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## Motivation

Based on "Tour into the Picture" (TIP) [2] approach, we aim to develop autonomous algorithms that infer two key structures from a single 2D image: the regular, program-like textures or patterns on 2D planes and the 3D positioning of these planes within the scene.

For example, from a single Metro Station image in Fig.1, we can infer the camera pose, partition the image into distinct planes (walls, floor, ceiling, and far plane), and recognize repeated patterns.

This method enables flexible image editing, such as inpainting, moving the camera, and extending the Image Space, which requires a deep understanding of the scene's 3D structure and real-time rendering of spatially consistent views.

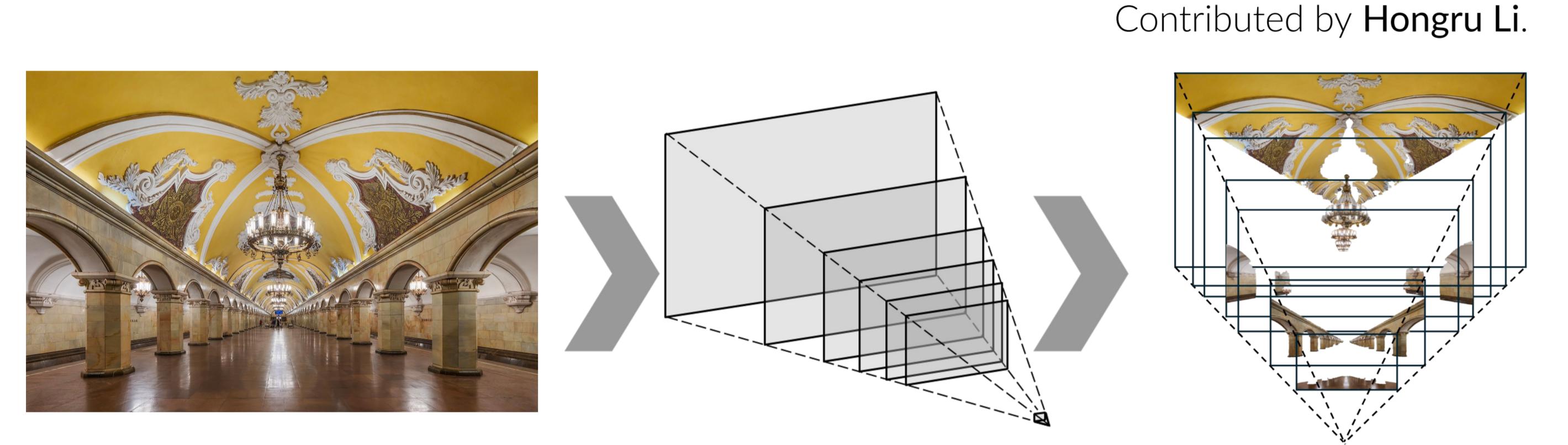


Figure 1. Illustration of Image Decomposition - Wenbo Ji

## Introduction

The project aims to develop a graphical user interface (GUI) that allows users to extract a simple scene model from a single 2D image, facilitating easy animation and scene manipulation.

With our GUI, users can intuitively distinguish between foreground and background objects. The background geometry is approximated using simple polygons, forming a polyhedral model with the vanishing point at its base.

Specifying the vanishing point is also user-driven, ensuring that the virtual vanishing point aligns with the user's perception.

Finally, users can determine the proximity of objects in the scene, effectively setting camera parameters to position foreground objects as desired.

Contributed by Shilin Zhang.

## Challenge & Solution

- Inpainting of Background a duis congue vitae
- Deformation of Foreground morbi justo neque, ullamcorper

Contributed by Wenbo Ji.

## Method

Step 1: Data Selection  
 Step 2: Image Decomposition  
 Step 3: Spidery Mesh  
 Step 4: Time to tour

Read Data from Local Folder  
 Select Foreground Object by Polygon  
 Get Input Background and Mask of Foreground

Get vanishing Point and corners of inner wall from interactive selection by user  
 Calculate corners of ceiling, floor left, right, inner wall  
 Modeling Foreground Object

Contributed by Hongru Li.

References:

- [1] Zhiqiang Cao, Xin Sun, and Jiaoying Shi. Tour into the picture using relative depth calculation. In Proceedings of the 2004 ACM SIGGRAPH international conference on Virtual Reality continuum and its applications in industry, pages 38–44, 2004.
- [2] Youichi Horry, Ken-ichi Anjyo, and Kiyoshi Arai. Tour into the picture: Using a spider mesh interface to make animation from a single image. In Proceedings of the 24th Annual Conference on Computer Graphics and Interactive Techniques, SIGGRAPH '97, page 225–232, USA, 1997. ACM Press/Addison-Wesley Publishing Co.
- [3] Jian Liu, Kuangrong Hao, Huan Liu, and Yongsheng Ding. An improved algorithm based on tip using a vanishing line. In 2013 IEEE Third International Conference on Information Science and Technology (ICIST), pages 546–549. IEEE, 2013.
- [4] Guihang Wang, Xuejin Chen, and Si Chen. Cut-and-fold: Automatic 3d modeling from a single image. In 2014 IEEE International Conference on Multimedia and Expo Workshops (ICMEW), pages 1–6, 2014.

## Experiment Results



Contributed by Yuming Li.

## References

- Zhiqiang Cao, Xin Sun, and Jiaoying Shi. Tour into the picture using relative depth calculation. In Proceedings of the 2004 ACM SIGGRAPH international conference on Virtual Reality continuum and its applications in industry, pages 38–44, 2004.
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- Jian Liu, Kuangrong Hao, Huan Liu, and Yongsheng Ding. An improved algorithm based on tip using a vanishing line. In 2013 IEEE Third International Conference on Information Science and Technology (ICIST), pages 546–549. IEEE, 2013.
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