

Plan Overview

A Data Management Plan created using DMPTool-Stage

Title: Computer aid system for the diagnosis of psychiatric disorders based on facial anthropometric measurements

Creator: Ariane Machado Lima

Affiliation: Universidade de São Paulo (www5.usp.br)

Principal Investigator: Ariane Machado Lima

Data Manager: Ariane Machado Lima

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Project abstract:

Neurodevelopmental disorders are psychiatric disorders, usually multifactorial, that are triggered during the neurodevelopment. Evidence shows that this fact also causes facial alterations in relation to a control group. Such alterations can be used to build a system to aid in the diagnosis of such disorders based on facial anthropometric measurements. Such a system would have the advantage of assisting early diagnosis, since the traditional diagnosis is based on information about the child's behavior, which generally postpones the diagnosis to school age. However, due to the characteristics of cerebral neuroplasticity, the earlier the diagnosis and the beginning of interventions, the greater the effectiveness of the treatment for improving the child's quality of life. Preliminary results from our pilot project indicated 80% accuracy in identifying autism versus control. In this pilot, the images were captured by a semi-professional camera and using a reference object to normalize the images. A user of the current system should follow a detailed protocol for capturing the photograph (including achieving a frontal pose and neutral facial expression image), download the image file on a computer and run the classification program. Such a procedure is very tiresome in the clinical practice. In this project we propose the evolution of the system in two aspects: 1) inclusion of other neurodevelopmental disorders, considering that the same child may have more than one disorder and 2) simplification of the system usage. For this second aspect we intend to develop a smartphone application with which the user can scan the child's face and, when the application identifies a suitable image in terms of image quality and pose, captures the photograph, performs the processing and presents the result. Therefore, in this project we will collect images with a semi-professional camera and smartphones to compare the results.

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Computer aid system for the diagnosis of psychiatric disorders based on facial anthropometric measurements - Description of Data and Metadata produced by the project

Photographs of children and adolescents with psychiatric disorders and controls will be collected. The individual should be in a frontal position with facial expression as neutral as possible. In addition, diagnostic scales will be completed through interviews with the children's guardians, applied by health professionals, for diagnosis assignment.

The collection will be carried out at the Institute of Psychiatry (School of Medicine, University of Sao Paulo) throughout the duration of the project, with the expectation of reaching around 200 children or more.

The photographs will be captured in order to guarantee a good image resolution. The child must have an identification (a tag with an identification number) that is as close as possible to his face, so that it can appear in the photograph.

The capture of images by the semi-professional camera will follow this protocol:

- The chair must be leaning against the wall (white background) below a light source.
- Just above the chair, a red stripe of width = 50 cm and height = 5 cm should be positioned (to be used in image normalization according to the old protocol, which will be compared with the new standard-independent standardization protocol - see research project). The stripe should be close to the child's head in order to fit the stripe and child's face into the photograph but also make visible the white wall between the child's head and the red stripe. The strip must be positioned straight, that is, the two lower corners must be positioned at the same height from the floor.
- The camera must be attached to a tripod positioned 1 meter from the chair.
- The camera must be used without a flash, in SCENE mode (in the case of the machine used - Nikon B500).
- Adjust the height of the camera (with the tripod handle) if necessary for the correct framing of the photograph (detailed in the protocol provided to the researchers). The zoom must be adjusted (procedure necessary only in the first photograph of the day, but it must be ensured that it is correct in the others, as per the guidelines below) to achieve the following framing described in the protocol.

The capture of good-quality images by the smartphone is part of the research project, since the smartphone application should analyze the image online and only capture the photograph when the image quality is adequate, both in terms of image resolution, lighting, contrast as to pose (frontal position and neutral facial expression).

Digital images, patient data relevant to the project as well as the results of the scales and the diagnosis given by a specialist will be stored in a relational database, in its final stage of development, ensuring long-term data sharing and access. The database includes information about the device with a given image was captured, the device positioning (in the case of semi-professional cameras) and collection date. The conceptual model of the database is attached at the end of this document.
