

3D Indoor Model Reconstruction Using A Panorama Equipment

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Abstract:

The reconstruction of 3D digital building models has gradually evolved into the indoor models. Multiple images are widely used for model reconstruction, but for the indoor environment, full surround information of a room will be more helpful. Using panorama equipment would be more suitable for this situation. Using equipment with a single camera, such as GigaPan EPIC Pro, all images will have the same imaging center. In that case, a 3D model can be reconstructed with traditional collinearity condition equations. This research, employees the process of vanishing point detection, of individual images to obtain the metrology of the image. In addition, stitching multiple images can increase the information available for building indoor models. The study procedure could be divided into four parts, which are equipment setting, image stitching, vanishing point detection, and model reconstruction. First of all, the nodal point position is identified to make sure the imaging center is located on the three axis of the GigaPan EPIC PRO. Secondly, Scale-Invariant Feature Transform (SIFT) with Random Sample Consensus (RANSAC) is applied to get the feature points and perspective transform is used to stitch the images in this step. The third step is to detect the line segments for vanishing point detection. Image segmentation is performed before the canny detector to exclude common indoor repeating texture. After a double Hough transform and a voting process, the location of vanishing points can be established. Finally, vanishing point geometry with a known reference height is used to build the model. The verification of the results is achieved using total station measurements to determine the accuracy of the model.

Keywords: Panorama Equipment, Single Image Reconstruction, Image Stitch, Indoor Model

Suggested Topic: GPS & Photogrammetry: Digital Photogrammetry

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