OPTIMIZING LATENT SPACE DIRECTIONS FOR GAN-BASED LOCAL IMAGE EDITING
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Introduction

Semantic Image Editing requires prior knowledge of high-level concepts.

Generative Adversarial Networks (GANs) learn a mapping from a low-dimensional latent space to the image domain (prior knowledge).

Previous works find meaningful directions in GAN’s latent space to perform high-level image editing, but they fail to perform localized semantic editing.

Contributions

- A novel objective function for finding Locally Effective Latent Space Direction (LELSD)
- GAN architecture and dataset-agnostic
- Fast training and convergence
- Editing any object/part
- Layer-wise editing for StyleGAN generators
- Multiple semantic edits for each object/part

Examples of Edits

Scheme of Our Method

Localization Score measures the ratio of change inside the mask

\[ LS(u) = \sum_{i,j} s_c(x, x^{edit}) \odot \frac{|r - r^{edit}(u)|^2}{\sum_{i,j} |r - r^{edit}(u)|^2} \]

To find multiple directions for editing the same semantic we add a regularization term to the objective to encourage diversity

\[ R(u_1, ..., u_k) = \frac{-1}{2} ||\text{Corr}(u_1, ..., u_K) - I_K||_F \]

\[ J(u_1, ..., u_k) = \sum_k LS(u_k) + cR(u_1, ..., u_k) \]