

Gen3DSR: Generalizable 3D Scene Reconstruction via Divide and Conquer from a Single View

Andreea Ardelean, Mert Özer, Bernhard Egger

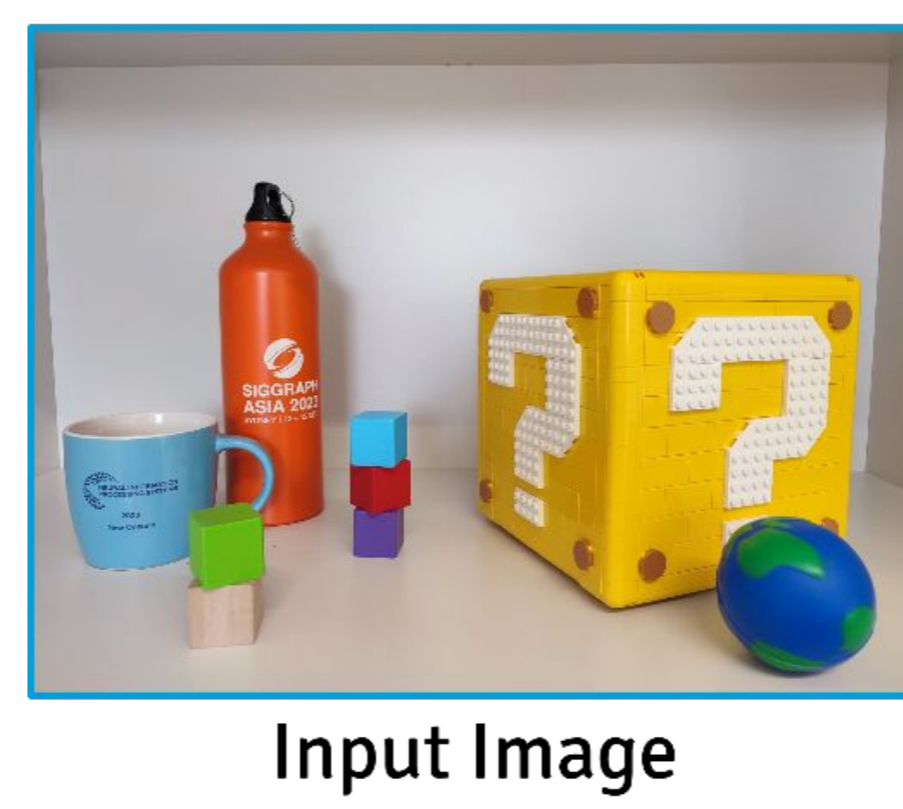


Summary

Most single-image scene-level reconstruction methods require 3D supervised end-to-end training and suffer from poor generalization capabilities. We propose a modular system where each module performs well by focusing on specific tasks that are easier to supervise. Our approach is compositional: the scene is divided into entities which are reconstructed (conquered) individually and composed into the final 3D scene using the unprojected depth as a layout reference.

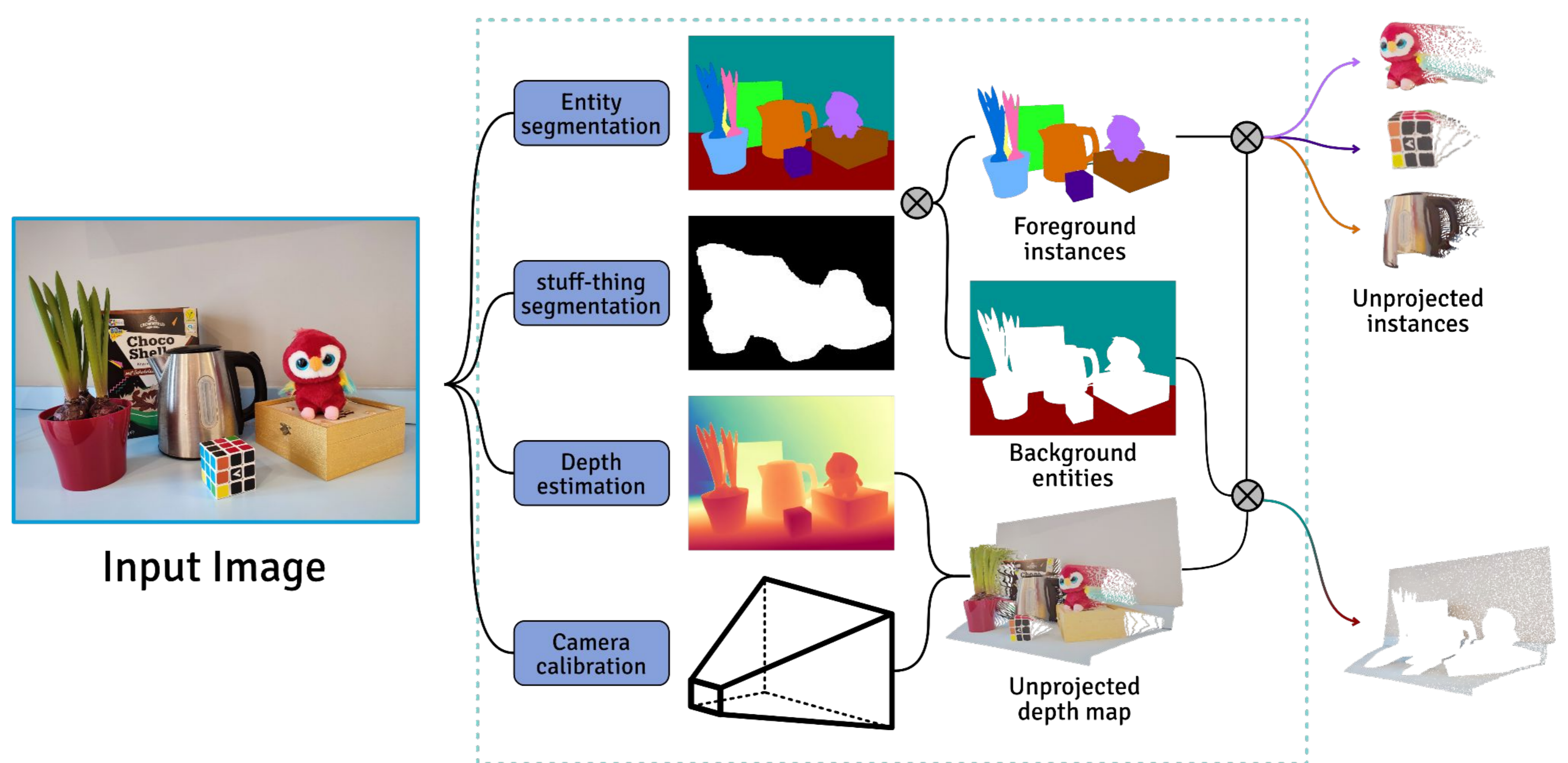
Insights

Essential steps for accurate 3D object reconstructions. Without them, the reconstructions suffer from missing geometry and distorted shapes.



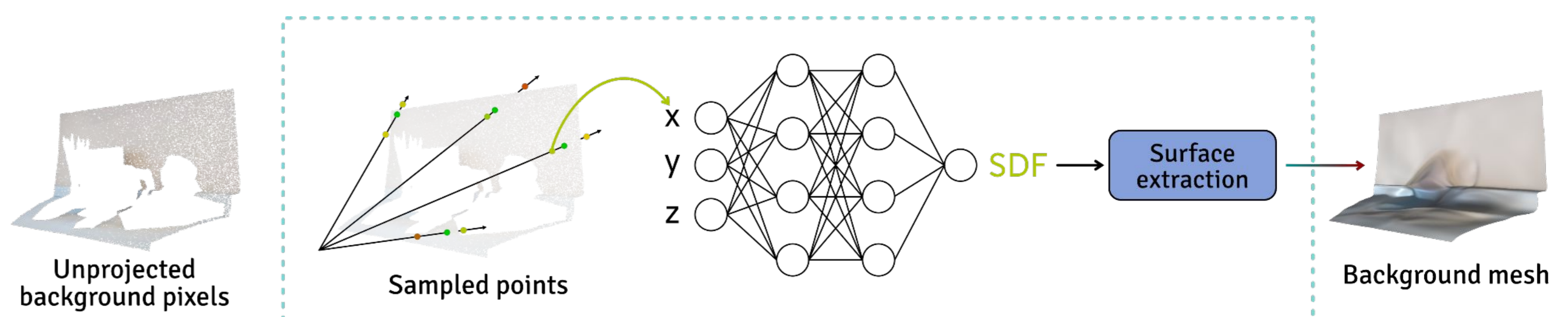
Scene analysis

We analyze the input image to estimate depth and camera parameters, and segment the scene into foreground objects and background regions.



Background modeling

We recover the background surface by fitting an implicit surface to the visible depth, effectively interpolating the occluded regions.



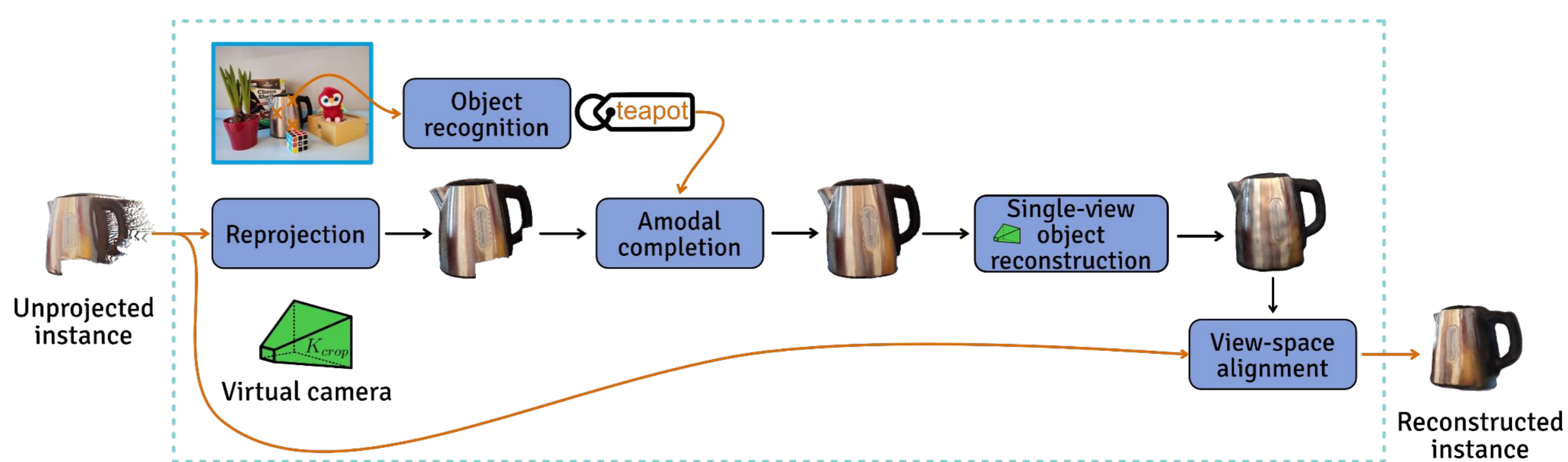
Real-world results

Gen3DSR enables applications in education: interactive tools for learning physics concepts or 3D assets for game development and computer graphics studies.



Instance processing

Each foreground object is reprojected to a normalized view, completed using a diffusion model, and reconstructed individually into a textured 3D mesh.



1. Andreea Ardelean, Mert Özer, and Bernhard Egger. "Gen3DSR: Generalizable 3D Scene Reconstruction via Divide and Conquer from a Single View." International Conference on 3D Vision 2025.



12th ACM Celebration of Women in Computing: womENCourage™
Braşov, Romania
17-19 September, 2025
Theme: Computer Science: a Catalyst for Educational Change

