Web-Based, 3D-Assisted Editing of Production Dailies

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1. Introduction

The shift in production techniques from film to digital is creating a large amount of new data and metadata. Without the requirement to control the usage of expensive film, and digital storage relatively inexpensive, production companies are free to digitally record every aspect of a scene. While the principal modality of recorded data is still image and sound (as these will form the final result of the production), they are by no means the only digital data recorded. In modern productions, a large variety of external data is recorded simultaneously, in order to assist the post-production process. This data includes 3D representations of the set, recorded by laser scan; light source information, recorded by one or more light domes; position and movement through time of the various cameras on set, including data on pitch, yaw, and zoom; and movement of actors within the scene. The combined information from all these sources results in a large amount of data, typically measured in Terabytes, for as little as a single day's filming. Thus an ability to rapidly view and assess the data is paramount.

Many digital production companies (whether for games, animated productions or digital film) now control and review their assets via web-based tools, due to the fast-moving ecosystem and rapid prototyping of web applications. The ability for members of the production team to be able to remotely view and assess Dailies could lead to improved decision making regarding future shooting, and also inform the post-production process.

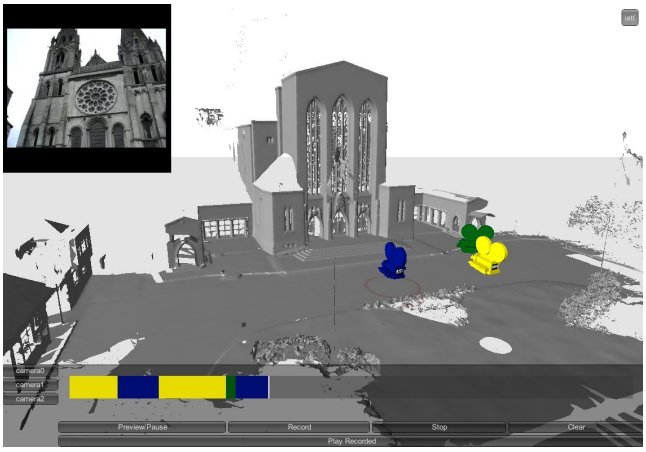
Here we present a prototype, browser-based application for remote analysis and editing of data-recording during production Dailies. The application allows a user to remotely view the 3D data recorded via laser scan, assess the location and movement of cameras through time, and create and view an initial edit of the recorded footage, thus informing and assisting the post-production process. The current application is built in the Unity [2013] engine, although we have a simplified version (without streaming video) replicated in a WebGL implementation also.

2. 3D Recreation of Recorded Data

The data made available to the current version of the application consist of the a 3D mesh created via [Kim et al, 2012] and metadata concerning the movement and positioning of the cameras in the scene. Three pre-processing steps are required in order for the data to be loaded in the application:

- *cleaning of the 3D mesh*: the mesh that is output from the laser scan is an .obj file which habitually consists of hundreds of thousands of vertices, and requires pre-processing (splitting into sub-meshes, normal calculation) for improved real-time performance.

- *calibration of camera positions*: the calibration data from the cameras needs to be embedded into the scene correctly to ensure the camera positions are correct with respect to the laser-scan data.



- *thumbnail image creation*: If thumbnail video is not present in the raw video data, automatic thumbnail creation can be added in the pre-processing step in order to improve real-time video playback in the scene.

3. Timeline, Projection and Editor

The application features a simple timeline which permits the animation of camera movement within the scene. This allows the user to see the interplay between each camera, judge best viewing angles, quickly spot occlusions etc. At any moment, the user can click on any of the cameras and see the video feed of the camera at that moment, displayed in the upper-left corner of the screen. The video recorded by each camera can also be projected onto the environment, this is particularly useful to check calibration. This timeline feature of the application also includes a record function, allowing the user to rapidly edit and splice footage from different cameras along the timeline. Editing can be carried out in real-time by clicking on the 3D representation of the cameras in the scene, or in a more standard way by clicking on a button. A visual representation of the edit is shown in the lower portion of the screen. The edit can then be instantly replayed in full-screen mode.

4. Future Development

We are currently incorporating additional data sources into the application, such as movement of actors within the scene, and light-source information. The principal challenge with these additions is the calibration step. We are also planning on using the application as a base for further research in the fields of camera positioning and shot analysis.

References

UNITY3D. 2013. Unity Technologies. http://unity3d.com/.

KIM H, GUILLEMAUT J-Y, TAKAI T, SARIM M, & HILTON A. 2012. Outdoor Dynamic 3D Scene Reconstruction. *IEEE Trans. on Circuits and Syst. for Video Technology* 22 (3), pp. 1611-1622.