

Eye-Tracking Dataset to Support the Research on Autism Spectrum Disorder

Federica Cilia, Romuald Carette, Mahmoud Elbattah, Jean-Luc Guérin, Gilles Dequen
Laboratoire MIS

Université de Picardie Jules Verne (UPJV), France

mahmoud.elbattah@u-picardie.fr

About our University



Université de Picardie Jules Verne, France

Laboratoire Modélisation, Information, Système
(MIS Lab)



About Jules Verne

- Jules Verne (8 February 1828 – 24 March 1905) was a French novelist, poet, and playwright.
- Famous for the Journey to the Center of the Earth.



Jules Verne,
French Novelist



Maison de Jules
Verne, Amiens,
France



Journey to the Center
of the Earth, 2008

Sources of Images:

https://en.wikipedia.org/wiki/Jules_Verne

https://fr.wikipedia.org/wiki/Maison_de_Jules_Verne

[https://en.wikipedia.org/wiki/Journey_to_the_Center_of_the_Earth_\(2008_theatrical_film\)](https://en.wikipedia.org/wiki/Journey_to_the_Center_of_the_Earth_(2008_theatrical_film))

Background: Autism Spectrum Disorder

- Autism Spectrum Disorder (ASD) is a pervasive developmental disorder characterised by a set of impairments including social communication problems.¹
- ASD has been considered to affect about 1% of the world's population (US Dep. of Health, 2018).²
- The hallmark of autism is an impairment of the ability to make and maintain eye contact.³

¹ L. Wing, and J. Gould, "Severe Impairments of Social Interaction and Associated Abnormalities in Children: Epidemiology and Classification". *Journal of Autism and Developmental Disorders*, 9(1), pp.11-29, 1979.

² U.S. Department of Health & Human Services. Data and statistics | autism spectrum disorder (asd) | ncbddd | cdc, 2018. URL: <https://www.cdc.gov/ncbddd/autism/data.html>.

³ Coonrod, E. E. and Stone, W. L. (2004). Early concerns of parents of children with autistic and nonautistic disorders. *Infants & Young Children*, 17(3), 258–268.

Background: Eye-Tracking Technology

Screen-based eye trackers



Glasses

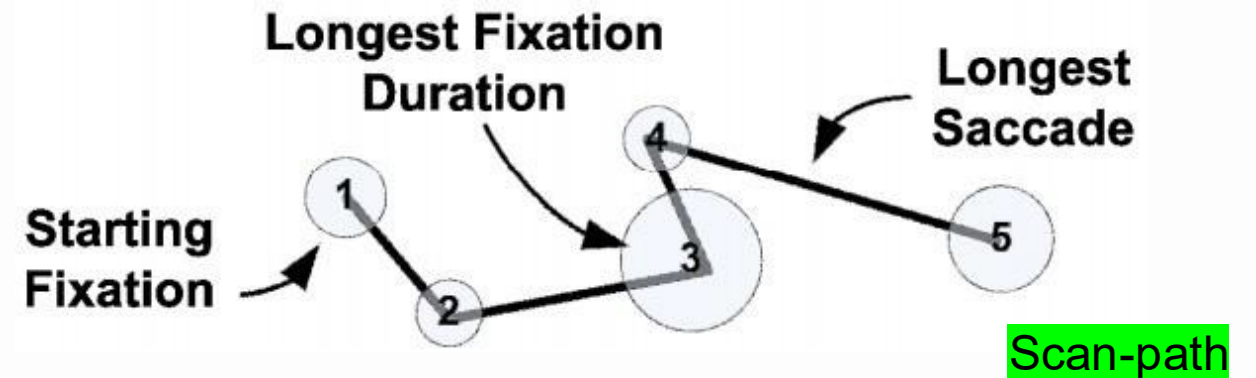


Image Source: <https://imotions.com/blog/eye-tracking/>

J.H. Goldberg, and J.I. Helfman, "Visual scanpath representation", In Proceedings of the 2010 Symposium on Eye-Tracking Research & Applications, ACM, 2010, pp. 203-210.

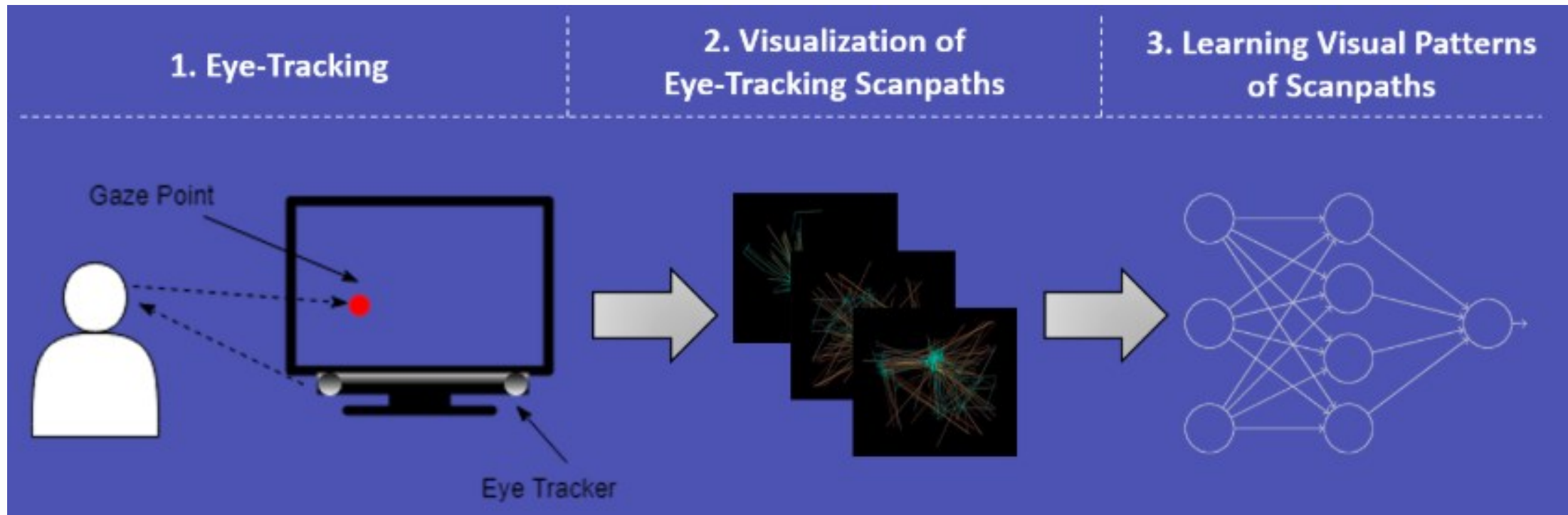
Key Motivation

- Understanding the behaviour of gaze movement related to autism.
- Detecting ASD-diagnosed individuals in eye-tracking data.

Data Description

Number of Participants (ASD, TD)	59 (29, 30)
Gender Distribution (M, F)	38 (\approx 64%), 21 (\approx 36%)
Age (Mean, Median) years	7.88, 8.1
CARS Score (Mean, Median)	32.97, 34.50
Eye-Tracking Experiments	25

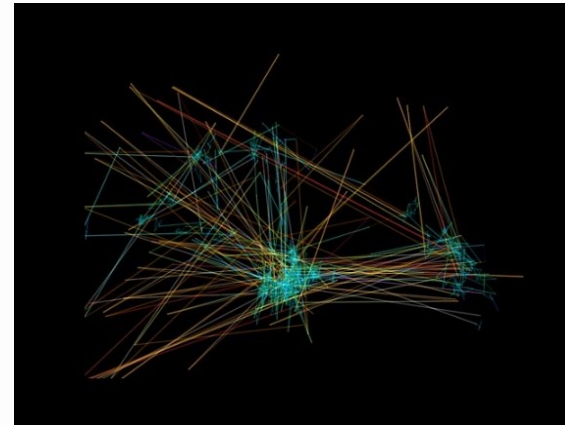
Our Earlier Work (HEALTHINF 2019, EMBC 2019, HEALTHINF 2022)



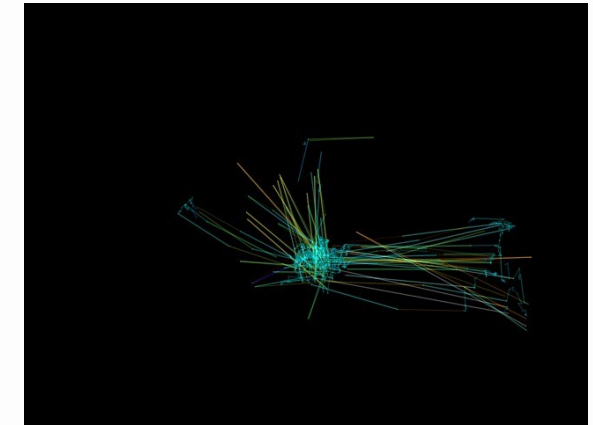
Carette, R., Elbattah, M., Cilia, F., Dequen, G., Guérin, J., & Bosche, J. (2019). Learning to predict autism spectrum disorder based on the visual patterns of eye-tracking scanpaths. *In Proceedings of the 12th International Conference on Health Informatics (HEALTHINF)*.

Image Dataset (Published Earlier)

- 547 images: 328 (Non-ASD), 219 (ASD)
- Image dimensions: 640x480



ASD



Non-ASD

Dataset Usage

- Raw and image datasets shared on Figshare:
 - https://figshare.com/articles/dataset/Visualization_of_Eye-Tracking_Scanpaths_in_Autism_Spectrum_Disorder_Image_Dataset/7073087
 - https://figshare.com/articles/dataset/Eye-Tracking_Dataset_to_Support_the_Research_on_Autism_Spectrum_Disorder/20113592

Possible Directions Using the Dataset

- Developing predictive models to detect ASD in eye-tracking data.
- Exploring interesting patterns or characteristics using unsupervised learning.
- The key challenge is about finding a suitable representation for ML with the high dimensional eye-tracking data.

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- Fonds Européen de Développement Régional (FEDER).
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Thank You!
