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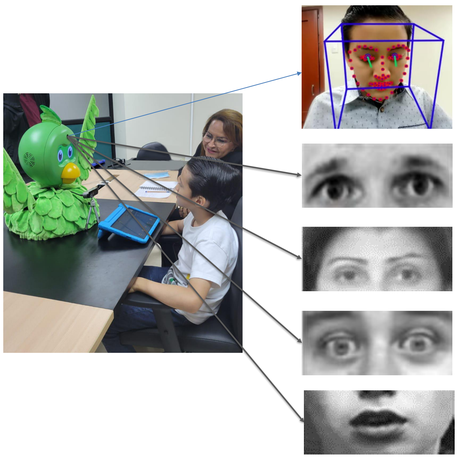
Advanced metrics to evaluate autistic children's attention and emotions from facial characteristics using a human robot-game interface.

PROBLEM

Several studies have discussed how to support children with autism spectrum disorder (ASD) using technological resources and the difficulties in their social interaction and non-verbal communication. In recent years, some authors have explained that a way to treat ASD syndrome has been through robot-assisted therapy such as the Loly-MIDI project, expecting to capture their attention and measure it.



GENERAL OBJECTIVE

The objective of this work focuses on analyzing the results of the designed metrics to quantitively evaluate attention and emotions degree of children with ASD from images captured in a social robot, developed in the Loly-MIDI project, expecting to obtain a higher level of accuracy for these metrics.

PROPOSAL

A quantitative and experimental methodology was applied to determine improvements in the metrics developed in the Loly-MIDI project. Three phases were applied:

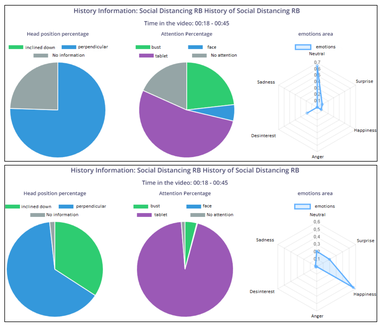
Phase 1: Setting parameters → Comparison between graphs of the dashboard with the information observed in the videos, respecting the division of time the graphs handle, to detect possible differences between two recording position (forehead and chest camera) expecting to evaluate improvements or adjustments in the metrics that can be corrected.

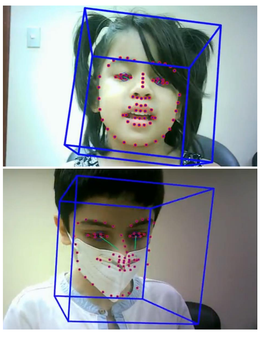
Phase 2: Parameter validation → To validate the metric accuracy using OpenFace with Facial action Unit (FACS), several human-robot interaction tests were carried out with people using the LOLY robot and recreating the procedure described in Phase 1.

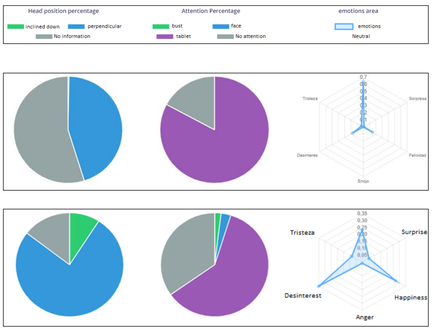
Phase 3: Field tests → After testing with test subjects and correcting the metrics, field tests were undertaken with children, considering the authorization of their representatives, and following the same procedure, except for the analysis by time segments.

RESULTS

Phase 1: Setting parameters → **Phase 2: Parameter validation** → **Phase 3: Field tests**







CONCLUSIONS

In this study, several techniques to evaluate attention and emotions of children with ASD using computer vision algorithms have been explored. The study started from observing several videos made to test users interacting with the robot Loly and playing on the tablet. From them, the effectiveness of the metrics applying OpenFace with FACS when making a detection were measured, with the aim to correct attention and the level of person's emotions parameters, for reaching better accuracy in the position of the head more than to the chest, and subsequently correct the errors exposed considering the results obtaining from the tests carry out with children.