ViRVIG
Visualització, Realitat Virtual i Interacció Gràfica

www.virvig.eu
C. Llorens i Artigas 4-6
Edifici U, 1er pis
E- 08028- Barcelona

3D Objectes Reconstruction Using Frontal Images. An Example With Guitars

Beacco, Alejandro; Gallego, J.; Slater, M.

This work deals with the automatic 3D reconstruction of objects from frontal RGB images. This aims at a better understanding of the reconstruction of 3D objects from RGB images and their use in immersive virtual environments. We propose a complete workflow that can be easily adapted to almost any other family of rigid objects. To explain and validate our method, we focus on guitars. First, we detect and segment the guitars present in the image using semantic segmentation methods based on convolutional neural networks. In a second step, we perform the final 3D reconstruction of the guitar by warping the rendered depth maps of a fitted 3D template in 2D image space to match the input silhouette. We validated our method by obtaining guitar reconstructions from real input images and renders of all guitar models available in the ShapeNet database. Numerical results for different object families were obtained by computing standard mesh evaluation metrics such as Intersection over Union, Chamfer Distance, and the F-score. The results of this study show that our method can automatically generate high-quality 3D object reconstructions from frontal images using various segmentation and 3D reconstruction techniques.

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