

Analyzing movement trajectories using a Markov bi-clustering method

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Abstract

In this study we treat scribbling motion as a compositional system in which a limited set of elementary strokes are capable of concatenating amongst themselves in endless amount of combinations thus producing an unlimited repertoire of complex constructs. We broke the continuous scribbles into small pieces. Next, after grouping the pieces based on trajectory similarity, the Markovian transition matrix between the trajectory-clusters is computed. Finally, the Markov states are grouped in a way that minimizes the loss of mutual-information between adjacent strokes. The grouping algorithm is based on a simultaneous bi-clustering version of the Information-Bottleneck principle. We illustrate the usefulness of this approach by applying it to human scribbling. Further we show how the scribbling may be hierarchically decomposed into finer and finer elements which may be regarded as 'sentences', 'words', and 'phonemes'.

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