

Eye-oriented Computer Vision Support for Medical Diagnosis and Behavioural Studies

(Invited Speaker)

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Abstract

Today there is the wide expectation that computer vision, supported by machine learning, can solve any visual sensing related task the way humans (or, more accurately, specialized humans) do. Recent reports show the increasing performance of such systems in medical diagnosis, for instance in dermatology (for recognizing malignant skin lesions), or infectious disease study (for COVID-19 identification from chest Xray/CT). In this talk we will review another direction of computer vision techniques, namely gaze tracking and, more general, eye area analysis and their use in medical, psychological and neurological experiments. The main focus will be in the quantitative measurement of ENT conditions and the detection and investigation of cognitive impairments.

First, we will summarize the normal anatomical and psychological traits of the human eye and gaze, in order to establish the reference parameters of normal behavior. Then, we will discuss the technicalities involved in the least-invasive acquisition of digital images that are suitable in spatial and temporal quality, followed by the algorithmics behind the detection of various impairments. We will discuss the challenges of migrating from clinical laboratory scenarios and tests to current, in-the-wild medical practice.

The presentation includes work performed with Corneliu Florea and Laura Florea at the Image Processing and Analysis Laboratory, Politehnica University of Bucharest, Romania.