GaussianShopVR

Facilitating Immersive 3D Authoring Using Gaussian Splatting in VR

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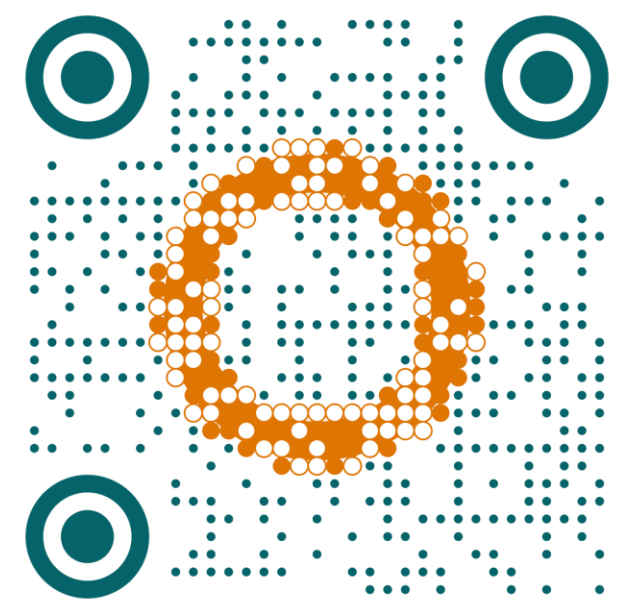
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Abstract
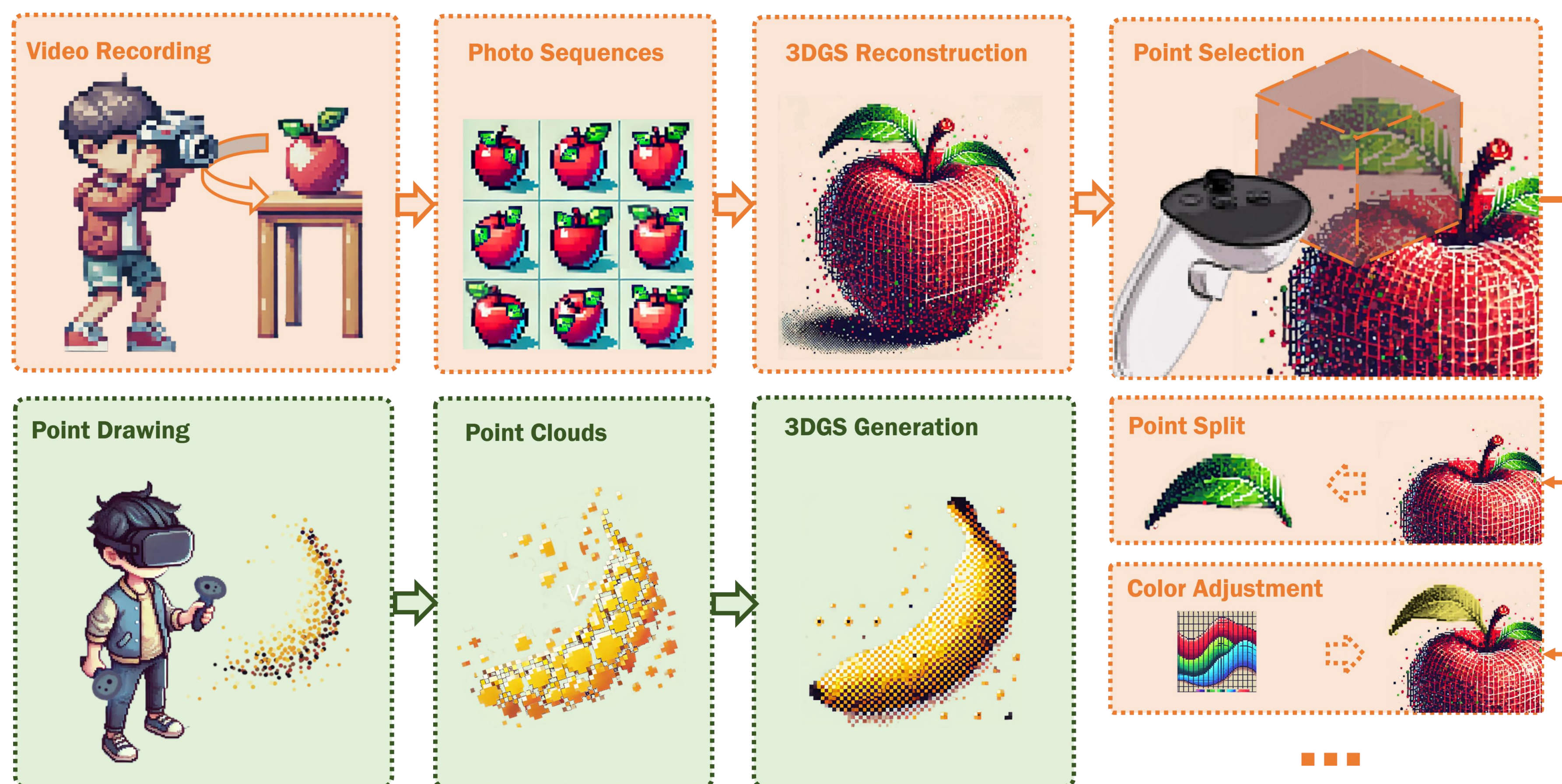
`VR` `3D Authoring` `Gaussian Splatting`

Virtual reality (VR) applications require massive high-quality 3D assets to create immersive environments. Generating mesh-based 3D assets typically involves a significant amount of manpower and effort, which makes VR applications less accessible. 3D Gaussian Splatting (3DGS) has attracted much attention for its ability to quickly create digital replicas of real-life scenes and its compatibility with traditional rendering pipelines. However, it remains a challenge to edit 3DGS in a flexible and controllable manner. We propose GaussianShopVR, a system that leverages VR user interfaces to specify target areas to achieve flexible and controllable editing of reconstructed 3DGS. In addition, selected areas can provide 3D information to generative AI models to facilitate the editing. GaussianShopVR integrates object hierarchy management while keeping the backpropagated gradient flow to allow local editing with context information.

Workflow

Users can obtain 3DGS objects in two ways: either by reconstructing point clouds from photo sequences or by generating them through user-drawn point clouds. Users can specify any target editing areas via point selection in VR, allowing for various editing methods to be applied to these areas.

Object Hierarchy

The hierarchy management system enables users to edit entire objects or individual components using both manual and AI-driven methods. The hierarchy system also supports gradient back-propagation.

Supported Editing Tasks
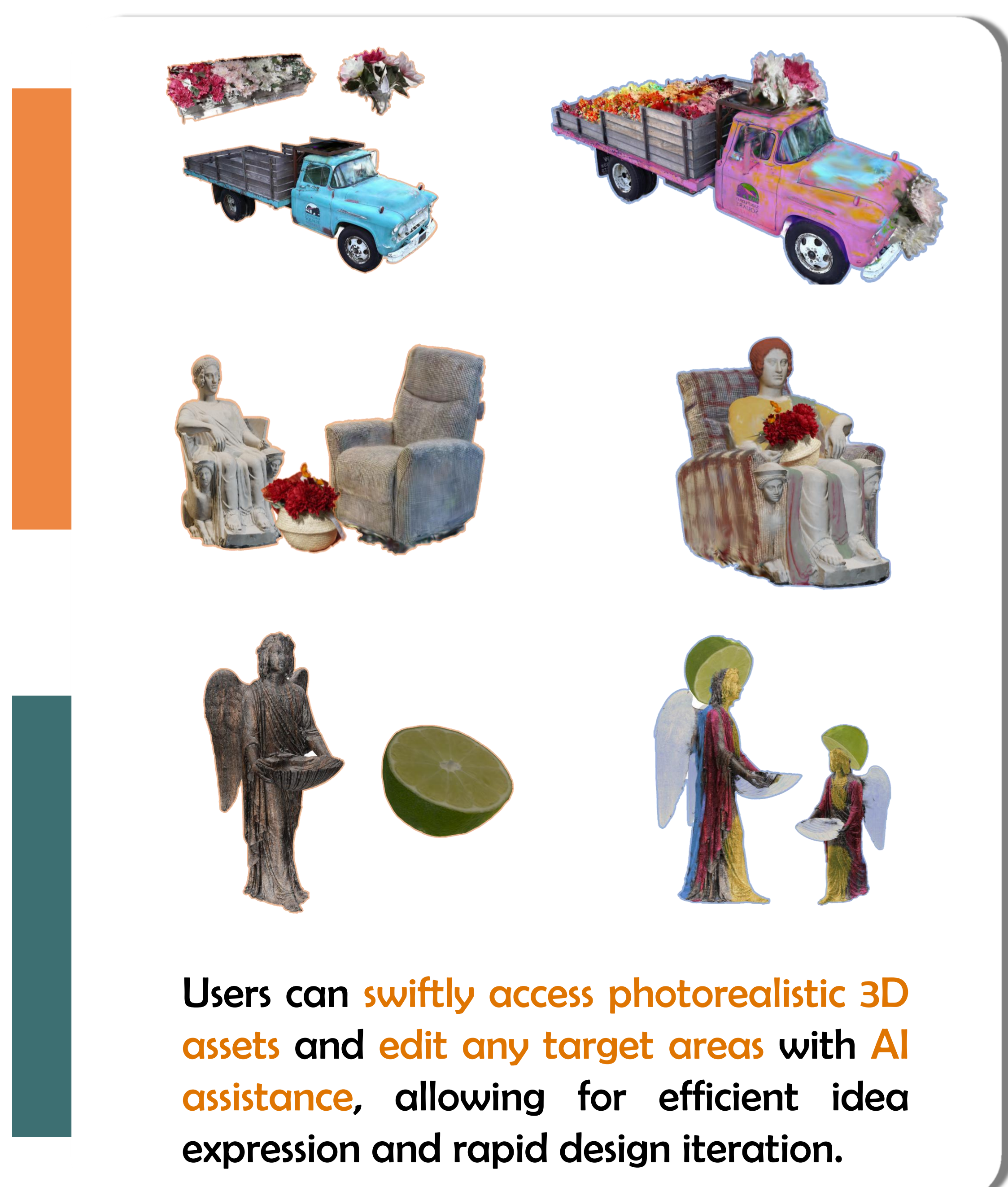
Users can swiftly access photorealistic 3D assets and edit any target areas with AI assistance, allowing for efficient idea expression and rapid design iteration.
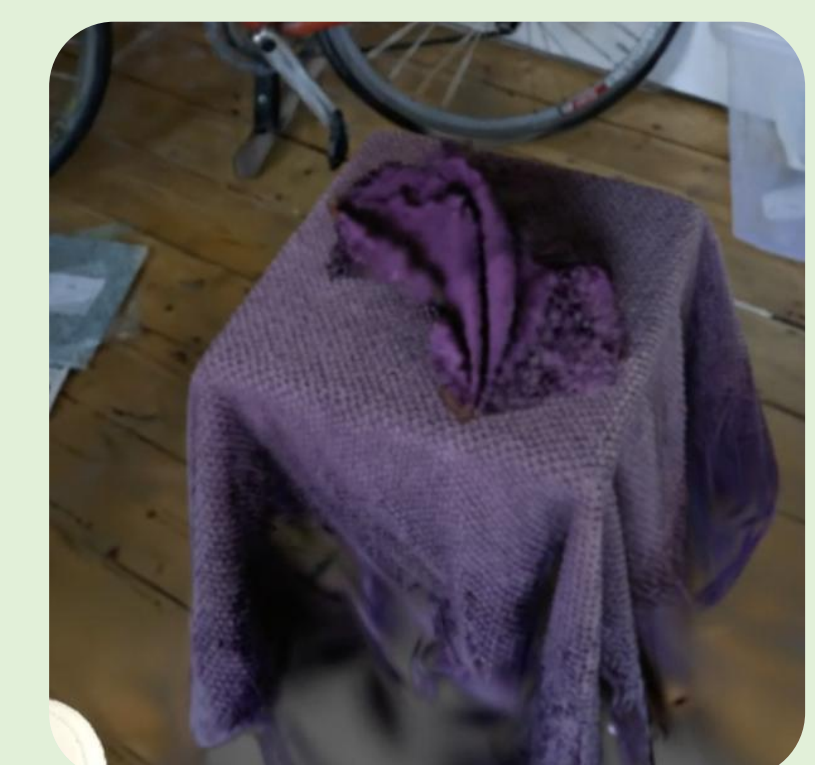
Color Adjusting

Object Splitting

Manual

Generation

Inpainting

AI-Driven