How Well you Move? Movement Variability in the context of Human-Robot Interaction

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Summary of research [1500 words]

Variability is an inherent feature in a human movement that occurs both at individual and group level. Given the complexity and at some extent the subjectivity that constraint the investigation of human(s) movement variability, a promising research direction is the study of human-robot interaction from the motion imitation perspective where little research has been performed so far. For instance, Guneysu et al. (2015) [1], in an scenario of rehabilitation with children, have analysed data from four physiotherapists who were asked to perform the same upper arm movements. As was expected, the movement variability was presented in each repetition of the movements as well as in the movements between physiotherapists. In the same spirit, this work presents some preliminary results of a Human-Robot Interaction scenario where the phenomenon of human movement variability can be observed. The experiment consists of a Human-Robot Imitation activity in which a humanoid robot is used as an instructor to perform consistent and repetitive movements. Following this, a (randomly chosen) group of 20 participants were asked to mirror the robot's arm in vertical and horizontal direction in normal to fast speed conditions. We found that our metrics based on nonlinear dynamics have good capability in measuring how well a given participant imitates the humanoid robot. With this in mind, we believe that the potential applications of this research are many, for instance in the fields of rehabilitation, therapy, and entertainment to mention only a few

References

[1] A. Guneysu, B. Arnrich, and C. Ersoy, "Children's rehabilitation with humanoid robots and wearable inertial measurement units," in *Pervasive Computing Technologies for Healthcare (PervasiveHealth), 2015 9th International Conference on*, pp. 249–252, IEEE, 2015.