Research Internship

Few-shot learning for motion inbetweening techniques in character animation

Team

Virtus. https://team.inria.fr/virtus/ Research Laboratory IRISA / Inria Center at Rennes University

Keywords

Character Animation, Deep Learning, Motion In-betweening

Context

This internship is part of a joint collaboration between the company Mercenaries Engineering which develops the Rumba animation tool, and the IRISA / Inria Center at Rennes University. Motion in-betweening in animation is the task that consists in creating intermediate animations between two given keyframes while preserving the naturalness of the motion. This is a classical task in the creation pipeline of artists, and recent contributions in the field have been proposing ways to automatically generate these in-between motions using deep-learning techniques. Harvey *etal.* [1] rely on conditioned Recurrent Transition Networks, extended with time-to-arrival information, to create in-between motions even with sparse keyframes for animated characters. The work has been applied to problems of in-betweening in virtual cinematography [2], to improve pose estimation of occluded characters [3] and have even inspired the most recent motion diffusion models [4]. Most approaches require large datasets to ensure natural motions, which may be sparse or hard to access when considering more cartoon-style animations.

Objectives

The objective of this internship is to design a motion in-betweening technique for character animation inside the Rumba animation tool. Given a small dataset of existing animations (*e.g.* representing sample motions of a character available in a studio), our purpose is to design a tool capable of exploiting this sparse data to generate automatically in-between motions. Additional specification constraints (speed / feet contacts) may also be considered to improve the editing capacity of the technique.

The work will start by reproducing the results of classical motion in-betweening techniques such as [1][5][6]. We will then explore how existing datasets may be augmented with dedicated sparse data provided directly by users of the system, to partially retrain the model and generate results which are visually similar to the sparse data. Dedicated noise generators may also need to be designed to ensure that the keyframe constraints can be reached even with low amounts of data by using the delta-interpolator [5]. We will finally explore how additional editing constraints can be added on the in-betweening process to provide creative designers with more high-level controllers (speed, trajectory, amplitude, style).

The research will be closely conducted with Mercenaries Engineering who will provide access to their tools and datasets. Results will be integrated in the Rumba animation tool with the support of the Rumba R&D team.

Technology & Languages

Languages: Python scripting, C/C++ (for Rumba integration)

Technology: Deep Learning, Rumba

Conditions

- 5 to 6 months Research or Research and Development internship
- Good background knowledge on Deep Learning and Computer Graphics techniques
- Master student or Engineering school

Bibliography

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6. Kim, J., Byun, T., Shin, S., Won, J., & Choi, S. (2022). Conditional motion in-betweening. *Pattern Recognition*, *132*, 108894.

Supervision

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