REAL-TIME TEXTURE MAPPING FOR 3D SCULPTURE MODEL USING SEQUENTIAL BUNDLE ADJUSTMENT

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**Abstract**

Using laser scanning technology to measure precise geometric model is a popular method in heritage model reconstruction. The difficulty of the method is texture mapping. Laser scanning model texture mapping is based on image bundle adjustment in photogrammetry to obtain the image position and attitude. With the position and orientation, the image can be projected to the geometric model to build texture. A 3D sculpture model corresponds to massive texture images. Usually, problems of poor texture quality and textures missing might appear during texture mapping process, which result in texture images re-acquiring or supplementing. It is uneconomical due to traditional bundle adjustment with plenty of images can only be performed in post-processing way. In this study, a method using sequential bundle adjustment is proposed to deal with online texture mapping problem, so as to speed up texture mapping and to ensure image acquisition quality in real time. At first, bundle adjustment is performed with a few images and enough control points to calculate the image parameters. Then, whenever a new image is added, relative orientation is applied to calculate initial value of image parameters and sequential bundle adjustment is performed combining the results of bundle adjustment and relative orientation to update all image parameters. To fulfill the real-time texture mapping requirement, a driver connecting camera and computer wirelessly is implemented in our experiments. The experimental results show that image parameters calculation took less than 3 seconds and the results of image sequences parameters were close to simultaneous bundle adjustment.

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