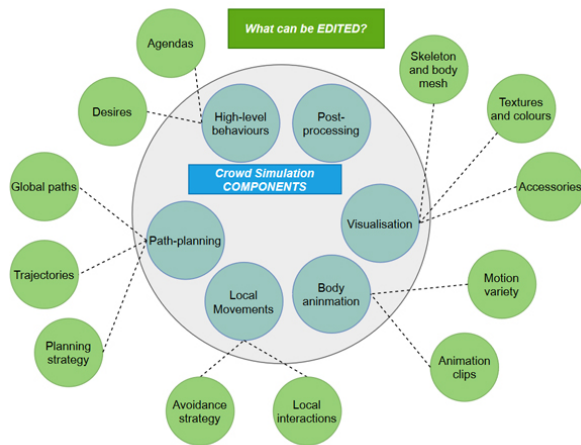


Authoring Virtual Crowds: A Survey

Lemonari, M.; Blanco, Rafael; Charalambous, P.; Pelechano, Nuria; Avraamides, M.; Pettre, J.; Chrysanthou, Y.



Recent advancements in crowd simulation unravel a wide range of functionalities for virtual agents, delivering highly-realistic, natural virtual crowds. Such systems are of particular importance to a variety of applications in fields such as: entertainment (e.g., movies, computer games); architectural and urban planning; and simulations for sports and training. However, providing their capabilities to untrained users necessitates the development of authoring frameworks. Authoring virtual crowds is a complex and multi-level task, varying from assuming control and assisting users to realise their creative intents, to delivering intuitive and easy

to use interfaces, facilitating such control. In this paper, we present a categorisation of the authorable crowd simulation components, ranging from high-level behaviours and path-planning to local movements, as well as animation and visualisation. We provide a review of the most relevant methods in each area, emphasising the amount and nature of influence that the users have over the final result. Moreover, we discuss the currently available authoring tools (e.g., graphical user interfaces, drag-and-drop), identifying the trends of early and recent work. Finally, we suggest promising directions for future research that mainly stem from the rise of learning-based methods, and the need for a unified authoring framework.