Tertiary Eye Movement Classification by a Hybrid Algorithm

Samuel-Hunter Berndt, Doug Kirkpatrick, Tim Taviano, Oleg Komogortsev

The proper classification of major eye movements – saccades, fixations, and smooth pursuits – remains essential to utilizing eye-tracking data. There has been difficulty separating out smooth pursuits from the other behavior types, in particular smooth pursuits from fixations. We propose a new algorithm, I-VDT-HMM, for ternary classification of eye movements. The proposed algorithm combines the simplicity of foundational algorithms, I-VT and I-DT, as has been done by the proposed I-VDT, with the statistical predictive power of Hidden Markov Models, in particular the Viterbi algorithm. We evaluate the fitness across a dataset of eleven eye movement records gathered from previous research, with a comparison to the current state-of-the-art using the proposed quantitative and qualitative behavioral scores.