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## S8: Game Theory

*Chair:* Laura Levaggi

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### Analysis of Human Movement Qualities Via an Automated Approach Based on Cooperative Games on Graphs

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**Abstract:** Research in computational models of human movement benefits from novel trans-disciplinary approaches, leading towards methods to model higher-level features of movement and movement qualities (Camurri and Volpe, 2016; Kolykhalova et al., 2017) Here, a novel computational method for the analysis of expressive full-body movement qualities is described. The human body structure is modeled as an undirected graph, where the joints are the vertices and the edge set contains both physical links (i.e., connections between adjacent physical body joints) and nonphysical links (acting as "bridges" between parts of the body not directly connected by the skeletal structure). The edge weights depend on features obtained by using Motion Capture data. The body movement is modeled via a transferable-utility cooperative game built on the graph, where the vertices represent the players. The Shapley value is exploited to estimate the contribution of each vertex to the way a particular movement quality is transferred and to detect the "origin of movement". The method is applied to a data set of Motion Capture data of subjects performing expressive movements, recorded in the framework of the H2020-ICT-2015 EU Project WhoLoDance (no. 688865) and of the H2020-FET-Proactive 4-year EU Project EnTimeMent (no. 824160). The model is validated through an online survey, to which several dancers and choreographers participated.

**Keywords:** Human Movement Qualities, Transferable-Utility Games, Shapley Value

#### References:

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