

# Queries and Responses

Question: What are the variety of Multimodal and Multi-modular AI Approaches to Streamline Autism Diagnosis in Young Children

Helpful Answer:

The text material "Multi-modular AI Approach Streamline Autism Diagnosis Young Children" discusses the use of multi-modular, machine learning-based assessment for young children with autism. The paper proposes a three-complementary module system, including a 4-minute parent-report questionnaire delivered through mobile app, a 2-minute parent-report questionnaire, and a 2-minute clinician questionnaire presented in-person. This multi-modular assessment system is designed to achieve diagnostic-grade reliability and automate the assessment process, with the goal of improving the accuracy and reducing wait times for at-risk children. The paper also mentions previous studies using machine learning to classify young children with autism, although these studies still require human involvement for answering questions and assessing videos.

Additionally, the text material "Robot-Assisted Autism Spectrum Disorder Diagnostic Based Artificial Reasoning" discusses a robot-assisted tool for automated behavior assessment in children with autism. This tool uses child-robot interaction theories and elucidates significant gains in diagnosis and therapeutic intervention. The paper notes a shortage of trained specialists for diagnostic procedures, and that early detection can result in children with autism receiving behavioral therapies more quickly and effectively.

In both papers, multi-modal and multi-modular AI approaches are being employed to streamline autism diagnosis for young children. These AI approaches combine various modalities and data sources to improve the accuracy and efficiency of diagnosing autism. The use of machine learning and artificial reasoning in these approaches is also highlighted as a means of improving the accuracy and reducing wait times for at-risk children.

Question: What is Autism Spectrum Disorder, how it is caused?

Helpful Answer:

Autism Spectrum Disorder, or ASD, is a neurological disorder that typically emerges during the first three years of life, and is characterized by impaired social communication and repetitive behaviors. The underlying causes of ASD are not fully understood, and it is believed to result from a combination of genetic and environmental factors. Despite significant advances in research and early intervention, children with ASD continue to experience significant delays in diagnosis and treatment. The diagnostic process involves standardized assessment scales, direct observation by medical professionals, and behavioral assessments. However, diagnostic accuracy can be affected by various factors, such as hospital level, physician subjectivity, and patient age.

Question: What is the cure of Autism Spectrum Disorder

Helpful Answer:

Currently, there is no cure for Autism Spectrum Disorder. However, with proper diagnosis and therapy, the symptoms can be managed to improve the individual's quality of life.

Question: What are Stereotypical and maladaptive behaviors in Autism Spectrum, how are these detected and managed

Helpful Answer:

Stereotypical and maladaptive behaviors in Autism Spectrum can include repetitive and restricted interests or activities, self-injurious behaviors, aggression, and property destruction. These behaviors can be detected through observations, parent and teacher reports, and diagnostic tools such as the Autism Diagnostic Observation Schedule (ADOS) and the Autism Diagnostic Interview-Revised (ADI-R). Management of these behaviors may involve behavioral therapy, medication, and environmental modifications.

Question: How relevant is eye contact and how it can be used to detect Autism

Helpful Answer:

According to the context given, eye contact is a social behavior that can be used to detect Autism. In the study conducted by Qiu et al., statistically significant differences in duration and frequency of eye contact between high-risk Autism Spectrum Disorder (ASD) group and typical development group were found during the Still-Face Paradigm (SFP) episode. This indicates that eye contact could be a valuable tool in detecting and screening for Autism, particularly in children as early as two years old using the SFP as a method.

Question: How can cross country trials help in development of Machine learning based Multimodal solutions

Helpful Answer:

Cross-country trials can help in the development of machine learning-based multimodal solutions by providing data from multiple sources with varying conditions. This can help in the validation of models across different environments and populations, improving their generalizability and robustness. By testing models in real-world scenarios, researchers can also identify challenges and limitations that may need to be addressed, leading to the development of more accurate and reliable multimodal solutions for various applications.

Question: How early infants cry can help in the early detection of Autism

Helpful Answer:

This article discusses the use of cry sounds in infants for the early detection of Autism. The study collected data from 102 children, 31 diagnosed with Autism Spectrum Disorder and 71 typically developing children, and analyzed their cry sounds to identify features that could distinguish between the two groups. The study found that cry sounds in Autistic children have intricate motor activities and deficiencies in the motor domain, suggesting that cry-based screening for Autism could be automated using systems like Amazon Alexa.

Question: What kind of facial expressions can be used to detect Autism Disorder in children

Helpful Answer:

Facial expressions such as inexplicable laughter, looking at someone's face, avoidance of eye contact, and non-communicative smiles are used to detect Autism spectrum disorder in children. These expressions are included in diagnostic scales such as CABS, ABC, and CARS, which are used to diagnose autism in children. Artificial intelligence technology is also being used to objectively and effectively reflect mental health in children using early expressions. Preliminary results suggest that computational coding of facial movements and expressions can be useful in detecting Autism Disorder in children as early as possible.

Question: What are various methods to detect Atypical Pattern of Facial expression in Children

Helpful Answer:

One study assessed the utility of tablet-based behavioral assessments for eliciting and detecting patterns of facial expression as a risk behavior in toddlers with Autism Spectrum Disorder (ASD). Another study collected facial expression data from 16 healthy children, aged 5-8 years, and used computer vision analysis to detect and track facial landmarks to identify specific points throughout movies that reliably differentiate children without ASD based on patterns of facial movement and expressions. These studies suggest that computational coding of images can improve recognition rates for children's facial expressions, and preliminary results suggest that this method improves facial expression recognition rate. The collection process involved recruiting parents for data collection and using high-definition cameras to collect facial expression images, which were processed professionally. The diagnostic procedure involved randomly displaying one of seven kinds of facial expressions to the tester, who would then imitate the expression. System compares the expression examples collected to actual facial expression data and gives a diagnostic result.

Question: What are methods to detect Autism from home videos

Helpful Answer:

In order to detect Autism from home videos, researchers developed and tested a novel video-based approach that can improve the detection of Autism risk in infancy. This approach involves using machine learning analysis to analyze home videos and speed up diagnosis without compromising accuracy. Features needed for this approach were identified and measured from home videos, using mobile devices and no expertise required. The process generates growing matrices of video features for autism detection and may provide a quantitative indication of autism risk. This approach has been evaluated in clinical prospective testing in general pediatric settings, and results support the possibility of rapid autism detection outside clinics using mobile video analysis and machine learning. Clinical experts classified videos as "ASD" or "non-ASD" using 9 video raters, either students or working professionals. The table below shows the 8 machines learning classifiers used for video analysis and autism detection.

Question: What is Still-Face Paradigm in Early Screening for High-Risk Autism Spectrum Disorder

Helpful Answer:

The study titled "Early Screening High-Risk Autism Spectrum Disorder Infants and Toddlers" discusses the need for early detection, early diagnosis, and timely intervention essential to achieve better prognosis for children with autism spectrum disorder (ASD) as their average age of diagnosis remains around 4 years in the US. The article highlights the importance of direct observational assessment of children, which improves the positive predictive value of the screening process. One of the tools used in this process is the Still-Face Paradigm, which is a research tool used to examine infant-caregiver social communication and affect. In the context of the study, it is used as a tool for assessing early childhood behaviors that may indicate the risk of developing ASD. The study also mentions the mixed evidence on stability of autism traits in early childhood and the delayed diagnosis still impacting timely intervention in a critical window of development. The article suggests that a two-tiered screening approach, including direct observational assessment of children, improves positive predictive value and supports the need for caregiver report, typically relied upon in current screening approaches, such as the modified checklist for ASD toddlers.

Question: What is West Syndrome?

Helpful Answer:

West Syndrome is also known as Infantile Spas. West Syndrome is a disorder characterized by spasm-like seizures that occur in infants between the ages of 2 to 12 months. The spasms are brief, and they can affect any muscle group. The spasms are often followed by a period of staring blankly, as if the child is in a daze. West Syndrome affects 1 in 2500 children, which means it is a fairly rare condition that is usually not diagnosed until after the age of six months. However, there are cases of babies as young as 1 week old who have already been diagnosed with this condition. The causes of West Syndrome are not fully understood and there is no known cure or treatment for the condition. However, there are several treatment options that can help manage the seizures and prevent them from getting worse. These treatments include medications, dietary changes, and surgery. The treatment plan is usually developed by a team of doctors and specialists, including a pediatric neurologist.

Question: What is the utility of Behavior and interaction imaging at 9 months of age predict autism/intellectual disability in high-risk infants with West syndrome

Helpful Answer:

A recent study by Ouss et al. in *Translational Psychiatry* (2021) found that behavior and interaction imaging performed at 9 months of age could predict the development of autism or intellectual disability in high-risk infants with West syndrome. The study involved 32 infants with West syndrome and 19 typically-developing children, all of whom were assessed through a standardized mother-infant interaction. Infant hand movements (HM) and speech turn-taking patterns were computed, as well as motherese and other multimodal social signals. The results showed that multimodal social signals at 9 months of age could predict outcomes (autism spectrum disorder (ASD) and intellectual disability (ID)) in infants with West syndrome 4 years

later. At follow-up, 10 out of the 32 infants with West syndrome developed ASD or ID (WS+). The study used machine learning to classify WS+ and WS- infants, with the best machine learning achieving 76.47% accuracy in classifying WS vs. TD, and 81.25% accuracy in classifying WS+ vs. WS-. The study's results suggest that behavioral interaction imaging is capable of predicting ASD/ID in high-risk children with West syndrome.