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Data Driven Eye Gaze Path Segmentation

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Abstract: The first stage of analyzing eye-tracking data is commonly to code the data into sequences of fixations and saccades. This is usually automated using simple, predetermined rules for classifying ranges of the time series into events, such as "if the dispersion of gaze samples is lower than the threshold, then code as a fixation." More recent approaches incorporate additional eye-movement categories in automated parsing algorithms, particularly glissades, by using time-varying, data-driven thresholds. We describe an alternative approach using the beta-process auto-regressive hidden Markov model (BP-AR HMM). The BP-AR-HMM offers two main advantages over existing frameworks. First, it provides a statistical model for eye movement classification rather than a single estimate. Second, the BP-AR-HMM uses a latent process to model the number and nature of the types of eye-movements and hence is not constrained to predetermined categories. We present comparisons between BP-AR-HMM parsing and standard analyses on multiple datasets.