Detecting the Perceived Origin of Full-Body Human Movement via Shapley Values Games on Graphs

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Abstract. Computational models that benefit from cross-disciplinary approaches [1] are exploited to detect the origin of full-body human movement perceived by an observer and its propagation. A mathematical game is built over a graph structure representing the human body and a utility function related with movement features is defined. The Shapley values of the players (joints) are evaluated and used to study movement. The methodology proposed in [2,3] is refined by considering a larger set of movement features, namely speed, tangential acceleration, and angular momentum. It is investigated which feature is best at predicting the origin of movement. A ground truth is produced, able to assess and compare the effectiveness of each such feature. An *Origin of Movement Continuum* is also defined, as the basis for creating a repository of movement qualities. The method is applied to a data set of Motion Capture data of subjects performing expressive movements. This research has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 824160.

Keywords: Human movement qualities, Transferable-utility games, Shapley value.

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