**Detection of Autism Spectrum Disorder Using Eye Tracking**

**Introduction:**

* Early detection of autism in any child could be very helpful for the parents and can control further worsening of autism.
* ASD begins before the age of 3 years and can last throughout a person’s life, although symptoms may improve over time.
* Doctors look at the child’s behavior and development to make a diagnosis.

**Problem Description:**

To classify a child into either autistic or not autistic is challenging because there is no medical diagnosis in the early stage of autism. Diagnosis is done by interacting with the child for at least an hour – a time taking task.

**Literature Survey:**

1. **Virtual Reality Based System for the Screening and Classification of Autism**

***Authors:*** *Marta Robles, Negar Namdarian, Julia Otto, Evelyn Wassiljew,* *Nassir Navab, Christine M. Falter-Wagner, Daniel Roth*

***Year and published by****: 2022 & IEEE Transactions on visualization and computer Graphics*

***Dataset****: Data are collected for creating virtual world.*

***Method:*** *Logistic regression, support vector machine, neural network is used.*

***Result:*** *Classification accuracy is 70% to 75%.*

1. **Identification of Autism Spectrum Disorder via an Eye-Tracking Based Representation Learning Model**

***Authors:*** *Chen Xia, Kexin Chen, Kuan Li, Hongxia Li*

***Year and published by****: 2021 & Published By ACM*

***Dataset****: Dataset is created by studying 31 children with ASD and 43 children with TD.*

***Method:*** *SVM and CNN are used.*

***Result:*** *Classification accuracy is 93%.*

1. **Detecting High-functioning Autism in Adults Using Eye Tracking**

***Authors:*** *Victoria Yaneva , Le An Ha, Sukru Eraslan, Yeliz Yesilada, and Ruslan Mitkov*

***Year and published by****: 2020 & IEEE Transactions on Neural Systems and Rehabilitation Engineering*

***Dataset****: Dataset is created by conducting several experiments.*

***Method:*** *Logistic Regression is used*

***Result:*** *Using fMRI, accuracy is 71% to 86%.*

1. **Automatic Identification of High-Risk Autism Spectrum Disorder**

***Authors:*** *Chuangao Tang, Wenming Zheng, Yuan Zong*

***Year and published by****: 2020 & IEEE Transactions on Neural Systems and Rehabilitation Engineering*

***Dataset****: Dataset for face detection is used.*

***Method:*** *Still face of kid is recorded and expressions on face are examined. SVM and KNN is used.*

***Result:*** *Children with high-risk ASD is classified.*

1. **Machine Learning Based Autism Spectrum Disorder Detection from Videos**

***Authors:*** *Chongruo Wu, Sidrah Liaqat, Halil Helvaci, Sen-ching Samson Cheung, Chen-Nee Chuah, Sally Ozonoff, Gregory Young*

***Year and published by****: 2020 & IEEE International Conference on E-health Networking, Application & Services*

***Dataset****: video dataset collected under the Infant Sibling Study.*

***Method:*** *Recursive Feature Elimination (RFE), Ridge Regression (RR), Mutual Information Estimation (MI) and Kolmogorov Smirnov Test (KS)*

***Result:*** *70% accuracy for smile, 68% accuracy for look face, 67% for look object and 53% accuracy for vocalization.*

1. **Diagnosis of autism using an eye tracking system**

***Authors:*** *Natalia I, Daniela Hidalgo, Avid Roman, Michael Power, Robert H Gilman, Mirko Zimic*

***Year and published by****: 2016 & IEEE Global Humanitarian Technology Conference*

***Dataset****: Dataset contains 20 videos; how many children watched the video and how many of them not watched.*

***Method:*** *Basic image processing techniques are used.*

***Result:*** *Video-2 could easily recognise whether autism is there or not in a child.*

**Framework going to be used:**

OpenCV and Keras

**Dataset going to be used:**

Creating a .csv file containing videos and duration of each child watching the video and not watching the video.

**References:**

* Automatic Identification of High-Risk Autism Spectrum Disorder: A Feasibility Study Using Video and Audio Data under the Still-Face Paradigm

*Chuangao Tang, Student Member, IEEE, Wenming Zheng, Senior Member, IEEE, Yuan Zong, Member, IEEE, Nana Qiu, Cheng Lu, Xilei Zhang, Xiaoyan Ke, Cuntai Guan, Fellow, IEEE*

* Detecting High-functioning Autism in Adults Using Eye Tracking and Machine Learning

*Victoria Yaneva , Le An Ha , Sukru Eraslan, Yeliz Yesilada, and Ruslan Mitkov*

* A Virtual Reality Based System for the Screening and Classification of Autism

*Marta Robles, Negar Namdarian, Julia Otto, Evelyn Wassiljew, Nassir Navab Fellow, IEEE, Christine M. Falter-Wagner, Daniel Roth Member, IEEE*

* Machine Learning Based Autism Spectrum Disorder Detection from Videos

*Chongruo Wu, Sidrah Liaqat, Halil Helvaci, Sen-ching Samson Cheung, Chen-Nee Chuah, Sally Ozonoff, Gregory Young*

* https://www.cdc.gov/ncbddd/autism/signs.html#:~:text=Autism%20spectrum%20disorder%20(ASD)%20is,%2C%20moving%2C%20or%20paying%20attention.
* Screening Early Children with Autism Spectrum Disorder via Expressing Needs with Index Finger Pointing

*Zhiyong Wang, Kai Xu, China Honghai Liu*

* Identification of Autism Spectrum Disorder via an Eye-Tracking Based Representation Learning Model

*Chen Xia, Kexin Chen, Kuan, Hongxia Li*

* Visual processing of social stimuli in children with autism spectrum disorder

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