

Autism Analysis and Detection using Neural Network Schema-A Review

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ABSTRACT: Autism spectrum disorder is a construct used to describe people with a specific combination of social communication deficits and repetitive behaviours, severely restricted interests, and/or sensory behaviours beginning early in life. The global prevalence of autism is just under 1%, but estimates in high-income countries are higher. Although gross brain pathology is not characteristic of autism, subtle anatomical and functional differences have been observed in autopsy, neuroimaging, and electrophysiological studies. Originally it was expected that accurate measurement of behavioural phenotypes would lead to specific genetic subtypes, but the genetic findings have mainly been applied to heterogeneous groups that are not specific to autism. Psychosocial interventions in children can improve specific behaviours such as joint attention, language, and social engagement, which may impact later development and reduce symptom severity. However, more research is needed to identify the long-term needs of people with autism and the treatments and mechanisms behind them that could lead to better independence and quality of life over time. Families are often the primary source of support for people with autism for much of life and must be considered, along with the perspectives of autistic people, in both research and practice.

1.INTRODUCTION

The problem of Autism Spectrum Disorder (ASD) is currently increasing rapidly in all age groups of the human population. Early detection of this neurological disorder can be of great help in maintaining the patient's physical and mental health. With the increase in the application of machine learning-based models in predicting various autism spectrum disorders, a complex developmental disorder is presented that is the result of a neurological disorder that interferes with the normal functioning of the brain. Sharing many of the same characteristics, ASD affects a person's ability to communicate, understand language, play, and relate to others. The term autism spectrum disorder is used because the symptoms can come in any combination and can range from very mild to fairly severe.

Human diseases now seem possible to be detected early on the basis of various physiological and health parameters. This factor motivated us to increase interest in the detection and analysis of ASD disorders in order to improve treatment methodology. Screening for ASD becomes challenging because there are several other mental disorders whose few symptoms are very similar to those of ASD symptoms, making this task difficult. Autism Spectrum Disorder is a problem related to human brain development. A person suffering from an autism spectrum disorder is generally unable to interact socially and communicate with other people [1] or [3]. A person's life is usually affected throughout his life.

It is interesting to know that both environmental and genetic factors can turn out to be causative factors of this disease. Symptoms of this problem can begin as young as three years old and last for life. It is not possible to complete the treatment of the patient suffering from this disease, however its effects can be temporarily reduced if the symptoms are recognized early. Assuming human genes are responsible, the scientist has not yet identified the exact causes of ASD. Human genes influence development by influencing the environment. Is there a risk factor that affects ASD, such as B. low birth weight, a sibling with ASD, and older parents?

Autism Spectrum Disorder is a neurodevelopmental disorder. These disorders are causes of hyperactivity, deficits in social communication, and learning and language deficits. Asperger's Syndrome can also be caused by inherited (genetic) chemicals, including those found in food. With a ratio of 1:68, the number of children with ASD is steadily increasing. ASD can be detected through a diagnosis, which can take 2-3 days depending on the severity of the ASD. Various groups of doctors observe the behaviour of a child in order to make a diagnosis. ASD can be manually detected at age 3 years or older. And you can see that from a young age. Machine learning can detect ASD faster. When older data is used to predict autism, machine learning takes less time.

Early detection and treatment are the most important steps to reducing the symptoms of Autism Spectrum Disorder and improving the quality of life of people with ASD. However, there is no medical screening procedure for autism screening. ASD symptoms are generally recognized through observation. In the older adults and adolescents who attend school, symptoms of ASD are usually identified by their parents and teachers. ASD symptoms are then evaluated by a special education team at School. This school team suggested that these children see their doctor for the necessary testing. In adults, identifying ASD symptoms is much more difficult than in older children and adolescents because some ASD symptoms can overlap with other mental health disorders. It is easier to detect behavioural changes in a child through observation, since they can be seen as early as 6 months of age, than autism-specific brain imaging, since brain imaging can be identified at 2 years.

II. LITERATURE SURVEY

Autism Spectrum Disorders include autism and related disorders. There are five main diagnostic terms that fall under this heading: Autism, Asperger's Syndrome, PDD-NOS, Rett Syndrome, and Childhood Disintegrative Disorder. While they all share common traits, there are slight differences between them. Autism is the longest recognized term. To receive a diagnosis of autism, the person must demonstrate impairment in each of the three core characteristics described above. These include social deficits, communication difficulties, and repetitive or restricted behaviours.

Asperger's Syndrome is a shape of ASD. The character with Asperger's Syndrome presentations extreme issues with social functioning and famous about repetitive pastimes or behaviours. An analysis of Asperger's Syndrome generally approach the character has sturdy language capabilities acquainted with the social factors of verbal exchange, including g. talking or knowledge pictures.

Pervasive Developmental Disorder Not Other Specific (PDD-NOS) is described through deficits in social interplay with marked demanding situations in verbal exchange or the presence of restrictive and repetitive behaviours. The capabilities are just like the ones of autism, however the might not be as severe, ensuing within side the character now no longer assembly all the standards for autism. Rett syndrome and child disintegrative ailment are very rare. Severe types of ASD have one of a kind preliminary styles and, with inside the case of Rett syndrome, a particular genetic basis.

Every person is different. However, there are primary traits associated with ASDs. The main characteristics are 1) poorly developed social skills, 2) difficulty of expressive and receptive communication, and 3) presence of restrictive and repetitive behaviours.

Young children with poorly developed social skills may have inadequate play skills. You may not be able to use items, including toys and games, in a functional or age-appropriate manner, or your ability to do so may be delayed. Adolescents and young adults may not understand social rules such as B. knowing which jokes to tell a peer and which to tell an adult. The person with autism often has difficulty interacting with people, including doing and maintains relationships with each other. The person with ASD may seem to want to be alone.

Some people with ASD can develop typical language, while others have difficulty with expressive and/or receptive communication. For example, a person with ASD may use single words or short phrases to communicate; another may be nonverbal. The language, if any, may have a restricted function or content. For example, the person may only use

words to request a desired item instead of speaking in sentences. Also, the speech may sound different, and the person may speak loudly or with a robotic quality.

A person with ASD may exhibit unusual behaviour or stereotypical body movements. This could be represented by hand movements, jumping or lining up blocks, or spinning the wheels of a car instead of playing with the object as intended.

The person may also have difficulty transitioning from one activity to another or worry about changes in the environment. Individuals with ASD may also demonstrate secondary characteristics. These are characteristics that are common to ASD but do not need to be present for the person to have a diagnosis of ASD. Remember that no two individuals with an ASD are the same! Each person has a mixture of characteristics. Each has a distinct personality, strengths, and interests that make him or her unique! A few of the secondary characteristics are as follows. An unusual response to sensory stimuli.

A person with ASD might be overly or under sensitive to sounds, touch, smells, tastes, or sights. Uneven skill development or "splinter skills." An individual may develop some skills normally or have advanced skills for his or her age; while other skills may be delayed. Difficulties with changes in surroundings. Many individuals with ASD like to have things in the same place and become upset when their environments change. Strength with visual processing. A person with ASD may find it easier to process information presented in a visual format, thus compensating for deficits in auditory processing.

III. DATASET

The dataset for research purposes was collected from the UCI repository, which are publicly available [12] or [15] or [16]. Three main types of data sets were used in this study. Below is the detailed summary of the data set.

Sl. No.	Dataset Name	Sources	Attribute Type	Number of Attributes
1	ASD Screening Data for Adult	UCI Machine Learning Repository [12]	Categorical, continuous and binary	21
2	ASD Screening Data for Children	UCI Machine Learning Repository [15]	Categorical, continuous and binary	21
3	ASD Screening Data for Adolescent	UCI Machine Learning Repository [16]	Categorical, continuous and binary	21

Table 1: List of ASD datasets

Attribute Id	Attributes Description
1	Patient age
2	Nationality
3	The patient suffered from Jaundice problem by birth
4	Any family member suffered from pervasive development disorders
5	Who is fulfilment the experiment
6	The country in which the user lives
7	Screening Application used by the user before or not?
8	Screening test type

Table 2: List of Attributes in the dataset

Autism spectrum disorders include autism and related disorders. They are usually detected during early childhood and are lifelong developmental disabilities. They are characterized by impairments in social interaction, deficits in verbal and nonverbal communication, restricted, repetitive behaviours and unusual responses to sensory stimuli. It should be remembered that individuals with ASD vary widely in their abilities, interests and strengths.

3.1 Alzheimer disease

Dementia is defined as the deterioration acquired in cognitive abilities that interferes with the satisfactory performance of activities of daily living . Alzheimer's Disease (AD) is a type of progressive dementia that has memory deficit as one of its earliest and most pronounced symptoms [4].

As a general rule the patient progressively deteriorates, exhibiting perceptual, language, and emotional problems as the disease progresses. This deterioration is due to the fact that the nerve cells, or neurons, that allow cognitive function in the brain have been damaged and no longer function normally. In addition, Alzheimer's disease usually occurs in combination with other types of dementia, which is called mixed dementia. AD has become a major social problem for millions of families and national health systems worldwide.

It is one of the most important causes of death in developed countries, behind cardiovascular disease and cancer [5]. This dementia have such a strong impact on the health system and society. Not only for its irreversible nature and the lack of curative treatment, but also due to the huge burden that the disease impose on the family of the patients. Although the most prevalent symptom of AD is the gradual loss of the ability to remember new information the following ones are also common of the disease [6]: difficulties planning activities or solving problems; challenges completing familiar tasks at home, work or at leisure; confusion about time or place; problem of knowing the current day of the week or where they are; speech or writing difficulties; decreased ability to organize personal items and remember where they are located; apathy or depression, including drastic personality or mood changes.

3.2 Causes

Although the exact causes of Alzheimer's disease and why it occurs are still unclear, abnormal presences of two proteins have been identified in the brains of the patients of AD [7]. It is know that the brain is made of neurons, which are interconnected to form a vast network. Such connections, named as synapses, enables the transmission of information from one neuron to another. In the case of the patients of AD, two main brain lesions are formed which affects directly to those connections in their brains.

The first one is produced by the beta-amyloid protein, or commonly called amyloid. This protein tends to accumulate in form of plaques in the brains of AD patients. Such aggregates, which disrupt the interconnection between neurons, are called senile plaques or amyloid plaques. Senile plaques are irreversible, meaning that once they are formed, their disappearance is no longer possible. Elderly individuals suffering from Down's syndrome, are particularly prone to develop insoluble amyloid deposits which results on the probable development of AD [8]. The reason behind this risk factor is the additional copy of the Amyloid Precursor Protein (APP) gene on individuals with Down syndrome. This gene usually increases the production of beta amyloid protein, triggering the chain of biological events leading to Alzheimer's disease. The second protein that is linked with the presence of the diasease is the tauprotein.

When a neuron communicates with another, a signal goes from the body connection, knows as soma, to the neuron's synapse to transfer the information. The signal passes through the skeleton of the neuron which is composed by microtubules. These microtubules are stabilized by the tau protein. In healthy neurons, tau normally binds to and stabilizes microtubules. In AD however, tau protein becomes defected and detaches from the microtubules sticking to other tau molecules.

3.3 Diagnosis

The criteria for the clinical diagnosis of Alzheimer's Disease (AD) were established by a National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) and Alzheimer's Disease and Related Disorders Association (ADRDA) workgroup in 1984 [12]. This initial criteria were designed with the expectation that in most cases, subjects who manifest

3.3.1 Pathophysiological diagnosis: Biomarkers are parameters - physiological, biochemical or anatomic - that can be measured in vivo that reflect specific features of the disease related to pathophysiological processes [14]. In the case of Alzheimer's disease, biomarkers are measured by image scanning, blood analysis or lumbar puncture tests. But in order to use a biomarker as core of a diagnostic, it should be validated beforehand. This requires multiple studies in large groups of people establishing if the biomarker accurately and reliably indicates the presence of disease. Unfortunately, this is not the current situation of the Alzheimer's biomarkers, which cannot offer an accurate and standardized threshold that indicates the presence of the disease. As a result, it is important to highlight that most of the diagnostics of AD dementia are based in clinical processes, being the pathophysiological diagnosis a complementary method for the medical practitioner.

3.3.2 Clinical diagnosis: Regarding the clinical diagnosis of the AD. A comprehensive physical examination of the patient should be performed. It includes a brief neurological and mental status evaluation, a review of the lifetime medical history and an analysis of the patient's lifestyle.

In order to test the mental status of the patient, the most common symptoms of the disease will be evaluated through a cognitive examination. The cognitive capacity of the patient is evaluated based on a combination of two methods. Firstly, a personal interview with the patient and close family members will be performed. And secondly, a brief cognitive exam which reflects the mental state of the patient. The Mini-Mental State Exam (MMSE) is one of the most commonly used screening tests to evaluate cognitive functioning [21]. The MMSE is a brief, structured test that takes about 10 minutes to complete. The test also includes the evaluation of variables such as the gender of the patient, his age, his educational level or various risk factors such as diabetes or hypertension.

IV. RESULTS OF ASD

Execution is the acknowledgment of the endeavor while hypothetical configuration ends up being a mobile gadget. Execution is the main certificate in achieving a fruitful new gadget acquiring buyer consider that the super present day gadget will craftsmanship effectively and precise. It includes cautious wanting to stay away from mayhem. The endeavor on fostering any gadget, results in progress handiest while the gadget is carrying out appropriately. Execution of any product program application has a few limitations with respect to cost, attempt and examine and utilize. The product program objectives negligible key stroke and extra utilization of mouse and application is gotten, hearty, with out inconveniences adaptable and customize. As improvement consider, for this product program programming program application we are numerous product program application devices, in that some are utilized for the front acquiescence planning and some are utilized as backend apparatus.

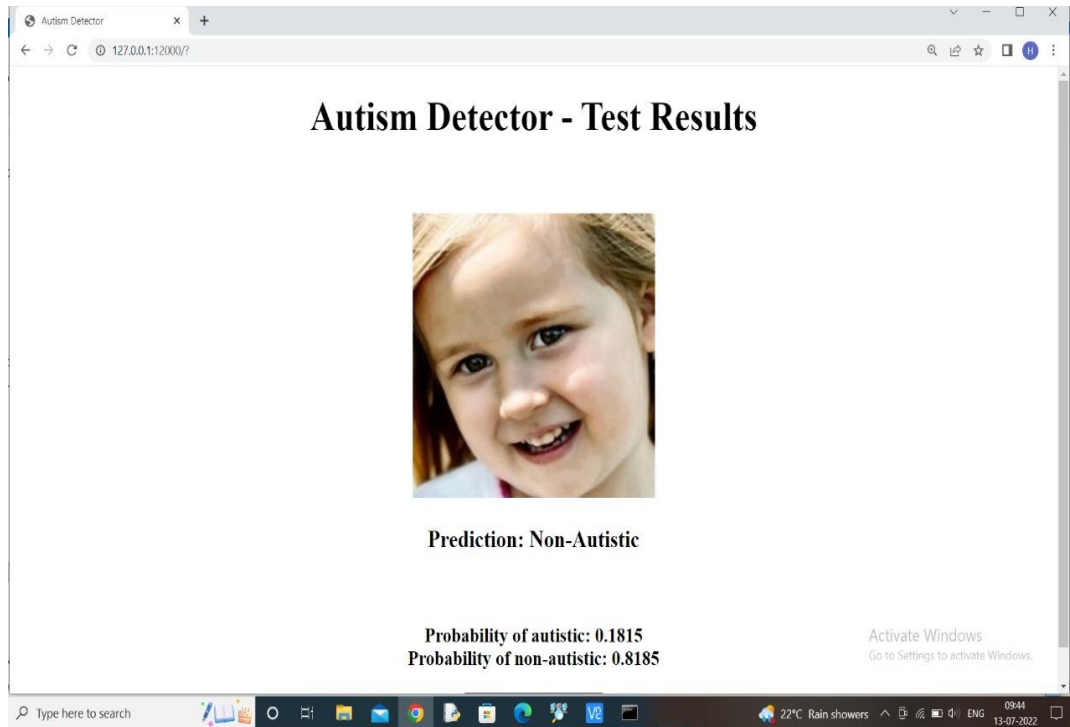


Figure 1: The result on non autistic

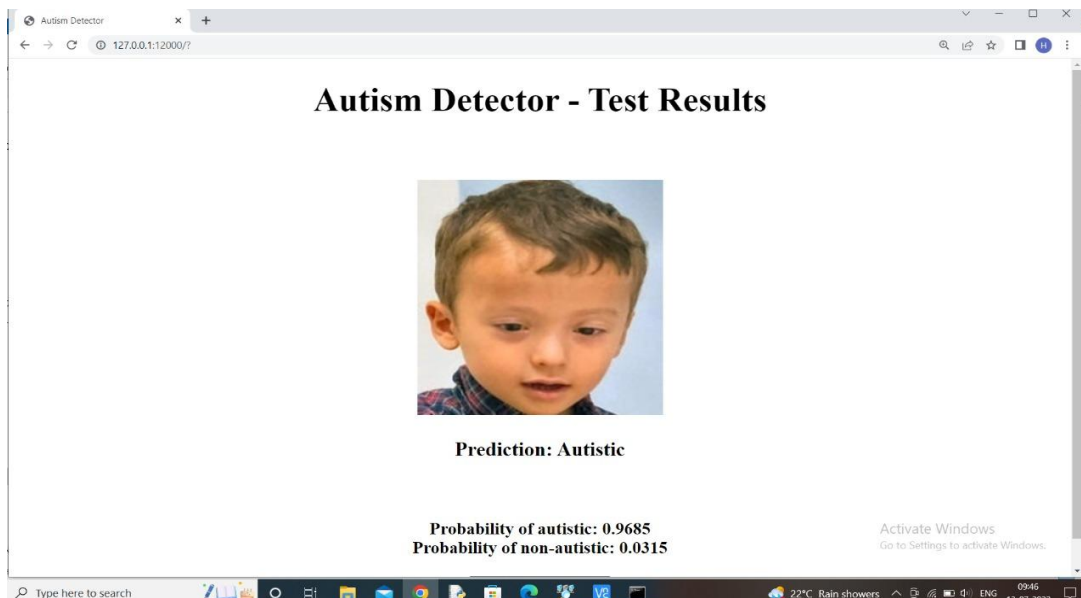


Figure 2: The result on autistic

4.1 Existing System

Cerebral imbalance range jumble is a neurological formative problem that influences individual's connection, correspondence and acquiring abilities. The impacts of chemical imbalance range jumble and the seriousness of side effects are different in every individual, chiefly this problem is perceived between the age of 1-5 years or more and the side effects they have are strange ways of behaving, interests and additionally, they could have social difficulties. In the

event that it was not settled at beginning stage, it becomes serious in forthcoming days, so to lessen the quantity of cases expanding because of mental imbalance.

V. CONCLUSION

The objective of the present project was to answer the research question presented. For this purpose, an analysis of the possible improvement on the diagnostic process of AD by means of deep learning techniques has been addressed through the implementation of the project. It is for this reason that, during this last chapter, an answer to this question will be exposed explaining its conclusions and future improvements of the system. As a resume, the result of the analysis was to build a classifier able to discriminate data from patients with AD or not. To do so, the first step was to collect the data needed to train the classifier. But before that the data can be used, the data had to be cleaned and pre-processed. Once the data was ready to use to train a model.

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