



# EyeTism

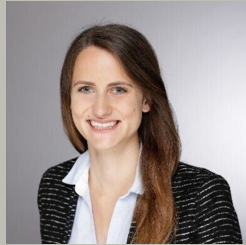
Eye Movement Based  
Autism Diagnostics

Elena Ockfen  
Adam Zabicki  
Stefan Schlögl  
Mariano Santoro  
Dennis Dombrovskij

# The EyeTism Team



**Mariano Santoro**  
Biologist  
(Microbiology)



**Elena Ockfen**  
Biologist  
(Immuno-Oncology)



**Adam Zabicki**  
Movement Science /  
Neuroscience



**Stefan Schlögl**  
M. Sc. IT & Digital  
Marketing Expert



**Dennis Dombrovskij**  
Biologist  
(Molecular Biology)

# Autism Spectrum Disorder (ASD)

## Developmental disability

### Symptoms:

- difficulties in social interaction and communication
- repetitive and restrictive behaviour
- atypical sensory processing
- special interests



# Early diagnosis of ASD is crucial

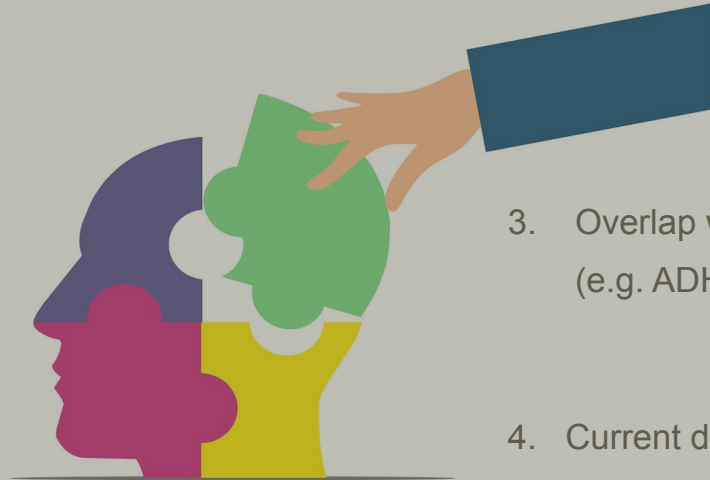
- Early behavioral and speech therapy can improve child's development
- Brain is more responsive to intervention in early childhood
- Support to families



# What makes diagnosis of ASD difficult?

1. Symptoms are heterogenous:  
different in each individual

2. Children develop coping  
mechanism and mask symptoms



3. Overlap with other conditions  
(e.g. ADHD, anxiety disorders, depression)

4. Current diagnostic tools  
difficult to interpret

# Eye-movement- based diagnosis: a new diagnostic tool

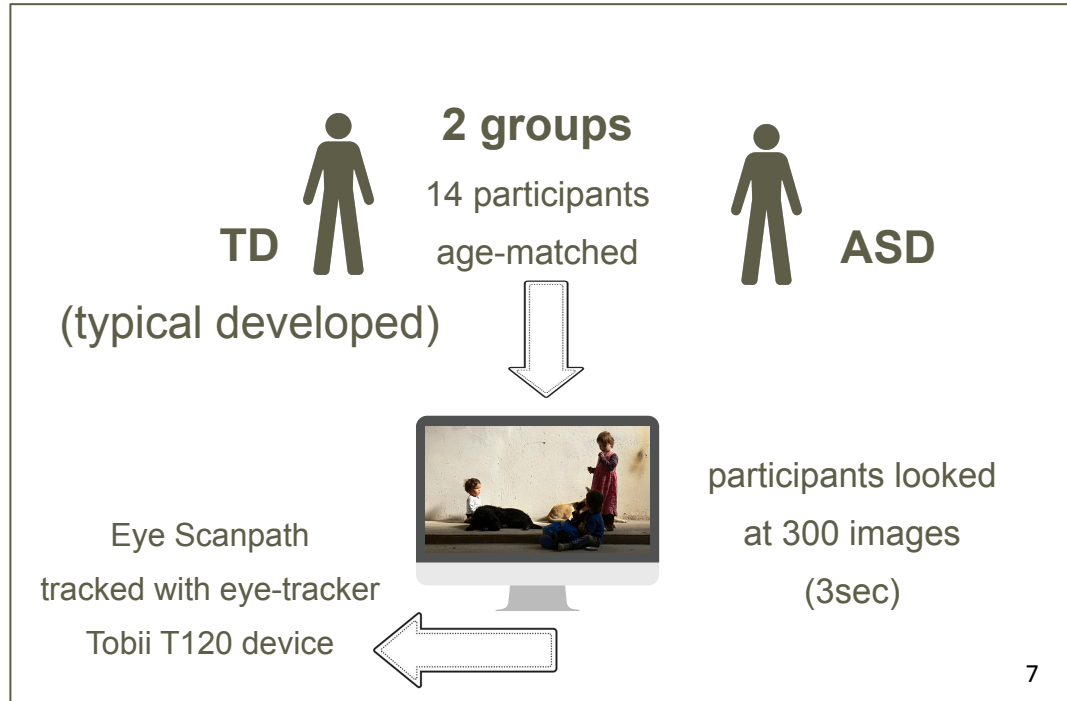


**Machine learning model to predict if children have ASD  
based on eye-tracking data**



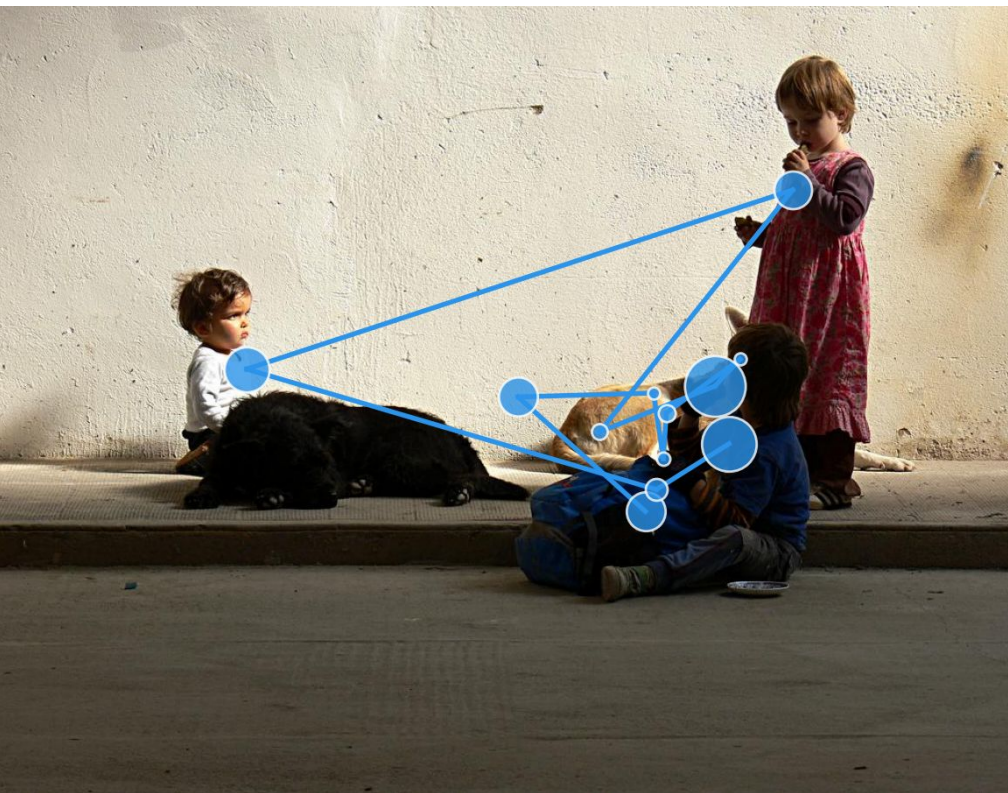
- easy-to-interpret diagnostic tool
- will speed-up diagnosis process
- allows pediatricians to provide early diagnosis to their patients and to ensure early treatment start

# Eye-movement- based diagnosis: a new diagnostic tool





# Dataset and Features

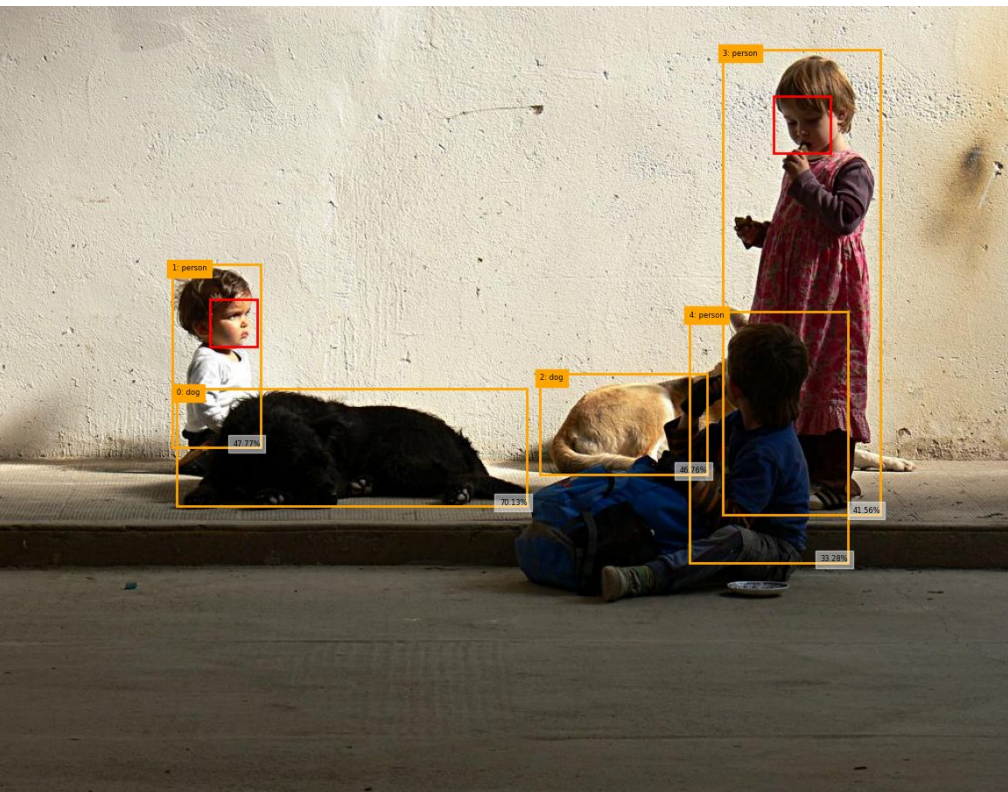


**Scanpath  
features**

*location & duration  
of  
fixations & saccades*



# Dataset and Features



Scanpath  
features

*location & duration  
of  
fixations & saccades*

**Object & Face  
recognition**

*how often & how long  
on  
faces & objects*

# Dataset and Features



**Scanpath  
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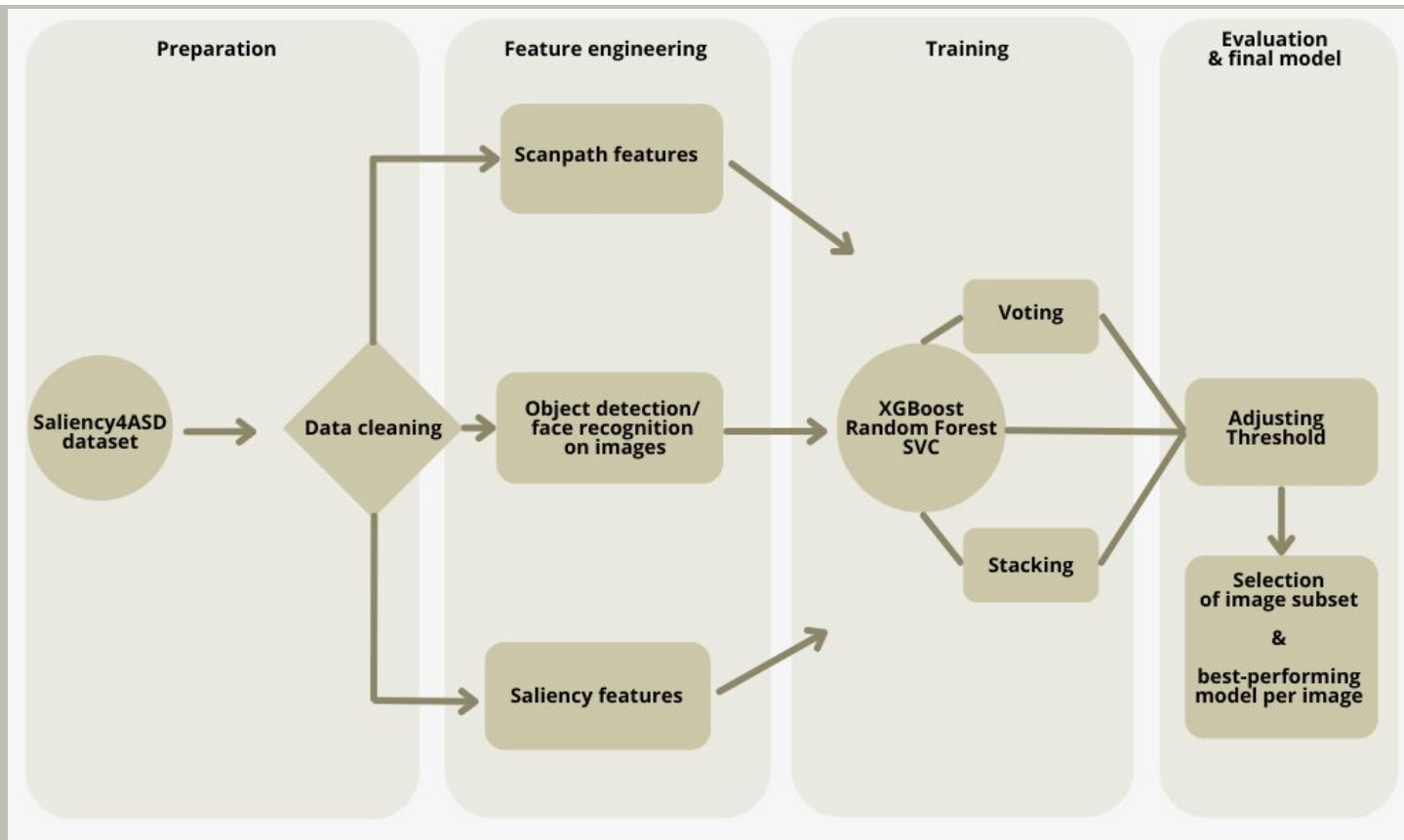
**Object & Face  
recognition**

*how often & how long  
on  
faces & objects*

**Saliency  
features**

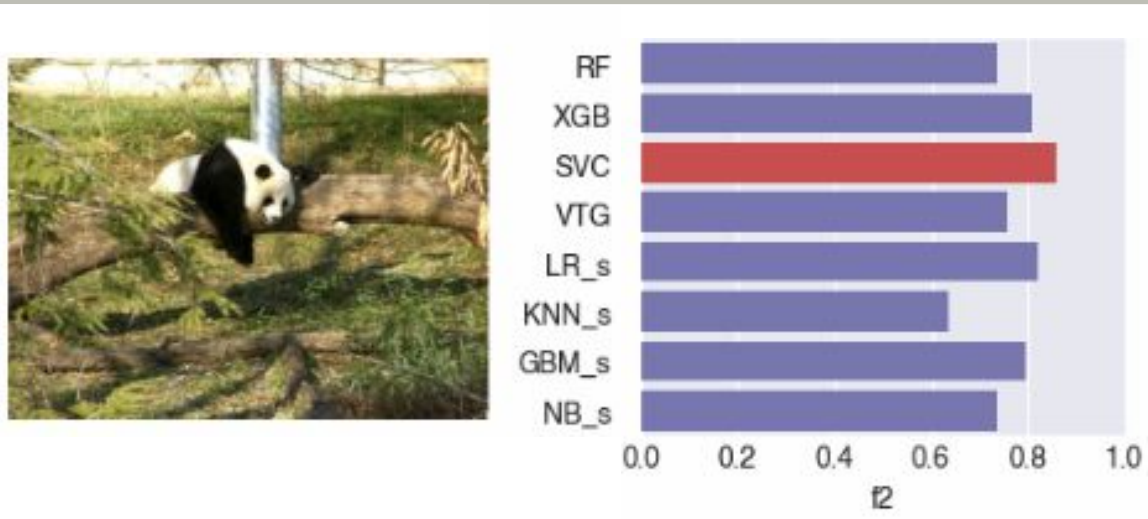
*comparing behaviour  
with  
saliency predictions*

# Roadmap to the final model



# Model performance dependent on objects

- e.g. SVC performs better on animals, but XGB better on vehicles



# Results

**Medical diagnosis requires:**

- correct identification of all ASD indications (=Recall)
- but not being too arbitrary (=Precision)

**F-2 score:**

**90,5%**

combines precision and recall



# Final product: web application





# Vision

- Implement diagnostic tool with our selected and standardized subset of images to efficiently distinguish between TD and ASD
- Collect more participants and data to further validate the model(s)
- In our tool: prediction of TD and ASD is made by the most powerful model per picture category (e.g. animals, vehicles, human ...)
- Prediction of ASD severity via regression models



# Thank you!

