and activities etc. are faced. Autism is so called as a "spectrum disorder" due to wideness in different kind and rigorousness of signs individuals' experience.

## III.    TYPES OF  AUTISM

On the basis of their social interaction, interest and behaviors, Autism is categorized into four types of disorder which are as follows:

*a.    Autistic Disorder*

Another name is "classic" autism. It is closely what most of individuals come up with when the word "autism" hears. Autistic disorder People typically have language intervals, communication and social defies, and uncommon behaviors and comforts. Numerous people with such autistic disorder also suffer intellectual disability.

*b.    Asperger Syndrome*

Individuals suffering with Asperger syndrome normally have minor signs of autistic disorder. They might have problem like societal challenges and unusual behaviors and eases. However, they are not dealing the difficulties with language or intellectual ill health.

*c.    Pervasive Developmental Disorder*

This is sometimes called "atypical autism," or PDD-NOS. People with certain measures for autistic disorder or Asperger syndrome may be recognized with a typical autism. Kids with autism spectrum often echo certain behaviors. They generally evade having eye contact, non-expressive, and might deal with having flat voice and high-pitched.

*d.    Childhood Disintegrative Disorder*

It is well-known as "Heller's syndrome" and "disintegrative psychosis." This is immensely rare condition where the kids mature for as a minimum 24 months and fail certain or entire communiqué and social capabilities.

## IV.    THE SYMPTOMS OF AUTISM

*a.    Social Communication*

- Partial usage of gesticulations such as pointing, ,waving ,giving, showing, clapping, or nodding head
- Delay in speaking or certainly not social chatting
- Creation of unusual sounds and having rare quality of voice
- Difficulties in gestures, making eye contact, gestures, and repeating the words all the time.
- Slightly pretending or mimicking of other people
- Use of another person's hand as a tool

*b.    Societal Interaction*

- Does not stare the people correctly or tough in  getting them to stare at you
- Non sharing of  joy full and kind expressions
- No reply when somebody calls them by their name
- No attentive to things they are oriented.
- No interest and share enjoyment with others

*c.    Restricted Interests and Monotonous Behaviors*

- Uncommon movement of fingers, hands or entire body.
- Padding objects up or repetition of stuffs over and over.
- Attached and attentive to unfamiliar objects.
- Extreme importance in specific objects or actions that affects social interaction.
- Unusual sensory comforts like looking out of the crook of their eyes and sniffing the objects.
- Uncertain responses to noises, surfaces, or other sensual input

## V.    DIAGNOSING AUTISM

Diagnosing the ASD can be challenging since there are certainly no medical examination or blood sample tests.  It can be determined by the analysis based  on social  features or symptoms .  The lack of typical developmental marks and the existence of unusual behaviors can be considered as features. The diagnosis of ASD can consist of two staged process.  At the first stage screening is done usually by doctors. It is done at child visits using screening checklists generally filled by the parents of ASD affected child. The next stage is a wide-ranging diagnostic evaluation. It is usually piloted by a multi-disciplinary crew who gathers evidence from structured observation and an interview. It is advisable that early detection should be done as it tips to earlier entrance to intervention. Therefore the technologies like Internet of things which includes Machine Learning, Artificial Intelligence concepts and image processing are introduced.

## VI.    PURPOSED TECHNOLOGIES

*INTERNET OF THINGS*

The Internet of Things, generally termed as IoT, is the connection with internet and to get other connected. It is an organization of interconnected and inter related computing devices, mechanical and digital machines, objects, animals or people, They all are given an unique identifiers and the capability to relocate data on network without human-to-computer or human-to-human interaction. Basically it allows you to shares your data as well as resources.it includes varieties of smart devices which have embedded processors and sensors to collect and exchange of data. Iot has four fundamental components including sensors, connectivity, user interface and data processing. **Sensors** or devices are components that are responsible for collecting live data from environment. **Connectivity** means the way through data is transmitted. It can be any **communication medium** such as Bluetooth, WIFI, mobile or satellite networks and WAN, etc. After data is being collected**, processing** on the gathered data is performed by the software. Lastly the information is needed to be available at the side of the end-user.



Internet of Things

*ARTIFICIAL INTELLIGENCE*

Artificial intelligence (AI) focuses on making machines Intelligent that reacts and works like humans. It is the learning of how to train the computers so that computers can perform the things which presently human can do better. It is based on the fact that

intelligence of human can be well-defined in a way that a machine can effortlessly mimic and perform tasks. Reasoning, learning and perception are the goals of AI which is considered as great part of computer science.

*MACHINE LEARNING*

Machine Learning is the application of artificial intelligence. It is the knowledge without being explicitly programmed, machine can learn itself. Machine Learning is a sub branch of AI which helps an application to anticipate most accurate outcomes without being explicitly programmed. The main starring role of the machine learning is to create an algorithm to solve the problem. These algorithms will yield the input data and use the Big Data to envisage the future results.
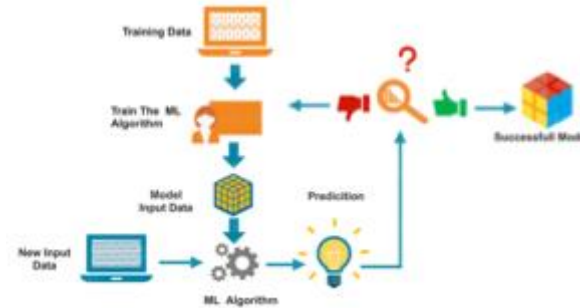
Working of Machine Learning

*IMAGE PROCESSING*

It is the processing of digital images with the use of computer. Basically it is the use of computer algorithm to enhance the quality of image or to extract the useful data.

## VII.    MACHINE LEARNING FOR AUTISM

A difficult dilemma have been faced by Parents and doctors while detecting and treating autism ASD in children. To improve the overall mental health of the child, early detection of Autism Spectrum Disorder is required. Machine learning can be used to define a set of situations that together predict the Autism Spectrum Disorder. By employing advanced technologies such as machine learning, the scientist has examined to improve precision, diagnostic timing, and quality. Different techniques of Machine learning such as decision trees, support vector machines (SVM), logistic regressions, and others, can be to datasets associated to autism to build predictive models. Such models claim to increase the capability of doctors to generate healthy prognoses and diagnoses of ASD.

Machine learning techniques and algorithm can be used to scrutinize the performance in four different criteria's which are sensitivity, specificity, Area under the curve (AUC) and accuracy. The ML application on neuroimaging, genetic, kinematic features and psychological might place significant challenges to it's the current diagnostic criteria. Growth of new techniques for diagnosis of autism spectrum based on machine learning is considered as more thoughtful claim. Upcoming studies regarding machine learning in autism research are impressively profited by such proposals.

## VIII.    FURTHER STUDIES

Presently, Momentum is gained by Autism Spectrum Disorder (ASD) more rapidly. Through screening tests, Detection of autism behaviors is very costly and tedious. Autism can be forecasted at quite initial stages with the development of machine learning and artificial intelligence. However numerous studies have proposed using various techniques, there are no definitive conclusion regarding prediction of autism behaviors. and there is no such comparison of different studies done under machine learning for detecting autism. Therefore next proposed research by author will include a systematic review for comparing Machine learning techniques and algorithm  and compare their respective performances in four different criteria's which are sensitivity, specificity, Area under the curve (AUC) and accuracy.

## ACKNOWLEDGMENT

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