Character Animation based on Early Motion Recognition

Type d'offre : Master Recherche
Lieu de travail : Rennes, équipe MimeTIC
Thème de recherche : Perception, cognition, interaction
Projet : MIMETIC
Responsables scientifiques : Said Yacine Boulahia, Ludovic Hoyet, Franck Multon

Subject

With the development of consumer-grade motion capture systems, such as the Microsoft Kinect, user motions are more and more used to increase user experience, in particular in the video game industry. In such applications, motions are both important for interaction purposes, i.e., interacting with the video game to punch, kick, hit a tennis ball, dance, etc, as well as for immersive purposes by displaying these captured motions on virtual characters. Even though numerous video games use such cheap motion capture systems, it is clear that the user experience is also impaired because of the low quality of the produced motions.

Therefore, the goal of this internship is to explore solutions to improve the visual quality of motions in applications using Kinect-like systems. Typically, two main approaches are possible in such applications. A first family of approaches uses the low-quality data from the low-cost motion capture system, which despite visual artefacts corresponds to some degree to the user performance, and propose different methods to correct erroneous poses [SHYT13, LZLS16,PSM17]. A second family of approaches replay pre-recorded high-quality motions instead, which therefore requires to recognise beforehand the gesture being performed [BAKM17,BAKM16]. This internship will focus on this second type of approaches. In particular, it will rely on a recently developed early recognition model [BAMK17] in order to evaluate the benefits of displaying early motion candidates. Such early recognition models typically compute temporary scores during the process of recognizing motions, before providing a final decision about the type of motion recognized whenever certain criteria have been met. Our goal is therefore to lever these temporary scores to display a blending of the different motion candidates, under the assumption that the candidate motions must be in some ways similar to the action being performed, even though uncertainties still remain about the exact motion being performed.

This internship therefore involves

- Integrating an early recognition model into a computer animation scene (in Unity)
- Developing a novel method for blending human motions, based on the curvilinear approach used in the early recognition model proposed by [BAMK17]
- Evaluating the advantages of displaying a blend of motion candidates on the user experience.

Environment

The candidate will work in the joined Inria / IRISA research centre located in Rennes. Inria (www.inria.fr) and IRISA (http://www.irisa.fr/) are amongst the leading research centres in

Computer Sciences in France. The work will be supervised by members of the MimeTIC team, internationally recognised in the fields of Computer Graphics and Virtual Human Simulation, as well as by members of the Intuidoc team, internationally recognised in the fields of pattern recognition.

Requirements for candidacy

- C/C++ recommended
- Knowledge in character animation or virtual reality
- Interest in User Evaluations

Keywords and References

Character Animation, Gesture Recognition, Perception, User Experimentation

[BAKM17] S. Y. Boulahia, E. Anquetil, R. Kulpa and F. Multon. 2017. 3D Multistroke Mapping (3DMM): Transfer of Hand-Drawn Pattern Representation for Skeleton-Based Gesture Recognition. In the 12th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2017), p. 462-467.

[BAKM16] S. Y. Boulahia, E. Anquetil, R. Kulpa and F. Multon. 2016. HIF3D: Handwriting-Inspired Features for 3D skeleton-based action recognition. In *23rd IEEE International Conference on on Pattern Recognition* (ICPR 2016), pp. 985-990.

[BAMK17] S. Y. Boulahia, E. Anquetil, F. Multon, R. Kulpa. 2017. CuDi3D: Curvilinar Displacement based approach for online 3D action detection. Submitted to Computer Vision and Image Understanding.

[LZLS16] Z. Liu, L. Zhou, H. Leung and H. Shum. 2016. Kinect Posture Reconstruction Based on a Local Mixture of Gaussian Process Models. In IEEE Transactions on Visualization and Computer Graphics, vol. 22, no. 11, pp. 2437-2450.

[PSM17] P. Plantard, H. Shum and F. Multon. 2017. Usability of Corrected Kinect Measurement for Ergonomic Evaluation in Constrained Environment. In International Journal Human Factors Modelling and Simulation.

[SHYT13] H. Shum, E. Ho, Y. Jiang and S. Takagi. 2013. Real-Time Posture Reconstruction for Microsoft Kinect. In IEEE Transactions on Cybernetics, vol. 43, no. 5, pp. 1357-1369, Oct. 2013.

Contacts

We are looking for motivated candidates, please send CV, motivation letter and any relevant material to: said-yacine.boulahia@irisa.fr, ludovic.hoyet@inria.fr, richard.kulpa@inria.fr and franck.multon@inria.fr

Advisors (please contact directly by email)

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