GROUP 32

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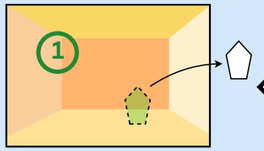
Tour Into the PICTURE

Interactive MATLAB tool creating virtual 3D tour by single view reconstruction: Combine user's spatial imagination with a texturing model.

PIPELINE

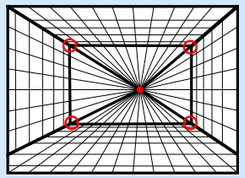
1. Foreground Objects

Mask objects (3), cut, and retouch background.



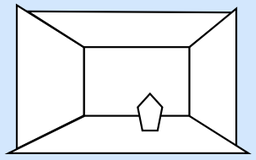
2. Mesh Calculation

Divide image into 5 quadrangles and span spidery mesh from vanishing point (2).



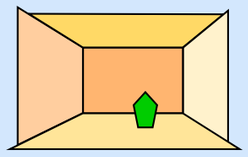
3. Surfaces Calculation

Compute the dimensions and positions of each surface in the 3D space.



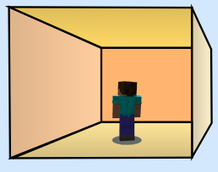
4. Texturing

Project the textures from the original image onto the 3D surfaces.



5. Rendering

Visualizing 3D scene and configuring interactive camera.



USER INTERFACE

(2) Adjust Background Window and Vanishing Point (Required)

(3) Draw Foreground Objects (Optional)

(1) Select 2D Image (Required)

RESULTS

Fig. 1: 3D View GUI picture [4].

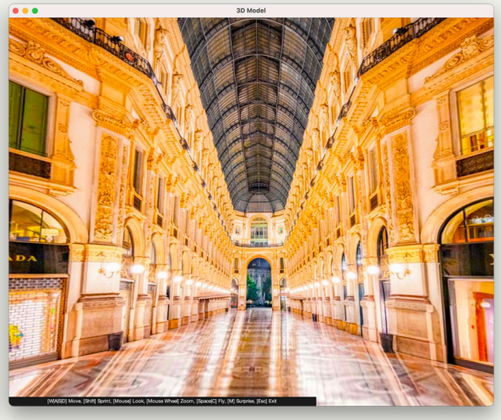


Fig. 2: 3D view *shopping-mall.png*.

METHODS

- **General pipeline** as in [1]
- **Retouch background** with foreground object neighborhood (*inpaintExemplar()* MATLAB®).
- **Texturing surfaces (4.)** with homography matrix (*fitgeotrans()* and *imwarp()* MATLAB®).
- **Determine 3D box model** height, width, depth [2], [3]
- **Costum controls** for navigation through 3D view.
- **Depth and size estimation** of foreground objects.

PROBLEMS

- **Increased runtime** alleviated by adjusting surfaces scaling (resolution) in GUI.
- Performance across **operating systems**
- **Focal length estimation:** Empirical method for foreground object scaling/positioning
- **Bugs:**

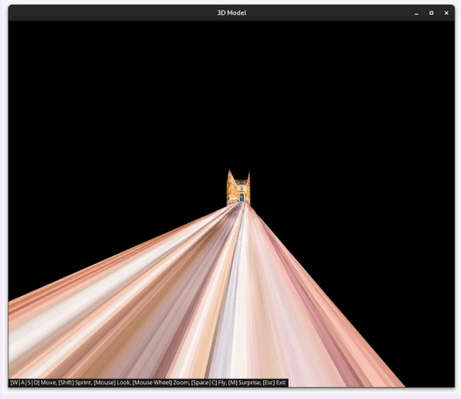


Fig. 3: A long way to go with *shopping-mall.jpg*.

References: [1]: K. Anjyo, Y. Horry, and K. Arai: *'Tour into the Picture'*, 1997. **[2]:** Z. Cao, X. Sun, and J. Shi. *'Tour Into the Picture Using Relative Depth Calculation'*, 2004. **[3]:** *'Tour into the Picture'* , https://github.com/yli262/tour-into-the-picture, (Depth calculation). **[4]:** Mojang Studios, *Minecraft*, 2011.