

Evaluation of the informative value of particular elements of the 12-lead ECG plots on the base of observation of human eye movements during the analysis of the plots

The main goal of every method of automatic analysis [1], recognition [2] and also understanding [4] of any medical signal is to follow up the physician's method of observation and thinking. Apparently it is easy, because the procedures of human interpretation of biosignals are now well standardized. In fact the real way of making observations and thinking about diagnosis highly depends on the observer experience and personal skills. In this paper, a new eyetrack-based approach [3] is proposed for quantitative assessment of these important factors. The visual experiment carried out on cardiologists of various professional experience supplied the scanpaths data for the analysis in context of observed ECG traces (Fig. 1).

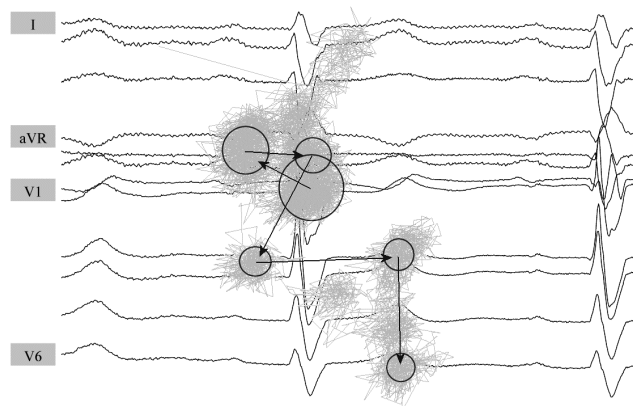


Fig. 1 The example of expert's perceptual strategy over a 12-lead ECG plot (CSE-Mo-001); the circle diameter represents foveation time.

Selected parameters of the cardiologist eye trajectory were particularly correlating with the declared proficiency and the recording complexity, and thus may be interesting as an objective assessment tool for the professional staff survey. The paper proposes also a focus attention-based analysis of the human interpretation procedure and its evolution with the growth of experience. The proposed approach, without the verbalization necessity, allows the cardiologists know-how to be extracted, analyzed and implemented in the automatic interpretation algorithm for better emulate the human way of thinking. It can be very useful for designing of new algorithms for automatic ECG signal analysis, recognition and also understanding by the machines.

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