C. Lino, M. Christie, F. Lamarche, G. Schofield and P. Olivier (2010). A real-time cinematography system for interactive 3D environments. Proceedings of the 2010 ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2010).

Abstract: Developers of interactive 3D applications, such as computer games, are expending increasing levels of effort on the challenge of creating more narrative experiences in virtual worlds. As a result, there is a pressing requirement to automate an essential component of a narrative -- the cinematography -- and develop camera control techniques that can be utilized within the context of interactive environments in which actions are not known in advance. Such camera control algorithms should be capable of enforcing both low-level geometric constraints, such as the visibility of key subjects, and more elaborate properties related to cinematic conventions such as characteristic viewpoints and continuity editing. In this paper, we present a fully automated real-time cinematography system that constructs a movie from a sequence of low-level narrative elements (events, key subjects actions and key subject motions). Our system computes appropriate viewpoints on these narrative elements, plans paths between viewpoints and performs cuts following cinematic conventions. Additionally, it offers an expressive framework which delivers notable variations in directorial style.

Our process relies on a viewpoint space partitioning technique in 2D that identifies characteristic viewpoints of relevant actions for which we compute the partial and full visibility. These partitions, to which we refer as Director Volumes, provide a full characterization over the space of viewpoints. We build upon this spatial characterization to select the most appropriate director volumes, reason over the volumes to perform appropriate camera cuts and rely on traditional path-planning techniques to perform transitions. Our system represents a novel and expressive approach to cinematic camera control which stands in contrast to existing techniques that are mostly procedural, only concentrate on isolated aspects (visibility, transitions, editing, framing) or do not encounter for variations in directorial style.