Sketch-based animation of virtual crowds

Advisers

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Motivation and context

Virtual crowds are essential for the entertainment industry: they are often needed to create the background of a scene in a film, to allow sequences with massive population such as sport or war scenes, or to make a video-game livelier. All these applications require being able to design crowd animations which are both plausible at the local scale (no interpenetration between characters, etc) and correspond to the desired scenario in terms of their general aspect and of the ambiance they convey.

Designing crowd animations is currently an extremely difficult task: Indeed, defining by hand the individual motion of each character in the crowd would be overly time consuming for animators. Therefore, they generally rely on crowd simulators, which only provide them with indirect control through sets of simulation parameters. While a set of high level properties can be assigned to each character in the crowd, there is no direct way to control their motion, or, even better, the emergent aspect of the resulting crowd animation.

Research Goal

The goal of this project is advance towards the intuitive design of virtual crowd animations, and more precisely, to design a method enabling direct and intuitive control of crowd simulation results. A possibility for doing so would be to enable users to sketch in space and time the main motions they would like to see in the crowd, such as principal directions, speeds and density of animated characters, and may be other properties such as the composition of the crowd in case of characters with different visual aspects. This sketch would then be interpreted into parameters of a simulator to produce a plausible crowd animation that matches these goals.

Approach

The work to be done will be three-folds:

- Identify the best strokes or painting gestures able to express the user intent;
- Propose a method for identifying (possibly time-varying) parameters of the crowd simulation in order to match these goals,
- Conduct an evaluation of the usability of the resulting tool with professional animators.

Other information

The project is a joint project of the Inria research groups MimeTIC and Imagine, respectively located in Rennes and in Grenoble. MimeTIC has a very strong background in crowd animation techniques, while Imagine is focused on the design of intuitive tools for the creation of 3D content, such as 3D shapes and animations. The localization of the work will depend on the preferences and possibilities of the selected candidate.

Candidates should have taken courses in Computer Graphics and/or Computer Vision.

Bibliography

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