

## Query 1: What are the variety of Multimodal and Multi-modular AI Approaches to Streamline Autism Diagnosis in Young Children

### Top Five Searches:

[Document(page\_content='research machine learn approach early detect autism combin questionnaire home video screen abba glover alto ca pediatric univers ca data science univers ca correspond alto ca receive march editor decision march accept abstract background screen early detect autism expensive cumbersome time intense sometimes fall short predict value work sought apply machine learn clinic data across risk autism spectrum disorder create low cost quick easy apply autism screen tool two train identify autism one base short structure parent key short semi structure home based algorithm use combin single assess higher accuracy come scarcity sparsity imbalance train data apply novel feature select feature allow inconclusive determine appropriate boost screen accuracy conclude perform center clinic study ascertain perform combin demonstrate cannot accuracy improve standard screen using sensitive conclusion suggest mobile machine learn process reliable method detect autism outside clinic variety confound clinic analysis final statistic limit benefit future clinic extend'),

Document(page\_content='without notice springer nature may revoke time remove access springer nature journal content save extent permit law springer nature either express respect springer nature journal content disclaimer waive law fit particular purpose please note automatic extend content data material springer nature may license third would like use distribute springer nature journal content audience regular basis manner expressly permit please contact springer nature scientific ai approach streamline autism diagnosis young abba ford eric wall autism become press challenge use aid diagnosis time labor expense require train administer lead long wait time risk present modular machine learn base assess autism three complementary unified outcome diagnosis grade reliable minute parent report questionnaire via mobile list key minute semi structure home minute questionnaire clinician time clinic assess demonstrate assess reliable blind site clinic study age unit specific operation sensitive less age assess accurate specific operation sensitive idiopathic autism spectrum disorder known biology'),

Document(page\_content='language evidence normal autism asperger syndrome visual cognition vol deep autism research institute report develop autism education rehabilitation industry china house facial autism facial facial express recognition base depth learn southeast univers research face express recognition base kernel univers research progress etiology treatment autism science life science vol argument basic cognition emotion vol research facial express recognition method base feature fusion univers ldeep facial express recognition survey preprintx summari research facial express recognition autistic modern special education vol jextend complete action unit emotion express computation society confer computation vision pattern recognition common without common theory vol b research implement real time face express recognition method inform technology vol organ classification mental clinic diagnosis world health organization geneva diagnosis statistic manual mental encyclopedia psychologist volz ding computation facial express recognition train improve facial express recognition ability autistic technology horizon vol singhnandi'),

Document(page\_content='interact autism spectrum disorder convoluted neural network robot reason model statistic shape model research child robot interact provide necessary interact child device take account fundamental child physical condition child mental health robot rat interest intervene faster significant gain therapist intervene tradition disorder people birth found early es ram feder period suffer exhibit persist social common social interact repetitive behavior may age although reliable diagnosis age accord accord use computation vision analyze child video summar help reduce delay diagnosis provide access early therapist add base intervene transform tradition diagnosis device systematic elicit child exhibit first assist make diagnosis base primarily open loop remote however unable perform autonomous feedback enhance interact content courtesy springer nature use apply reserve nevertheless differ ability modify behavior robot accord environment child response close loop artificial

cognit offer technolog support flexibl potenti naturalist interact fact literatur'),

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Document(page_content='progress earli detect treatment autism developkj  
smithcarpentg atyp control via comput vision analysi autism spectrum  
disordg hill spencerl affect young autist journal abnorm child psychologg  
potenti digit behavior measur transform detect autism spectrum disord jama  
pediatrkJj earli social attent autism social joint attent attent  
development psycholog de lawf dingj intern confer automat face gestur  
recognittwo way street automat emot moral journal experiment child eggerlj  
carpentlkautomat emot attent analysi young home autism feasibl studi digit  
medicinreveal new york timeface basic appli stud spontan express facial  
action new york univers presshlnposit affect infant autism journal abnorm  
child psychologc random sampl paradigm model imag analysi cartographi  
machinerideceit facial express role poker face child depend person detector  
psychologljoint initi without posit affect risk group journal  
developmentlordautism diagnost observ schedul diagnost valid journal autism  
develop mental')]
```

Model Output:

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{'output_text': "- **Modular machine learning-based assessment of autism:**  
This approach involves using machine learning algorithms to analyze data  
from multiple sources, such as parent reports, clinician observations, and  
home videos, to assess autism symptoms. This can help to streamline the  
diagnostic process and make it more efficient.\n\n- **Three complementary,  
unified outcomes:** This approach combines the results of the three  
different assessment methods (parent report, clinician observation, and  
home video) to create a more comprehensive and reliable diagnosis.\n\n-  
**Reliable in minutes:** This approach can provide a reliable diagnosis in  
just a few minutes, which can significantly reduce the time it takes to get  
a diagnosis.\n\n- **Parent report questionnaire via mobile:** This approach  
allows parents to complete a questionnaire about their child's symptoms on  
their mobile phone, which can make the diagnostic process more convenient  
and accessible.\n\n- **Semi-structured home video:** This approach involves  
recording a short video of the child at home, which can provide valuable  
information about their symptoms.\n\n- **Clinician time in clinic  
assessment:** This approach involves the clinician observing the child in a  
clinical setting, which can provide additional information about their  
symptoms.\n\n- **Demonstrated assessment reliability:** This approach has  
been shown to be reliable in a blind site clinic study, which means that  
the clinicians who made the diagnoses were not aware of the child's  
diagnosis.\n\n- **Age-unit specific operat sensit:** This approach has been  
shown to be sensitive to autism symptoms across different age groups.\n\n-  
**Less age assessment inaccuracy:** This approach has been shown to be less  
likely to misdiagnose autism in children of different ages.\n\n- **Idiopath  
autism spectrum disord known biolog:** This approach has been shown to be  
able to identify children with idiopathic autism spectrum disorder, which  
is a type of autism that does not have a known biological cause."}
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Query2: What is Autism Spectrum Disorder, how it is caysed?

Top 5 searches: [Document(page\_content='exampl articl diagnos autism facial  
autism facial express diagnosi autism develop autism disord collect autism  
spectrum disord al sinc child psychiatrist first autism incid autism risen  
rapidli everi peopl diseas everi diseas accord nation center health statist  
probabl autism among age unit percent al statist survey autist china howev  
accord data report develop china autism educ rehabilit industri number  
peopl autism china exceed million million autist time grow rate nearli  
annual deer autism research institut autism seriou financi burden societi  
famili autist one hand spend lot time work reduc work incom reduc hand cost  
famili rehabilit treatment autist huge famili financi burden accord survey

occupy economic burden preschool autistic percent autistic serious affect annual income significantly lower ordinary average loss income yuan per year meanwhile average annual cost autistic education training significantly higher ordinary yang wang society govern also need invest lot money rehabilitate education autistic time'),

Document(page\_content='autism development morgan self-regulate affect express play autism syndrome short-term longitudinal study journal development goldtrace temporal autism spectrum diagnosis severe measure diagnosis observe schedule systematic meta-analysis one carpenter borgh computer vision analysis atypical autism autism carpenter use digit autism follow improve quality screen autism pediatric hall swain techali white group facial emotion express autism evidence machine behavior therapy change line library support vector intelligent technology prevalence autism spectrum disorder among child age autism development network unit dyadic triadic infancy later social response autistic disorder journal autism carpenter al digit behavior young early autistic disorder video analysis journal autism development early develop joint attention autistic disorder parent interview journal development reduce facial muscle movement autism evidence dysfunction pathway brain cognitive quarter century progress early detect treatment autism develop kj smith carpenter atypical control via computer vision'),

Document(page\_content='operant sensitive less age assess accurate specific operant sensitive idiopathic autism spectrum disorder known biological cause may correspond multiple similar incident recent accord latest clinic accord standard child social behavior autism said spectrum due vary range relatively mild social impairment intellect change severe sensory approximate autistic non-verbal severe notable diagnosis within first life dramatic outlook autism treatment key window development unfortunate latest show although autism development child age median age diagnosis unit complex diagnosis shortage training result get early enough receive behavior time effect autism unit gender two development screen prehens diagnosis evaluate screen positive screen typical use parent teacher gender ease inexpensive administer use flag risk however always accurate enough help inform standard autism also high false positive rate lead unnecessary comprehensive diagnosis evaluate hand accurate require long expensive highly training paper present two previous autism assess underlying first module base brief questionnaire child directly'),

Document(page\_content='all home video detect may help study interact become autistic ibap induct one level decision machine learn ninth intern workshop morgan san ca wanali quality interact risk associate year autism outcome child psychiatric infant dyadic early common base screen autism spectrum disorder grid one greenall parent versus intervene high risk autism parallel single-blind trial lancet psychiatry purpura bilateral repetitive month-old autism spectrum front-thalamic associate autism high risk pilot sibling sample autism development morgan barber repetitive stereotypic movement autism late second year life child psychiatric repetitive month-later autism spectrum disorder child psychiatry longitudinal repetitive behavior autism child psychiatric gender autism spectrum dileu hprrlrne motor grasp month-old high risk autism child deval social common risk autism gaze follow attention engage autism development lbhtawush ugc eulface scan typical atypical develop social affect network leoe present decline month-old later autism naturalistic rhkr lue mh vocal product child psychiatry ekfvrjnlrpr'),

Document(page\_content='statistical manual mental psychiatrist associate pattern klg sensory response nonverbal autism treatment quarter century progress early detect treatment autism spectrum disorder deval trial intervene autism early start model pediatric foster peacock whittle wait time explore minimum delay initial concern diagnosis treatment autism spectrum disorder north mao en autism spectrum primary care practitioner manual preschool center child youth family screen accuracy level autism spectrum disorder rate scale review select autism measure screen diagnosis autism spectrum research child mental health lord rutter autism diagnosis interview version diagnosis interview possible pervasive development autism development lord al autism diagnosis observe schedule standard observe common social behavior autism development abba f glover wall machine learn approach early detect autism combine questionnaire home video screen real-time st alto ca

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walldalliljuse artifici intellig shorten behavior diagnosi autism one  
lordal studi clinic diagnosi differ autism spectrum arch gen psichiatri']]
```

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Model output: {'output_text': "Autism spectrum disorder (ASD) is a complex  
developmental condition that affects a person's ability to communicate and  
interact with others. It is characterized by a range of symptoms, including  
difficulty with social interaction, repetitive behaviors, and restricted  
interests. ASD is a spectrum disorder, meaning that the symptoms can vary  
widely from person to person. Some people with ASD may have difficulty with  
only a few social situations, while others may have more severe symptoms  
that affect their daily lives. There is no cure for ASD, but there are  
treatments that can help to improve symptoms and quality of life."}]
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### Query3: What is the cure of Autism Spectrum Disorder

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Top 5 searches: [Document(page_content='autism development morganself regul  
affect express play autism syndrom short term longitudin studi journal  
developmentggoldtrace tempor autism spectrum diagnosi sever measur diagnost  
observ schedul systemat meta analysi onecarpentlborrgg comput vision analysi  
atyp attent autism autismcarpentljg use digit autism follow improv qualiti  
screen autism pediattrhalln swain techali whitegroup facial emot express  
autism evid machin cation behavior therapi changc linj librari support  
vector intellig technologjvjpreval autism spectrum disord among chil age  
autism development network unitdyadic triadic infanc later social respons  
autist disord journal autism carpent al digit behavioryoungp earli autist  
disord video analysi journal autism developmentearli develop joint attent  
autist disord parent interview journal developmentreduc facial muscl move  
autism evid dysfunct pathway brain cognitr quarter centuri progress earli  
detect treatment autism developkj smithcarpentg atyp control via comput  
vision'),
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Document(page_content='statist manual mental psichiatr associipattenklg  
sensori respons nonverb autism treatr quarter centuri progress earli detect  
treatment autism spectrum disord deval trial intervent autism earli start  
model pediattrfosterpeacockwhittl wait time explor minim delay initi concern  
diagnosi treatment autism spectrum disord northmao enautism spectrum  
primari care practitionmanual preschool cent child youth famscreen accuraci  
level autism spectrum disord rate scale review select autismmeasur screen  
diagnost autism spectrum research child mental heal lordrutter autism  
diagnost interview version diagnost interview possibl pervas  
developmentautism dev lordal autism diagnost observ schedul standard observ  
commun social behaviorautism dev abbafe gloverwallmachin learn approach  
earli detect autism combin questionnair home video screenel real st alto ca  
walldalliljuse artifici intellig shorten behavior diagnosi autism one  
lordal studi clinic diagnosi differ autism spectrum arch gen psichiatri'),
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```
Document(page_content='progress earli detect treatment autism developkj  
smithcarpentg atyp control via comput vision analysi autism spectrum  
disordg hill spencerl affect young autist journal abnorm child psychologg  
potenti digit behavior measur transform detect autism spectrum disord jama  
pediatrckjj earli social attent autism social joint attent attent  
development psycholog de lawf dingj intern confer automat face gestur  
recognittwo way street automat emot moral journal experiment child eggerlj  
carpentlkaumat emot attent analysi young home autism feasibl studi digit  
medicinreveal new york timeface basic appli stud spontan express facial  
action new york univers presshlnposit affect infant autism journal abnorm  
child psychologc random sampl paradigm model imag analysi cartographi  
machinerideceit facial express role poker face child depend person detector  
psychologljoint initi without posit affect risk group journal
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developmentlordautism diagnost observ schedul diagnost valid journal autism develop mental'),

Document(page\_content='oper sensit less age assess accur specif oper sensit idiopath autism spectrum disord known biolog caus may correspond multipl similar incid recent accord latest clinic accord standard child social behavior autism said spectrum due vari rang rel mild social impair intellectu chang sever sensori approxim autist non verbal sever notabl diagnosi within first life dramat outlook autism treatment key window development unfortun latest show although autism development chil age median age diagnosi unit complex diagnost shortag train result get earli enough receiv behavior time effect autism unit gener two development screen prehens diagnost evalu screen posit screen typic use parent teacher gener easi inexpens administ use flag risk howev alway accur enough help inform standard autism also high fals posit rate lead unnecessari comprehens diagnost evalu hand accur requir long expens highli train paper present two previous autism assess underli first modul base brief questionnair child directli'),

Document(page\_content='autism outsid clinic varieti confound clinic analysi final statist limit bene fu clinic extend sampl size key machin learn autism spectrum disord diagnost mobil introduct diagnosi within first life dramat outlook autism treatment child brain still rapidli autism typic age unit undiagnos age delay diagnosi driven primarili lack effect screen shortag evalu risk higher accuraci screen seen therefor essenti autism use today base parent medic practition produc pare sum answer autism chat base screen tool autism intend development child parent screen question question given equal weight total determin threshold child consid high risk author univers press behalf medic associ reserv pleas medic associ advanc access public date may research case multipl scale base upon correspond differ autism spectrum scale use perform paper paper present two new machin learn reliabl cost effect short enough achiev higher accuraci one base short questionnair child parent base specif train watch three short']]

Model output: {'output\_text': 'The provided context does not mention anything about a cure for autism spectrum disorder, so I cannot answer this question from the provided context.'}

**Query4: What are Stereotypical and maladaptive behaviors in Autism Spectrum, how are these detected and managed**

Top 5 searches: [Document(page\_content='progress earli detect treatment autism developkj smithcarpentg atyp control via comput vision analysi autism spectrum disordg hill spencerl affect young autist journal abnorm child psychologg potenti digit behavior measur transform detect autism spectrum disord jama pediatrikjj earli social attent autism social joint attent attent development psycholog de lawf dingj intern confer automat face gestur recognittwo way street automat emot moral journal experiment child eggerlj carpentlkautomat emot attent analysi young home autism feasibl studi digit medicinreveal new york timeface basic appli stud spontan express facial action new york univers presshlnposit affect infant autism journal abnorm child psychologc random sampl paradigm model imag analysi cartographi machinerideceit facial express role poker face child depend person detector psychologljoint initi without posit affect risk group journal developmentlordautism diagnost observ schedul diagnost valid journal autism develop mental'),

Document(page\_content='autism development morganself regul affect express play autism syndrom short term longitudin studi journal developmentggoldtrace tempor autism spectrum diagnosi sever measur diagnost observ schedul systemat meta analysi onecarpentlborgg comput vision analysi

atyp attent autism autismcarpentljg use digit autism follow improv qualiti  
screen autism pediattrhalln swain techali whitegroup facial emot express  
autism evid machin cation behavior therapi changc linj librari support  
vector intellig technologjvjpreval autism spectrum disord among chil age  
autism development network unitdyadic triadic infanc later social respons  
autist disord journal autism carpent al digit behavioryoungp earli autist  
disord video analysi journal autism developmentearli develop joint attent  
autist disord parent interview journal developmentreduc facial muscl move  
autism evid dysfunct pathway brain cognitr quarter centuri progress earli  
detect treatment autism developkj smithcarpentg atyp control via comput  
vision'),

Document(page\_content='interact autism spectrum disord convolut neural  
network robot reason model statist shape model research child robot  
interact provid necessari interact child devic take account fundament child  
physic condit child mental health robot rat interest intervent faster  
signific gain therapeut intervent tradit disord peopl birth found earli es  
ram feder period suffer exhibit persist social commun social interact  
repetit behavior may age although reliabl diagnosi age accord accord use  
comput vision analyz child video summar help reduc delay diagnosi provid  
access earli therapeut addit base intervent transform tradit diagnosi devic  
systemat elicit child exhibit first assist make diagnosi base primarili  
open loop remot howev unabl perform autonom feedback enhanc interact  
content courtesi springer natur use appli reserv nevertheless differ abl  
modifi behavior robot accord environment child respons close loop artifici  
cognit offer technolog support flexibl potenti naturalist interact fact  
literatur'),

Document(page\_content='support autism autism scienc foundat report financi  
potenti interest autism spectrum disord video infant rate system autism  
alearli autism detect readi routin screen pediattrvideo static improv learn  
procedur content human behaviorlwarrenspencerc whitel leehallvanpreval  
autism spectrum disord among age autism development network unit surveil  
summari barger preval onset regress within autism spectrum meta analyt  
review journal autism developmentrf parent recognit development autism  
spectrum journal autism developmentf autism criteria comparison neural  
standard child neuropsycholog clarkrare rare appropri use screen journal  
child psycholog psichiatri gammerhtuckerv olein basi team behavior autism  
infanc autism observ scale prospect studi risk infant behavior developyoung  
use prospect longitudin gaze regress paper annual meet intern societi  
autism research da screen lancet young al pagechild psichiatri author  
manuscript avail author manuscript author manuscript author manuscript  
author'),

Document(page\_content='research machin learn approach earli detect autism  
combin questionnair home video screen abba gloveralto ca pediattr univers ca  
data scienc univers ca correspond alto ca receiv march editori decis march  
accept abstract background screen earli detect autism expens cumbersom time  
intens sometim fall short predict valu work sought appli machin learn  
clinic data across risk autism spectrum disord creat alow cost quick easi  
appli autism screen tool two train identifi autism one base short structur  
parent key short semi structur home binat algorithm use combin singl assess  
higher accuraci come scarciti sparsiti imbal train data appli novel featur  
select featur allow inconclus determin appropri boost screen accuraci  
conclus perform center clinic studiascertain perform combin demonstr cant  
accuraci improv standard screen ing sensit citi conclus suggest mobil  
machin learn process reliabl method detect autism outsid clinic variet  
confound clinic analysi final statist limit bene fu clinic extend'])]

Model output: {'output\_text': 'This question cannot be answered from the  
given context because it does not mention anything about stereotyp autism  
spectrum.'}]

**Query5: How relevant is eye contact and how it can be used to detect Autism**

Top 5 searches: [Document(page\_content='mother infant interact affectal development hand typic risk development observ studi year life frontal take account infant engag emot earli may help determin risk autism intellectu disabl west syndrom child psychiatribrunetr vi de de la premier lordrutter autism diagnost interview version diagnost interview pervas devautism devrrk toward object cation childhood autism childhood autism rate scaleautism devbcolor base particl joint detect multipl acoust speech signal pa huede mont pour non lin air un bruit laneunehe de blake condens condit densiti propag visualvicfknbeneellverecognit technolog method spontan high risk front al dynam non verbal father infant interact affectal linguist employ complex commun engag social repair interactsoc open saintal recogn autist deviant behavior long diagnosi take account interact comput one saintal interact cross road emot cognit systemat review one al home video detect may help studi interact becom autiste ibap induct one level decis machin learn'),

Document(page\_content='languag evid normal autism asperg syndrom visual cognit vol deer autism research institut report develop autism educ rehabilit industri china hous facial autism facial facial express recognit base depth learn southeast universresearch face express recognit base kernel universresearch progress etiolog treatment autism scienc life scienc volargument basic cognit emot vol research facial express recognit method base featur fusion univers lideep facial express recognit survey preprintx summari research facial express recognit autist modern special educ voljjextend complet action unit emot express comput societati confer comput vision pattern recognit commun without commun theori volb research implement real time face express recognit method inform technolog vol organh classif mental clinic diagnost world health organ genevadiagnost statist manual mental encyclopedia psycholog volz dingcomput facial express recognit train improv facial express recognit abil autist tech horizon vol singhnandi'),

Document(page\_content='progress earli detect treatment autism developkj smithcarpentg atyp control via comput vision analysi autism spectrum disordg hill spencerl affect young autist journal abnorm child psychologg potenti digit behavior measur transform detect autism spectrum disord jama pediattrkjj earli social attent autism social joint attent attent development psycholog de lawf dingj intern confer automat face gestur recognittwo way street automat emot moral journal experiment child eggerlj carpentlkaumat emot attent analysi young home autism feasibl studi digit medicinreveal new york timeface basic appli stud spontan express facial action new york univers presshlnposit affect infant autism journal abnorm child psychologc random sampl paradigm model imag analysi cartographi machinerideceit facial express role poker face child depend person detector psychologljoint initi without posit affect risk group journal developmentlordautism diagnost observ schedul diagnost valid journal autism develop mental'),

Document(page\_content='autism development morganself regul affect express play autism syndrom short term longitudin studi journal developmentggoldtrace tempor autism spectrum diagnosi sever measur diagnost observ schedul systemat meta analysi onecarpentlborgg comput vision analysi atyp attent autism autismcarpentljg use digit autism follow improv qualiti screen autism pediattrhalln swain techali whitegroup facial emot express autism evid machin cation behavior therapi changc linj librari support vector intellig technologjvjpreval autism spectrum disord among chil age autism development network unitdyadic triadic infanc later social respons



autist disord journal autism carpent al digit behavioryoungp earli autist disord video analysi journal autism developmentearli develop joint attent autist disord parent interview journal developmentreduc facial muscl move autism evid dysfunct pathway brain cognitr quarter centuri progress earli detect treatment autism developkj smithcarpentg atyp control via comput vision'),

Document(page\_content='interact autism spectrum disord convolut neural network robot reason model statist shape model research child robot interact provid necessari interact child devic take account fundament child physic condit child mental health robot rat interest intervent faster signific gain therapeut intervent tradit disord peopl birth found earli es ram feder period suffer exhibit persist social commun social interact repetit behavior may age although reliabl diagnosi age accord accord use comput vision analyz child video summar help reduc delay diagnosi provid access earli therapeut addit base intervent transform tradit diagnosi devic systemat elicit child exhibit first assist make diagnosi base primarili open loop remot howev unabl perform autonom feedback enhanc interact content courtesi springer natur use appli reserv nevertheless differ abl modifi behavior robot accord environment child respons close loop artifici cognit offer technolog support flexibl potenti naturalist interact fact literatur')]

Model output: {'output\_text': 'The duration of active social engagement was positively correlated with the social commun factor score, language factor score, and the total csb dp score. Frequency of eye contact was positively correlated with the social commun factor score, the language factor score, and the total csb dp score.'}

**Query6:** How can cross country trials help in development of Machine learning based Multimodal solutions

Top 5 searches: [Document(page\_content='train framework comparison model linear kernel train data split\_deep learn model well vanilla singl eightpeer review figur structur joint optim model auto ae bidirect long short term memori perform evalu perform method five fold cross valid averag averag proport distribut five estim utter data five valid model tabl use train model selecttest ae joint model classif stage one utter frame wise method outputclass indic averag class indic utter consid child utter score convent well unweight averag recalweight averag recal war chosen emot challeng consid class experi model low precis extrem toward class er ae model consider qualiti ae model margin improv correctli select degrad qualiti toward tabl classif support vector machin selectae ae accuraci precis recal score unweight averag recal figur structur joint optim model auto ae bidirect long short term memori perform evalu perform method fold cross valid averag averag proport distribut gener estim utter data valid model tabl use train model'),

Document(page\_content='cross valid averag averag proport distribut gener estim utter data valid model tabl use train model select ae joint model cation stage one utter frame wise method output convert class indic averag class indic utter consid child utter score convent well unweight averag recal weight averag recal war chosen emot challeng consid class experi model low precis extrem toward class er ae model consider qualiti ae model margin improv correctli select degrad qualiti toward tabl cation support vector machin select ae ae accuraci precis recal score unweight averag recal discuss vanilla model discrimin well month old sort distinct distribut select three fold cross valid method howev di data distribut achiev featur select test cation featur set herein applic ident model structur adopt featur domain allow indirectli compar data stochast neighbor analysi train data set squeez data dimens base machin learn algorithm figur



data distribut two dimension scatter plot almost ident distribut except amount'),

Document(page\_content='model base diagnosi uncertain figur two dimension scatter plotc ae stochast neighbor overall perform compar low gener cation account subject complex limit shortag data jointli model impli possibl deep learn base featur extract improv diagnosi restrict paper possibl auto base featur extract joint optim method detect earli development condit dispers data set cation rel poor comparison gener cation base deep learn although investig use limit number unbalanc data set auto base featur extract joint optim method reveal possibl featur dimens slight improv model base diagnosi uncertain futur work focu increas reliabl method addit number speech data acoust auto featur extract better date model research also extend age speak sever case investig linguist well acoust done paper addit detect research appli detect develop author content manuscriptkresearch idea framework studibj provid discussagl data collect read agre version manuscript work institut inform technolog evalu grant fund govern develop'))]

Model output: {'output\_text': 'The provided context does not mention anything about cross country helping develop machine learning based multimodal, so I cannot answer this question from the provided context.'}

#### Query7: How early infants cry can help in the early detection of Autism

Top 5 searches: [Document(page\_content='research machin learn approach earli detect autism combin questionnair home video screen abba gloveralto ca pediater univers ca data scienc univers ca correspond alto ca receiv march editori decis march accept abstract background screen earli detect autism expens cumbersom time intens sometim fall short predict valu work sought appli machin learn clinic data across risk autism spectrum disord creat alow cost quick easi appli autism screen tool two train identifi autism one base short structur parent key short semi structur home binat algorithm use combin singl assess higher accuraci come scarciti sparsiti imbal train data appli novel featur select featur allow inconclus determin appropri boost screen accuraci conclus perform center clinic studi ascertain perform combin demonstr cant accuraci improv standard screen ing sensit citi conclus suggest mobil machin learn process reliabl method detect autism outsid clinic varietati confound clinic analysi final statist limit bene fu clinic extend'),

Document(page\_content='multimod social interact synchroni could predict autism spectrum disord id follow id best machin learn accuraci accuraci best distinguish includ combin infant combin synchroni vocal data indic behavior interact abl predict id high risk introduct behavior interact promis domain affect ore psychiatr regard child psychiatri mani identifi reliabl mental high riskg sib autism year life recommend earli howev social cult identifi young addit explor qualiti dynam earli complex endeavor percept integr social understand synchron proceed turn take affect possibl analyz interact sever multimod natur dynam date semin appli social signal mother infant withoutcondit speech turng al head hand movement facial west syndrom rare encephalopathi earli onset age year high risk one third show later autism spectrum disord intellectu disabl id typic particip standard earli mother infant author open access articl licens creativ common attribut licens use adapt distribut reproduct medium format long give'),

Document(page\_content='longitudin studi elev lower risk autism spectrum disord older sibl known famili histori autism video infant rate system autism web base applic togeth forc choic video similar child rate rate age split half test retest reliabl converg discrimin valid sensit specif neg posit predict valu concurr month diagnos satisfactori reliabl converg discrimin valid significantli lower ultim typic develop age age well studi initi step develop novel video base approach detect infanc psychometr promis use older affect child still must test commun famili histori replic

low burden web base format potenti reduc limit access screen autism screen  
infanc social develop correspond salli mind institut health street ca  
public access author manuscriptchild psychiatri author manuscript avail  
final formchild psychiatri author manuscript author manuscript author  
manuscript author development cours autism spectrum disord onset first  
three life later receiv diagnosi typic develop emerg second birthday gammer  
al al'),

Document(page\_content='interact autism spectrum disord convolut neural  
network robot reason model statist shape model research child robot  
interact provid necessari interact child devic take account fundament child  
physic condit child mental health robot rat interest intervent faster  
signific gain therapist intervent tradit disord peopl birth found earli es  
ram feder period suffer exhibit persist social commun social interact  
repetit behavior may age although reliabl diagnosi age accord accord use  
comput vision analyz child video summar help reduc delay diagnosi provid  
access earli therapist addit base intervent transform tradit diagnosi devic  
systemat elicit child exhibit first assist make diagnosi base primarili  
open loop remot howev unabl perform autonom feedback enhanc interact  
content courtesi springer natur use appli reserv nevertheless differ abl  
modifi behavior robot accord environment child respons close loop artifici  
cognit offer technolog support flexibl potenti naturalist interact fact  
literatur'),

Document(page\_content='mother infant interact affectal development hand  
typic risk development observ studi year life frontal take account infant  
engag emot earli may help determin risk autism intellectu disabl west  
syndrom child psychiatribrunetr vi de de la premier lordrutter autism  
diagnost interview version diagnost interview pervas devautism devrrk  
toward object cation childhood autism childhood autism rate scaleautism  
devbcolor base particl joint detect multipl acoust speech signal pa huede  
mont pour non lin air un bruit laneunehe de blake condens condit densiti  
propag visualvicfknbeneellverecognit technolog method spontan high risk  
front al dynam non verbal father infant interact affectal linguist employ  
complex commun engag social repair interactsoc open saintal recogn autist  
deviant behavior long diagnosi take account interact comput one saintal  
interact cross road emot cognit systemat review one al home video detect  
may help studi interact becom autiste ibap induct one level decis machin  
learn']]

Model output: {'output\_text': 'This study found that computer vision  
analysis of facial movement expression via tablet-based assessment can  
detect differences in affect expression, one of the early core features of  
ASD.'}]

**Query8:** What are various methods to detect Atypical Pattern of Facial  
expression in Children

Top 5 searches: [Document(page\_content='al automat track facial child face  
de la al head rel camera optim rotat canon face model visibl tag assign  
face drastic yaw center acknowledg current method use whether child toward  
stimulu track eye visibl frame probabl three standard facial posit  
neutralactiv facial figur exampl movi stimuli development appropri mechan  
bunni anim split screen show woman sing nurseri one side dynam nois side  
carpent al digit behavior unit assign al model express extens pose invari  
cross modal dictionari learn approach origin al train represent setup map  
facial abl infer discrimin facial inform facial recognit even facial avail  
deploy train data bing univers facial express yin sun wang use along see al  
synthesi extract imag subset facial use facial learn robust dictionari  
lastli discrimin facial support vector machin chang lin train differ facial  
recent progress automat facial express analysi al thrasher chow addit

algorithm expert human rater facial affect subsampl video record across non non sampl'),

Document(page\_content='elicit pattern behavior toward therapist begin  
intervent transit therapist robot mediat end contrast toward therapist  
transit fact clear differ behavior pattern task protocol fact pattern use  
evid improv diagnosi work robot tool assist enhanc tradit practic diagnosi  
design framework vision system analysi nonverb addit platform upon open  
sourc research state art innov flexibl scalabl architectur capabl automat  
regist joint attent visual contact robot base mediat well pattern behavior  
relat comfort discomfort along intervent addit artifici vision pipelin base  
camera approach vision system face detect recognit landmark detect head  
pose gaze estim visual focu attent perform consid suitabl use convent  
intervent least one camera child face sampl frame furthermor feedback  
inform child perform success use modul behavior improv perform visual  
attent regard estim algorithm abl estim target differ recurr also robot abl  
react accord estim howev algorithm occlus child hand occlus therapist  
robot'),

Document(page\_content='child current lyg duction eye gaze posit facial  
emot increas neg emot de episode relev also reason generdisappear social  
eye contact show still face two often use research randomli order past  
basic use method explor earli childhood social reason studi chosen present  
studi om child stop interact neutral face setup experiment infant engag  
phase al de ne protest behavior infant facialinfant upset cri arch bodi  
escap anger non social smile infant mother toward eye contact  
infantdirectli mother face instead look thfant mother initi smile ting  
smile mother infant immedi smile smile activ social engag infant happi  
facial clear smile occasion coo activ laugh babbl mother initi infant posit  
respons interact mother observ behavior observ record train graduat durat  
durat measur unit total randomli select determinfound high consist protest  
behavior non social smile eye contact social smile engag respect figur  
pediatr june volum articl al earli screen high risk tabl comparison gener  
group group'),

Document(page\_content='languag evid normal autism asperg syndrom visual  
cognit vol deer autism research institut report develop autism educ  
rehabilit industri china hous facial autism facial facial express recognit  
base depth learn southeast universresearch face express recognit base  
kernel universresearch progress etiolog treatment autism scienc life scienc  
volargument basic cognit emot vol research facial express recognit method  
base featur fusion univers lideep facial express recognit survey preprintx  
summari research facial express recognit autist modern special educ  
voljjextend complet action unit emot express comput societi confer comput  
vision pattern recognit commun without commun theori volb research  
implement real time face express recognit method inform technolog vol  
organh classif mental clinic diagnost world health organ genevadiagnost  
statist manual mental encyclopedia psycholog volz dingcomput facial express  
recognit train improv facial express recognit abil autist tech horizon vol  
singhnandi'),

Document(page\_content='progress earli detect treatment autism developkj  
smithcarpentg atyp control via comput vision analysi autism spectrum  
disordg hill spencerl affect young autist journal abnorm child psychologg  
potenti digit behavior measur transform detect autism spectrum disord jama  
pediatrjkjj earli social attent autism social joint attent attent  
development psycholog de lawf dingj intern confer automat face gestur  
recognittwo way street automat emot moral journal experiment child eggerlj  
carpentlkaumat emot attent analysi young home autism feasibl studi digit  
medicinreveal new york timeface basic appli stud spontan express facial  
action new york univers pressshlnposit affect infant autism journal abnorm  
child psychologc random sampl paradigm model imag analysi cartographi  
machinerideceit facial express role poker face child depend person detector  
psychologljoint initi without posit affect risk group journal

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developmentlordautism diagnost observ schedul diagnost valid journal autism  
develop mental')]
```

```
Model output: {'output_text': 'The various methods used to detect atypical  
patterns of facial expression in children include:\n\n- Computer vision  
analysis (CVA)\n- Automatic detection and tracking of facial landmarks\n-  
Estimation of head position\n- Facial expression positivity\n- Neutral  
expression'}
```

**Query9: What kind of facial expressions can be used to detect Autism Disorder in children**

Top 5 searches: [Document(page\_content='standard facial express studi  
recognit differ emot autist found autist better recognit basic facial happi  
rel complex facial surpris recognit difficult recogn present main diagnost  
criteria autism autism child behavior scale autism rate scale behavior  
scale wang consult larg number investig actual situat hospit hospit mainli  
fill fill fill diagnos autism detail review test three scale scale contain  
test judg autism facial scale seventh item inexplic laughter tenth item  
look face eye contact relat express scale seventh item non commun smile  
seventeenth item respond peopl facial twentieth item activ avoid eye  
contact fifteen scale third emot respons pleasur unhappi interest express  
facial express postur scale basic includ autism detect facial show diagnosi  
autism accur facial progress artifici intellig technolog facial express  
recognit technolog object effect reflect mental health use earli diagnosi  
autism al also matern child health hospit hospit medic center mani time  
actual check'),

Document(page\_content='languag evid normal autism asperg syndrom visual  
cognit vol deer autism research institut report develop autism educ  
rehabilit industri china hous facial autism facial facial express recognit  
base depth learn southeast universresearch face express recognit base  
kernel universresearch progress etiolog treatment autism scienc life scienc  
volargument basic cognit emot vol research facial express recognit method  
base featur fusion univers lideep facial express recognit survey preprintx  
summari research facial express recognit autist modern special educ  
voljjextend complet action unit emot express comput societi confer comput  
vision pattern recognit commun without commun theori volb research  
implement real time face express recognit method inform technolog vol  
organh classif mental clinic diagnost world health organ genevadiagnost  
statist manual mental encyclopedia psycholog volz dingcomput facial express  
recognit train improv facial express recognit abil autist tech horizon vol  
singhnandi'),

Document(page\_content='progress earli detect treatment autism developkj  
smithcarpentg atyp control via comput vision analysi autism spectrum  
disordg hill spencerl affect young autist journal abnorm child psychologg  
potenti digit behavior measur transform detect autism spectrum disord jama  
pediatrkkj earli social attent autism social joint attent attent  
development psycholog de lawf dingj intern confer automat face gestur  
recognittwo way street automat emot moral journal experiment child eggerlj  
carpentlkaumat emot attent analysi young home autism feasibl studi digit  
medicinreveal new york timeface basic appli stud spontan express facial  
action new york univers pressshlnposit affect infant autism journal abnorm  
child psychologc random sampl paradigm model imag analysi cartographi  
machinerideceit facial express role poker face child depend person detector  
psychologljoint initi without posit affect risk group journal  
developmentlordautism diagnost observ schedul diagnost valid journal autism  
develop mental'),

Document(page\_content='autism development morganself regul affect express  
play autism syndrom short term longitudin studi journal  
developmentggoldtrace tempor autism spectrum diagnosi sever measur diagnost

observ schedul systemat meta analysi onecarpentlborgg comput vision analysi atyp attent autism autismcarpentljg use digit autism follow improv qualiti screen autism pediattrhalln swain techali whitegroup facial emot express autism evid machin cation behavior therapi changc linj librari support vector intellig technologjvjpreval autism spectrum disord among chil age autism development network unitdyadic triadic infanc later social respons autist disord journal autism carpent al digit behavioryoungp earli autist disord video analysi journal autism developmentearli develop joint attent autist disord parent interview journal developmentreduc facial muscl move autism evid dysfunct pathway brain cognitr quarter centuri progress earli detect treatment autism developkj smithcarpentg atyp control via comput vision'),

Document(page\_content='sion pattern evid qualiti facial emot al young maestro al daw son restrict rang emot sion integr eye gaze found differenti typic well development age al al al stone core vari age cognit abil languag one stabl earli childhood frequenc neutral express bal kim lord facial affect may show util earli risk recent meta analysi facial express product autism found display facial less often non display facial shorter differ qualiti non frequenc emot facial morgan hill spencer snow lab base al al respons emot fur higher frequenc neutral social impair al chil morgan durat facial affect promis earli risk marker young autism previou research atyp facial chil hand facial time intens often cant train morgan al al al al al al approach scalabl use gen eral risk screen behavior outcom assess use larg clinic eld toward facial one approach chil atyp facial howev technolog wear face data cap yang al invas scalabl recent sever appli non technolog measur affect older within laboratori set hall al al al')]

Model output: {'output\_text': 'The paper uses the latest deep learning technology to improve the accuracy of facial expression recognition, which is better than the previous traditional techniques. The low recognition rate of facial expression in recent years has been improved by the development of artificial intelligence technology. The great improvement in the accuracy of facial expression recognition by convolutional neural networks has greatly improved the accuracy of facial expression recognition.'}

#### Query10: What are methods to detect Autism from home videos

Top 5 searches: [Document(page\_content='research machin learn approach earli detect autism combin questionnair home video screen abba gloveralto ca pediatri univers ca data scienc univers ca correspond alto ca receiv march editori decis march accept abstract background screen earli detect autism expens cumbersom time intens sometim fall short predict valu work sought appli machin learn clinic data across risk autism spectrum disord creat allow cost quick easi appli autism screen tool two train identifi autism one base short structur parent key short semi structur home binat algorithm use combin singl assess higher accuraci come scarciti sparsiti imbal train data appli novel featur select featur allow inconclus determin appropri boost screen accuraci conclus perform center clinic studi ascertain perform combin demonstr cant accuraci improv standard screen ing sensit citi conclus suggest mobil machin learn process reliabl method detect autism outsid clinic varietati confound clinic analysi final statist limit bene fu clinic extend'),

Document(page\_content='al home video detect may help studi interact becom autiste ibap induct one level decis machin learn ninth intern workshopmorgan san ca wanal qualiti interact risk associ year autism outcomchild psychiatric infant dyadic earli commun base screen autism spectrum disord grid one greenal parent versu intervent high risk autism parallel singl blind trial lancet psychiatri purpuraal bilater repetit month old autism spectrum fronthtaeeehassoci autism high risk pilot sibl

samplautism dev morganbarber repetit stereotyp move autism late second year  
lifechild psychiatric repetit month later autism spectrum disordchild  
psychiatrij al longitudin repetit behavior autismchild psychiatric gener  
autism spectrum dileuhprrlrlne motor grasp month old high risk autism child  
deval social commun risk autism gaze follow attent engagautism devlbhtawush  
ugceulface scan typic atyp develop soc affectnwleoeepresent declin month old  
later autism naturururghrkluemhvocal productchild psychiatriekfvrjnlerpr'),

Document(page\_content='longitudin studi elev lower risk autism spectrum  
disord older sibl known famili histori autism video infant rate system  
autism web base applic togeth forc choic video similar child rate rate age  
split half test retest reliabl converg discrimin valid sensit specif neg  
posit predict valu concurr month diagnos satisfactori reliabl converg  
discrimin valid significantli lower ultim typic develop age age well studi  
initi step develop novel video base approach detect infanc psychometr  
promis use older affect child still must test commun famili histori replic  
low burden web base format potenti reduc limit access screen autism screen  
infanc social develop correspond salli mind institut health street ca  
public access author manuscriptchild psychiatri author manuscript avail  
final formchild psychiatri author manuscript author manuscript author  
manuscript author development cours autism spectrum disord onset first  
three life later receiv diagnosi typic develop emerg second birthday gammer  
al al'),

Document(page\_content='spot label sent third binari classifi train  
inconclus perform therefor simpler method rang machin learn output use  
paper inconclus rate model paramet coverag accuraci paper inconclus rate  
variant set video second two method approach autism screen classifi input  
presenc target among inform analyst upon two three minut home semi structur  
taken mobil classifi train item level data two modul preverb modul speech  
correspond clinic diagnosi two decis forest train correspond modul classifi  
robust featur select method allow inconclus made parent classifi model  
independ paramet grid search class use cross valid age label use weight  
balanc relat chang environ train applic especu signific case video minut  
direct observ wherea screen base unsupervis specif expect likelihood  
inconclus unobserv much higher plicat train data assess level frequenc less  
reliabl train data follow help overcom presenc behavior minim potenti bia  
video analyst se veriti symptom short cell phone video featur reliabl  
expens'),

Document(page\_content='mother infant interact affectal development hand  
typic risk development observ studi year life frontal take account infant  
engag emot earli may help determin risk autism intellectu disabl west  
syndrom child psychiatribrunetr vi de de la premier lordrutter autism  
diagnost interview version diagnost interview pervas devautism devrrk  
toward object cation childhood autism childhood autism rate scaleautism  
devbcolor base particl joint detect multipl acoust speech signal pa hue  
mont pour non lin air un bruit laneunehe de blake condens condit densiti  
propag visualvicfknbeneellverecognit technolog method spontan high risk  
front al dynam non verbal father infant interact affectal linguist employ  
complex commun engag social repair interactsoc open saintal recogn autist  
deviant behavior long diagnosi take account interact comput one saintal  
interact cross road emot cognit systemat review one al home video detect  
may help studi interact becom autiste ibap induct one level decis machin  
learn')]

Model output: {'output\_text': 'The study moves beyond verbal descriptions and employs video examples to reduce subject interpretation. Use of videos has shown a dramatic increase in clarity in fields such as music instruction and motor vehicle repair. Recent videos have been incorporated into ASD screening to reduce discrepancies in interpretation of items and provide information common to naturalist standard comparisons.'}

# Query11: What is Still-Face Paradigm in Early Screening for High-Risk Autism Spectrum Disorder

Top 5 searches: [Document(page\_content='research machine learn approach early detect autism combine questionnaire home video screen abba glover alto ca pediatric univers ca data science univers ca correspond alto ca receive march editori decis march accept abstract background screen early detect autism expensive cumbersome time intensive sometimes fall short predict value work sought apply machine learn clinic data across risk autism spectrum disorder create low cost quick easy apply autism screen tool two train identify autism one base short structure parent key short semi structure home based algorithm use combine single assess higher accuracy come scarcity sparsity imbalance train data apply novel feature select feature allow inconclusive determine appropriate boost screen accuracy conclude perform center clinic studies ascertain perform combine demonstrate cannot accuracy improve standard screening sensitivity conclude suggest mobile machine learn process reliable method detect autism outside clinic varieties confound clinic analysis final statistic limit bene fu clinic extend'),

Document(page\_content='owjowkqlv kylww jo omr silolkqlwbzzolgon zokn zo om omyouzn zost lokwom fun mon om zo zockkzokkwn omyou research june pediatric june volume article lori canada correspond receive accept citat risk front still face paradigm early screen high risk autism spectrum disorder china medic engine chinachin china background although autism spectrum disorder current day age age diagnosis still en later order early recent method still face paradigm adopt measure durat non social'),

Document(page\_content='respect figure pediatric june volume article al early screen high risk table comparison gender group group mean group group value sex male female age adapt gross motor fine motor language person social high risk autism spectrum disorder typical develop dev diagnose evaluate group age age group autism diagnosis interview clinic base diagnose criteria group cut diagnosis analytic approach di group group social determine independent test social group age symptom severe rho final early screen machine learn base group group group con met would use veriearly screencant comparison gender group group age adapt language ne motor person social dip see comparison social differ episode statistic cannot di durat frequency eye contact group group di length frequency non social smile protest enseeepisode statistic cannot di durat frequency eye contact active social engage group group di length frequency non social smile protest social smile group group statistic cannot see analysis correlate social factor differ group frequency eye contact posit'),

Document(page\_content='longitudinal study elev lower risk autism spectrum disorder older sibling known family history autism video infant rate system autism web base application together force choice video similar child rate rate age split half test retest reliable converge discriminate valid sensitivity specific negative predict value concurrent month diagnosis satisfactory reliable converge discriminate valid significantly lower ultimate typical develop age age well study initial step develop novel video base approach detect infancy psychometric promise use older affect child still must test common family history replicate low burden web base format potenti reduce limit access screen autism screen infancy social develop correspond salli mind institut health street ca public access author manuscript child psychiatrist author manuscript available final form child psychiatrist author manuscript author manuscript author manuscript author development course autism spectrum disorder onset first three life later receive diagnosis typical develop emerge second birthday gammer al al'),

Document(page\_content='diagnosis still en later order early recent method still face paradigm adopt measure durat non social smile protest behavior eye act social smile active social engage high risk group typical de groupn group follow old con diagnosis machine learn use establish early screen face face interact episode statistic cannot durate eye contact social smile face episode statistic cannot durat frequency eye contact active social engage two group meet criterion group accuracy support vector machine cation episode conclude use



social behavior indic child screen mode use home trial registr clinic trial  
registri high risk autism spectrum disord stillace paradigm social behavior  
machin learn model earli al earli screen high risk introduct autism  
spectrum disord seriou disord earli childhood repetit stereotyp percept  
recent epidemiolog survey data incid preval rate increas china larg number  
shown earli intervent improv patient prognosi howev age diagnosi still even  
later therefor earli detect earli diagnosiintervent essenti')]

```
Model output: {'output_text': "The still face paradigm (SFP) is a behavioral observation method used to assess infant emotion regulation and social expectations in social interactions. It involves three episodes: a baseline episode, a face-to-face interaction episode, and a reunion episode. During the face-to-face interaction episode, the mother is required to present a neutral expression without any response to the child's actions. This causes the child to experience a disruption in social signals, which can lead to the appearance of negative emotions. The SFP has been used in research to study the social and emotional development of infants and children, including those at high risk for autism spectrum disorder (ASD)."}

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Query12: What is West Syndrome?

Top 5 searches: [Document(page\_content='omksolokkqkkgw wo omstz yoq owyo  
omqq st ow zovzломqstzzw omzo owzmovmoomkq owstsow mokk molqkzq  
yokwzoomyouowl soy yonz om wozow lo sokz zoqk lozwzqzzzzqnzkkq sotz  
stfzzkzwowozwk wozwzzwovwkwz wow zo mo wowozwkwkkk wowk wowwowozw  
omyouowgqkomowknjow wokrgzj woz omowkwojom sok owowfj omkqom wonlqnkwonkk  
owzkq ortow yoqowzjfgofwwwozzz om jokgn frok om wo noykzlozomq owzlstzww  
omnfkrwoqomz wokom joznz wo owkomyouq zorw zoufq wo mowzzqggwwqom zonn  
owzjkz owvyof jojlzk omwrqk omznulq omrlllzzq jowr jowllzgkfkfzk zonkwk jog  
zonkwqwgzozzzq owjowkqlv kylww jo omr silolkqlwbzzolgon zokn zo om omyouzn  
zost lokwom fun mon om zo zockkzokkwn omyou research june pediater june  
volum articl lori canada correspond receiv accept citat risk front still  
face paradigm earli screen high risk autism spectrum disord china medic  
engin chinachin china background although autism spectrum disord current di  
age age diagnosi still en later order earli recent method still face  
paradigm adopt measur durat non social'),

[illegible]

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Document(page_content='zokfkqzstnkkowlqwlk wo owkstkkz stkkzzkstjkstk owk  
om yokvom owklo owkzzzzkkk stzkkkzq stjqqkjkzkszst solozv yozqzkzgfjjvkjj ow  
zonjowyon stlokzo stk omk lolk owl stj zo owowq sot omk soyfn owq om zo  
omkjowz loolqksotqzlo zo owl sokkzo ownk zo owz sotom non wo zo ow sot  
owomzfloz ststqkk sokzqz zo owksokqkjjzkl ow zo owfzo owk soynoykzj  
soyzsotwj yost soyqk mokk stkkkq yoy lostsow stj sotstokqwg stj sonkz  
mozkzokoskzlwzwwkzzzozokoswzjwkkkyok jo omzoz om om yozfw zokz  
omlgnijlwoomkjcvk omzwok omvyokq sok yowokow wowoy wok wokz
```

yozoomnyofzkzwwoom jozlowqkzzowo wojowfi zonfzznkkwon yokzom joulq omrlzom  
wo wozlol stwf zoz ut wo nizozkzkok ow yokgq longomomnu goql logko owq  
omomwjzwogzkbsookqnzznz jowgozzzo zowz jozqjnv jokkn woozo jozowqnk sotu  
omk omnmouczz loomqomkzwmomojutkqgn omk ow yowvgzuf omzwwyst wokfzzlrkkquzn  
om quoqzzvf omzogzozksowwq mowfnnwomzmozqgwukr wozzzzjoz yoomwjzkw goowcz  
own zokwzqkwzmozfwig moomq momowfk ow yokf omjogvwkzomkwj moqgfkwozz jo  
omfkrq morz zozz mo mo'),

Document(page\_content='unit data brief vol correspond author wang order  
articl pleas visit contact us autismwyzokoswos os  
zorwoskkqwkqomjmonwnjkfqk sotkowk loom non om zokzyomo sokkfjo owl  
sonkwjzkl om ow yokw om owzqz yol noyk loqqqkk loklwsokfnf omjl sot  
owzkrknzq one open accessznzkz omzfu loson woo zo omk moqzz sonststk  
stqfzzz yontmoomfsotstzyokk son yoznfqqkwowfwkzklomow yoq zoonrz omr  
monwowsowtwl wofzk zofkwokz zoon zo mof yoff sotkmoqlngwokksokz  
mowkzkzqqowwglözq omqn zofk zo omkwjomzo sotyokqkw yokwqk owkmokkgloj jo  
owowkwjzzfkj om owkqzqkkkqkqwnzkq sokkz yonon nonnj lowzfv stqq owkowk  
omwo owzkkjzfzk soloznqkjyovzkstn sokomzo wozkw sonkqz lostnz monk  
yonfqomjstlol zofk owznqvq sokzj stzkkzyok yoyoknjlojstk  
omfloqkzjstqkzzwokq sok omstkyonkkk yonq nonk lorjr omkqwklnz owsowwjkwjzo  
soyz sortzqkwjzo owzzzzzkowqkkflok monf omflkklzfkk ow yonkzzzjqzsot yo  
zowq om sotjnz om ownz om owk zozlkkomkfsoyqz om owqnz omzom ow omom zozoow  
zokjq omkqnoykuwsowq om yokkwoq wofkjrqqom omrfwstllozfjom owzzqjk')]

Model output: {'output\_text': 'West syndrome (WS) is a rare epileptic encephalopathy with early onset before age 1 year and a high risk of neurodevelopmental disorders (NDD) outcomes, including one third of WS children showing later autism spectrum disorder (ASD) and/or intellectual disability (ID).']}

Query13: 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

Top 5 searches: [Document(page\_content='mother infant interact affectal development hand typic risk development observ studi year life frontal take account infant engag emot earli may help determin risk autism intellectu disabl west syndrom child psychiatribrunetr vi de de la premier lordrutter autism diagnost interview version diagnost interview pervas devautism devrrk toward object cation childhood autism childhood autism rate scaleautism devbcolor base particl joint detect multipl acoust speech signal pa huede mont pour non lin air un bruit laneunehe de blake condens condit densiti propag visualvicfknbeneellverecognit technolog method spontan high risk front al dynam non verbal father infant interact affectal linguist employ complex commun engag social repair interactsoc open saintal recogn autist deviant behavior long diagnosi take account interact comput one saintal interact cross road emot cognit systemat review one al home video detect may help studi interact becom autiste ibap induct one level decis machin learn'),

Document(page\_content='depart denecker rue de al translat psychiatri page interest declar con interest publish note springer natur remain neutral regard jurisdict institut supplementari inform paper receiv accept al distinguish se hetero stress behavior prog psychiatric interact behaviour novel method measur mother infant interact video reconstruct psychiatrinehhcnfefacial express infant mother interact pilot studi infanc wanal parent infant interact ion infant risk autism devgre tauen tie year life pilot studi infant start parent intervent symptomatautism devn earli cation autism spectrum brainparent infant synchroni construct time physiolog development riskchild psychiatric interperson synchroni survey evalu across affectsocial signal survey domain imag vib crownl dialogu infanc ted time develop soc child dev al prosodi involv facilit social

interact later develop autism onejhead movement dynam play perturb mother  
infant interact affectal development hand typic risk development observ  
studi year life'),

Document(page\_content='interact autism spectrum disord convolut neural  
network robot reason model statist shape model research child robot  
interact provid necessari interact child devic take account fundament child  
physic condit child mental health robot rat interest intervent faster  
signific gain therapeut intervent tradit disord peopl birth found earli es  
ram feder period suffer exhibit persist social commun social interact  
repetit behavior may age although reliabl diagnosi age accord accord use  
comput vision analyz child video summar help reduc delay diagnosi provid  
access earli therapeut addit base intervent transform tradit diagnosi devic  
systemat elicit child exhibit first assist make diagnosi base primarili  
open loop remot howev unabl perform autonom feedback enhanc interact  
content courtesi springer natur use appli reserv nevertheless differ abl  
modifi behavior robot accord environment child respons close loop artifici  
cognit offer technolog support flexibl potenti naturalist interact fact  
literatur'),

Document(page\_content='speech turn infant mother interact develop sever  
moder id age high risk confus matric cation random interest method addit  
infant cant versu probabl motor impact due acut encephalopathi contribut  
infant audio synchroni much sever believ import synchroni reciproc earli  
line risk year life homeg prospect follow high riskfuhalggeeref prospect  
screen risk autismg ref eld synchroni reciproc parent sensit emot engag  
could prevent earli inter activ viciou es risk tri compens lack interact  
child stimul thereforrcation interact especu use among neurolog development  
earli social predict similarli believ import distinguish one hand hand also  
line import non social investig risk year life exampl home al found bilater  
later develop similarli sever prospect follow high risk retrospect  
homemotor atyp repertoire earli social previous assess comput eye earli  
vocal pro analysi acoust cri none done interact set studi paradigm shift  
infant behavior dyadic assess retrospect aim implement social signal'),

Document(page\_content='multimod social interact synchroni could predict  
autism spectrum disord id follow id best machin learn accuraci accuraci  
best distinguish includ combin infant combin synchroni vocal data indic  
behavior interact abl predict id high risk introduct behavior interact  
promis domain affect ore psychiatr regard child psychiatri mani identifi  
reliabl mental high riskg sib autism year life recommend earli howev social  
cult identifi young addit explor qualiti dynam earli complex endeavor  
percept integr social understand synchron proceed turn take affect possibl  
analyz interact sever multimod natur dynam date semin appli social signal  
mother infant withoutcondit speech turnng al head hand movement facial west  
syndrom rare encephalopathi earli onset age year high risk one third show  
later autism spectrum disord intellectu disabl id typic particip standard  
earli mother infant author open access articl licens creativ common  
attribut licens use adapt distribut reproduct medium format long give']]

Model output: {'output\_text': 'Yes, the study found that multi-modal social  
signal interaction and synchrony in infant-mother interaction at 9 months  
of age could predict the outcome of autism spectrum disorder (ASD) and  
intellectual disability (ID) in high-risk infants with West syndrome  
(WS).'}]