Projection Planes: Efficient Verification of Photogrammetric Reconstructions

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Abstract: The thesis presents a projection-based lens technique for the exploration of spatially anchored images in immersive 3D environments[1]. A user study with 18 participants showed the efficiency of the developed technique on the example of visual error verification.

Keywords: Virtual Reality, Interaction Design, Verification, Magic Lenses

Virtual reality (VR) is used for the presentation and analysis of 3D reconstructions. The original images of scanned models can be spatially located and anchored in virtual environments. They provide a real world reference and can be used for verification. Typically, source images are either displayed in galleries or are embedded into the 3D scene [BNM+17]. Both presentation forms have their downsides when used in VR. Image galleries display photos in a second context and lack detailed comparison methods. Anchored images only work from specific viewpoints, thus require the user to navigate to a certain position.

We present a novel visualization method for spatially anchored images that follows the idea of magic lenses [BSP+93]. The fundamental concept (Figure 1) is to project an image with its original orientation into the scene and cut the projection frustum with a hand-held plane. This results in the plane showing a section of the projected image.

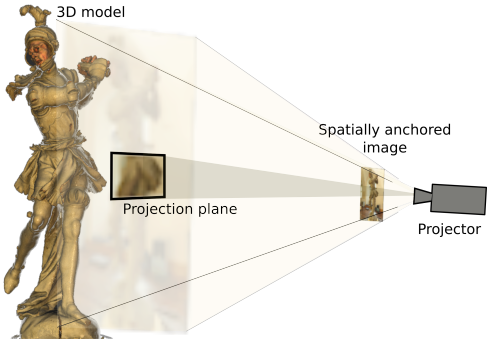

Figure 1: Projection plane concept.

In a user study the technique was compared to an image gallery. The participants had to verify texture errors in three reconstructions. The results showed that the verification with the projection plane was significantly faster with two of the three models.

References

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[BSP+93] E. Bier, M. Stone, Pier, W. Buxton, and T. DeRose. Toolglass and magic lenses: the see-through interface. In *Proceedings of the 20th annual conference on Computer graphics and interactive techniques*, pages 73–80, 1993.

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