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A Multi-Modal Virtual Walkthrough of the Virtual Past and Present Based on Panoramic View, Crowd Simulation and Acoustic Heritage on Mobile Platform

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Abstract : This research presents a multi-modal simulation in the reconstruction of the past and the construction of present in digital cultural heritage on mobile platform. In bringing the present life, the virtual environment is generated through a presented scheme for rapid and efficient construction of 360° panoramic view. Then, acoustical heritage model and crowd model are presented and improvised into the 360° panoramic view. For the reconstruction of past life, the crowd is simulated and rendered in an old trading port. However, the keystone of this research is in a virtual walkthrough that shows the virtual present life in 2D and virtual past life in 3D, both in an environment of virtual heritage sites in George Town through mobile device. Firstly, the 2D crowd is modelled and simulated using OpenGL ES 1.1 on mobile platform. The 2D crowd is used to portray the present life in 360° panoramic view of a virtual heritage environment based on the extension of Newtonian Laws. Secondly, the 2D crowd is animated and rendered into 3D with improved variety and incorporated into the virtual past life using Unity3D Game Engine. The behaviours of the 3D models are then simulated based on the enhancement of the classical model of Boid algorithm. Finally, a demonstration system is developed and integrated with the models, techniques and algorithms of this research. The virtual walkthrough is demonstrated to a group of respondents and is evaluated through the user-centred evaluation by navigating around the demonstration system. The results of the evaluation based on the questionnaires have shown that the presented virtual walkthrough has been successfully deployed through a multi-modal simulation and such a virtual walkthrough would be particularly useful in a virtual tour and virtual museum applications.

Keywords : Boid Algorithm, Crowd Simulation, Mobile Platform, Newtonian Laws, Virtual Heritage
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