Spatial Montage

Phd Thesis Proposal

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25 June 2021

Context

This Phd thesis is proposed as part of an ongoing collaboration between the ANIMA team at Inria and the SPATIAL MEDIA team at EnsadLab (Ecole des Arts Décoratifs, Paris) on « directing immersive virtual reality ».

Objectives

The goal of this PhD thesis is to extend the rules of cinematographic montage for the case of immersive virtual experiences where the spectator (immersant) is allowed to move freely, a process we call « spatial montage ». This is challenging because « cuts » between virtual worlds must be computed in real time, taking into account the movements of the immersant. To achieve this goal, we will build an immersive VR film editing environment allowing a director to program the montage and execute it in real time in a VR headset, based on a novel set of « spatial montage rules » that still need to be elaborated and evaluated experimentally.

Specifically, the Phd thesis will address two related research issues:

- **First-person montage.** In first person VR, cuts are experienced as teleportations and time travels, provoking strong psychomotor effects which are as yet poorly understood (1,2,3). Starting from a list of desired « cuts » programmed by the director of the experience, we will propose methods for controling their execution in real time to minimize possible disorientation effects, based on a generalization of the classical rules of cinematographic montage, taking into account the movements of the immersant.
- **Third person montage.** During a VR experience, it is often useful to show the immersant in third person view to an external audience. This requires that we compute third person cameras in real time to follow the movements of the immersant and that we compute a montage of those cameras in real time. A variety of methods have been proposed in the past to solve those problems in video games and animation (4,5) and we will seek to extend them for the case of real-time virtual reality.

The proposed approaches for the two cases will be implemented in the Unity 3D game engine, and evaluated experimentally using the HTC VIVE Pro Eye headset, in collaboration with the Spatial Media team at EnsadLab.

For this Phd topic, we are looking for candidates holding a Masters in Computer Graphics with a strong background in mathematics and excellent programming skills.

References

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