UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Diagnosis and prognosis from eye movements: clinical applications of eye tracking data from patients with neurological disorders

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Description

Motivation and application domain

Eye movements represent the first and more direct output of the sensory motor system, by which the human brain interact with the external world. Two main classes of eye movements exist: 1)for gaze shifting (saccades vergences) 2) for gaze holding (pursuit, VOR). Each class of eye movement may be involved in neurological disorder. The identification of changes in specific pattern of eye movement signal associated to different diseases has a high diagnostic and prognostic value.

General objectives and main activities

The objective is 1) Database including saccades (h-v)/antisaccades/memory guided/fixation(different saccadic oscillations and nystagmus) pupil diameter 2) pooling data of eye movements in normal and different diseases 3) identification of indicators of disease 4) make predictions.
Eye movements and pupillary size will be recorded in normal subjects, using a high speed eye tracker (240Hz sampling rate, 16 bit resolution, accuracy of 0.16 deg). Rough data will be pre-treated by appropriate filters for saccade identification.

Training Objectives (technical/analytical tools, experimental methodologies)

Technical objective: Practical approach to the use of different eye tracking devices.
Analytical tool objectives: Learning new skills in human neuroscience, neural network, signal analysis.
Experimental methodology objective: Acquisition of an experimental approach typically used in basic neuroscience, neural network analysis and neurophysiology of vision and eye movements in humans.

Place(s) where the thesis work will be carried out: Laboratorio di "Eye-tracking & Visual Applications EVALABâ€•, Dipartimento di Scienze Mediche Chirurgiche e Neuroscienze, UniversitÃ di Siena

Additional information

Maximum number of students: 2