Social Cognitive Systems Group
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CITEC
Cognitive Interaction Technology
Center of Excellence
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Bachelor / Master Thesis –

**Let's do the Time Warp: How to Align Motion Capture Data for
Analysis and Synthesis of Human Motion?**

Online analysis and synthesis of human motion is one of the most interesting fields in the area between virtual reality, machine learning and computer graphics. Human motion is used in computer games, VR coaching environments, computer-aided rehabilitation and much more. Many algorithms, be it in the field of machine learning, be it in the field of computer animation, require the comparison of motion capture data. But how to compare data from different recordings which always differ in length and speed of the performance execution? Dynamic Time Warping (DTW) is typically used to solve this issue as it can establish a frame-to-frame correspondence between two trajectories. However, the standard DTW is slow as its computational costs grow quadratically with respect to the trajectories' lengths. Researchers developed lots of different extensions of the standard algorithm which help to speed up the computation or which allow the handling of trajectories which contain multiple executions of certain movements. Which of these variants of DTW works best for the analysis of human motion data?

This thesis aims at the implementation of different variants of Dynamic Time Warping. All of them will be evaluated in terms of the quality of their results, but also in terms of computational costs. A successful thesis might help to drastically boost the performance of data-driven algorithms for the analysis and synthesis of human motion. The thesis will be located inside the Large Scale Project "Intelligent Coaching Space" (ICSPACE): The project aims at the research question of how humans can be supported in learning and practicing movement tasks, as needed in sports training, motor skill learning, or physical rehabilitation.

Recommended skills:

■ Experience in C++ or Python programming
■ Knowledge in computer graphics and animation

Ansprechpartner:
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Dieses Thema
online ansehen