# FFaceNeRF: Few-shot Face Editing in Neural Radiance Fields

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TL;DR: FFaceNeRF performs mask-based 3D face editing using a customized layout and is trained with only a few examples.

Motivation

➤ Existing 3D face-editing methods yield high-quality results. However, these methods rely on a fixed mask layout, making it impossible to edit customized regions.

➤ FFaceNeRF addresses this by injecting tri-plane features via a geometry adapter and employing overlap-based optimization for few-shot adaptation to any mask layout (requiring as few as ten samples), enabling precise, multi-view-consistent 3D face edits.


FFaceNeRF Overview

α : Alpha blending
Sel : Feature selection
$\oplus$: Feature aggregation (Sum)
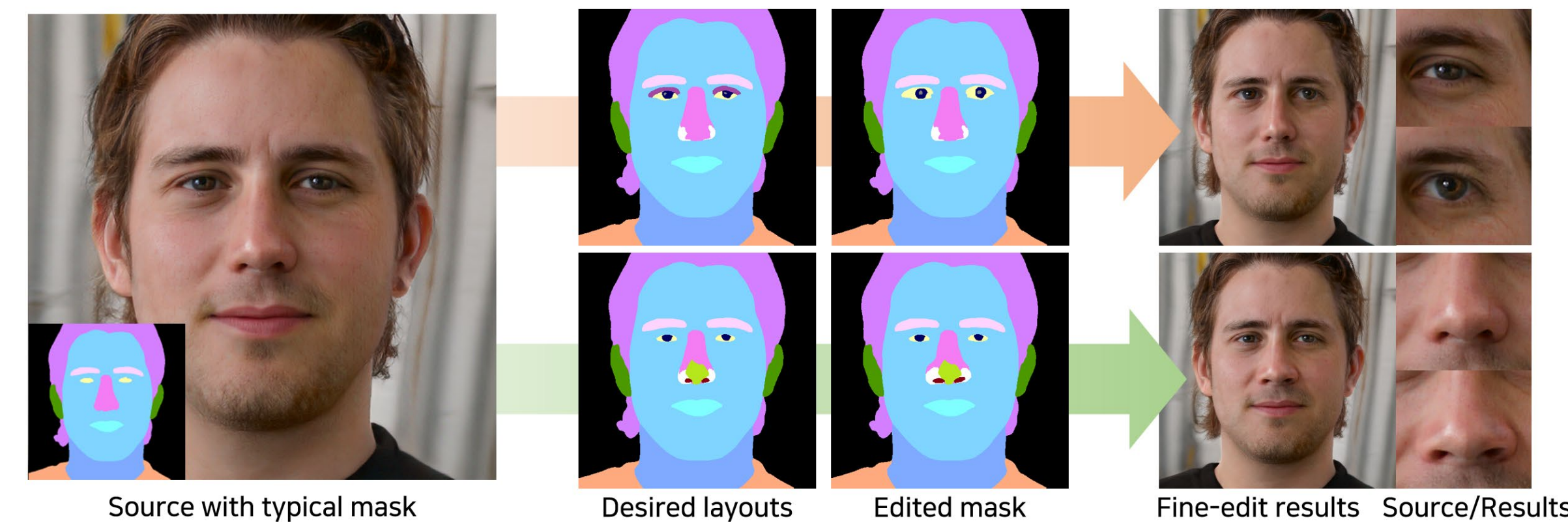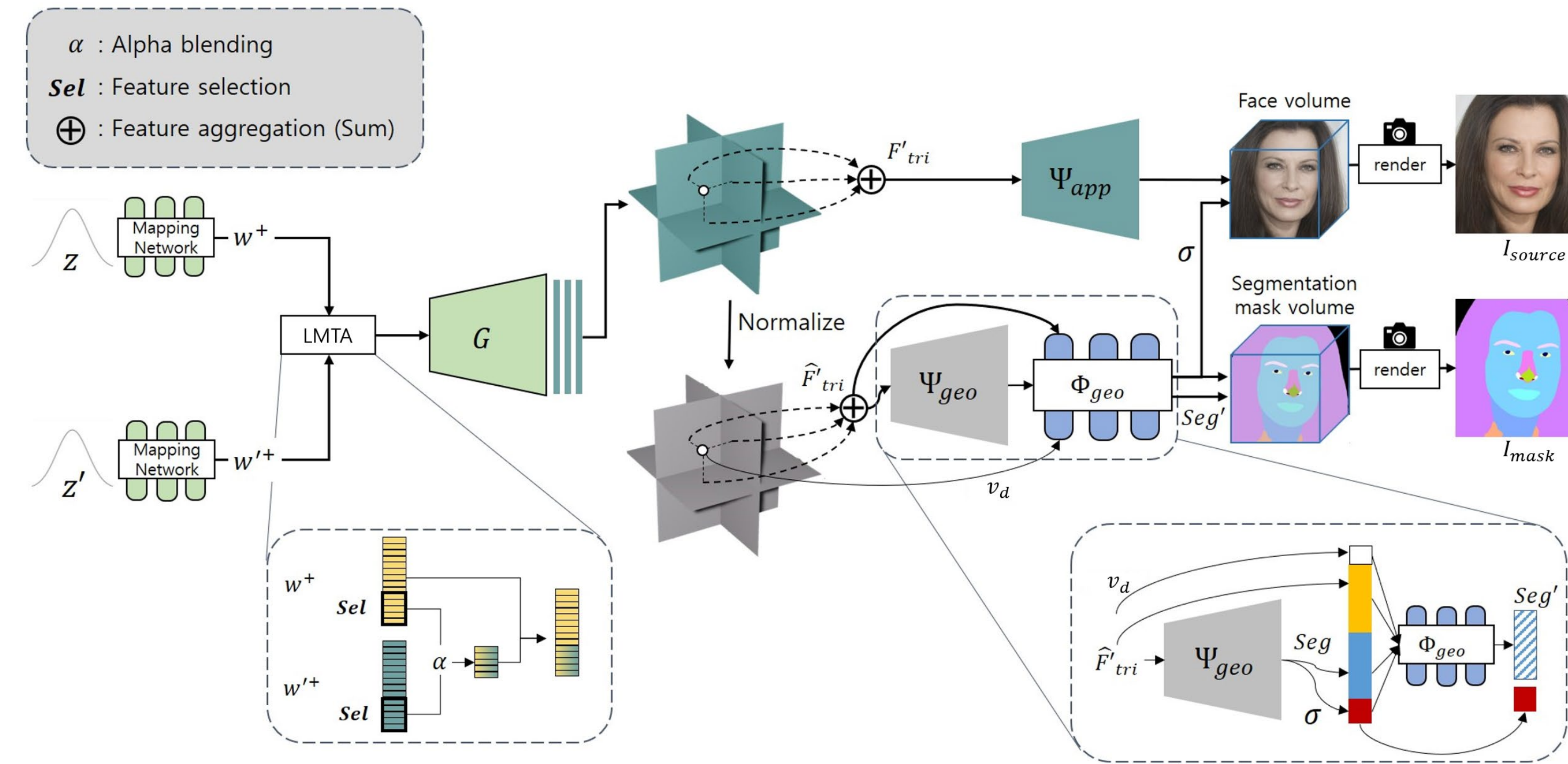
Method Summary: From pretrained 3D face editing model with fixed layout, we train geometry adapter with tri-plane feature injection to achieve 3D face editing on desired mask layouts.

Method:

➤ Generate a random latent code w^+ and its corresponding face image via pretrained appearance decoder (e.g., EG3D).

➤ From this image, the user creates a small set of customized segmentation masks in the desired layout.

➤ Augment w^+, pair it with the labeled masks, and train the geometry adapter with tri-plane feature injection while keeping all other network parameters frozen.

➤ After training, given new face images, perform 3D GAN inversion to obtain latent codes and optimize them to match the edited mask.
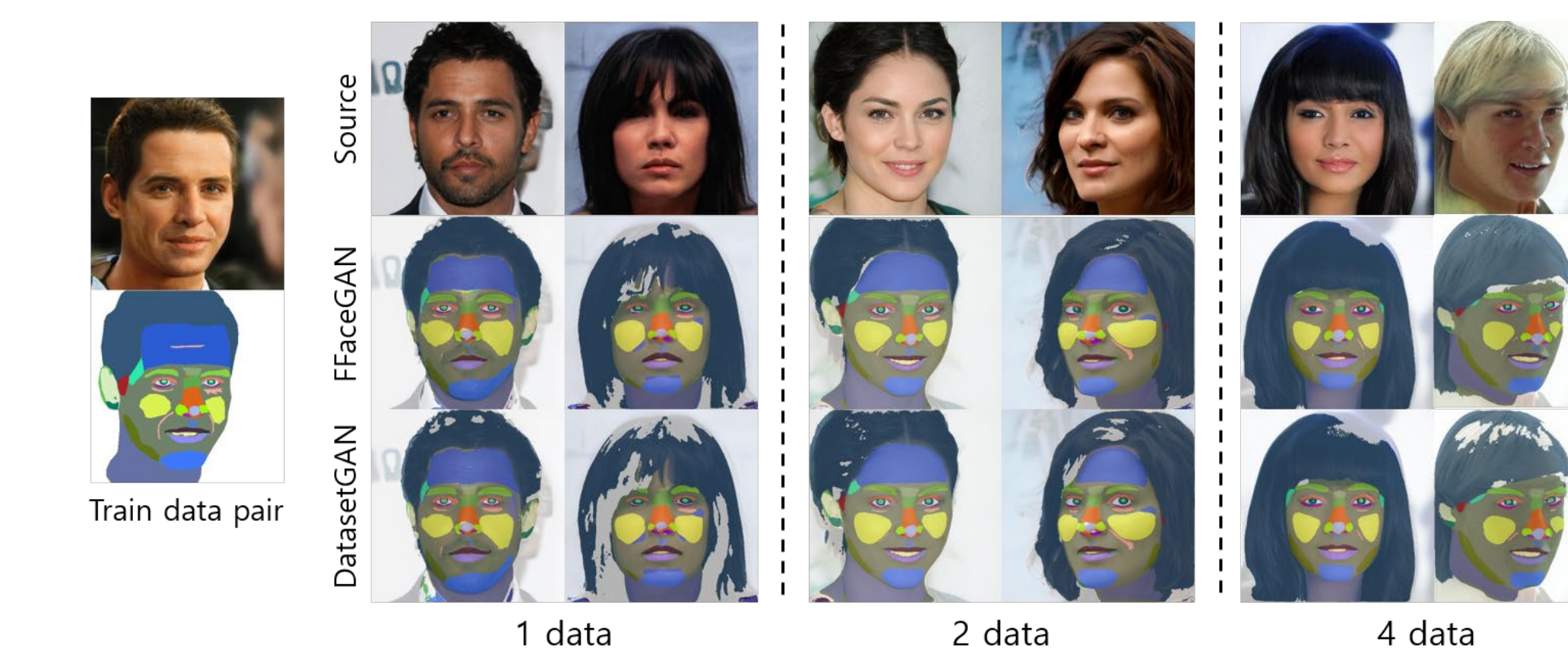
TakeAways:

➤ Training a lightweight adapter can modulate geometry of face with few-shot training.

➤ Tri-plane feature injection facilitates few-shot training.

➤ Overlap-based optimization can be adopted for efficient small-region segmentation and editing.
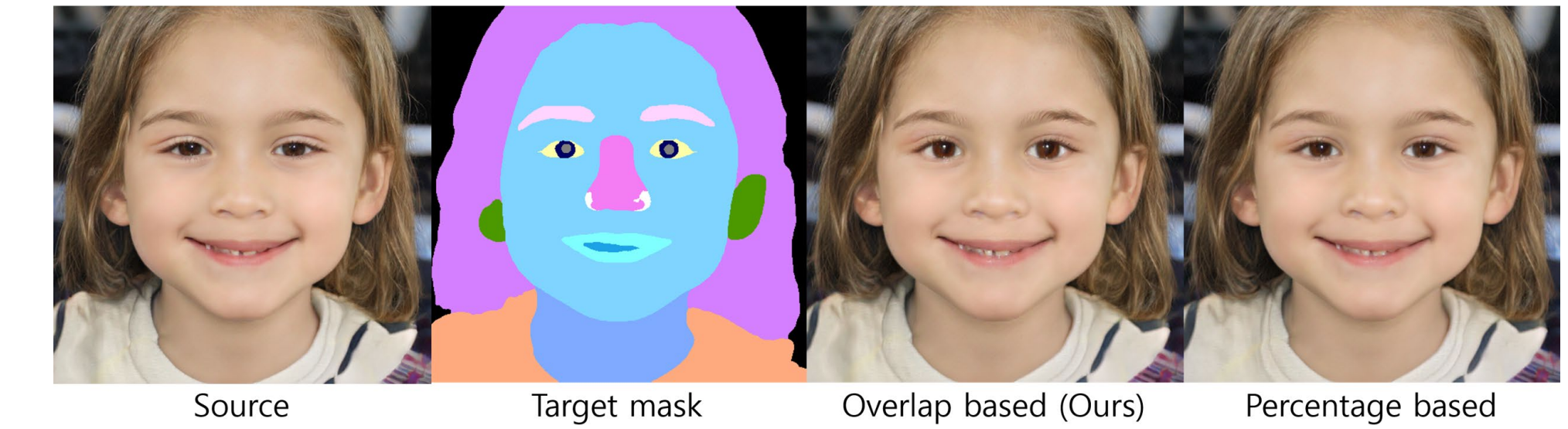
Effect of overlap-based editing
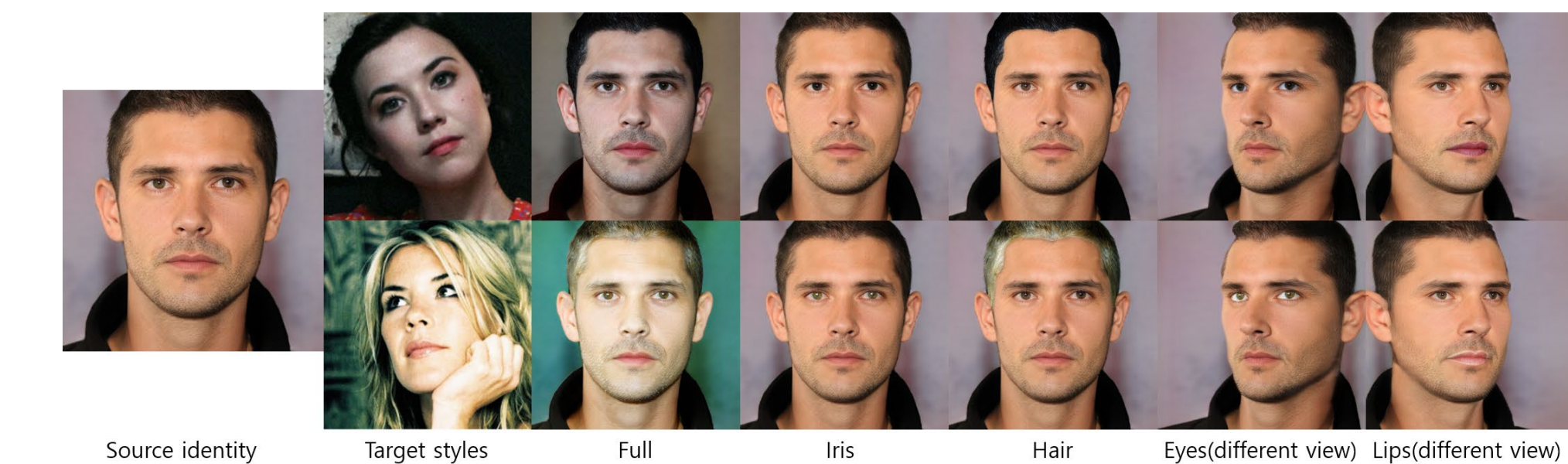
Application 1. Style Transfer

Application 2. FFaceNeRF + DatasetGAN