Dual Contrastive Loss and Attention for GANs
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https://github.com/ningyu1991/AttentionDualContrastGAN

Motivations
• Generative Adversarial Networks (GANs) evolve fast in the past 7 years for photorealistic generation. However, uncurated generations still suffer from artifacts that are easy to spot.
• We improve on StyleGAN2, by revisiting its loss and architectures.
• We propose a novel dual contrastive loss to replace traditional cross-entropy loss in the adversarial training.
• We revisit the self-attention modules in the generator architecture.
• We propose a novel reference-attention module in the discriminator architecture.

Dual contrastive loss
• Batch-wise pick-one-out classification instead of sample-wise binary classification.
• One real v.s. a batch of fakes.
• One fake v.s. a batch of reals.

Self-attribution in the generator and reference-attention in the discriminator
• In the generator, we replace one layer of convolution with the self-attention module SAN [1]: long-range and spatially adaptive.
• In the discriminator, we introduce a reference real image input and Siamese network, and merge the two branches using a novel reference-attention module.
• Feature augmentation for discriminator training.
• Balance between generator and discriminator.

All the self-attention modules in G improve FID
SAN [1] improves the most
SAN [1] does not increase complexity

Combine all our contributions
Progressively improves FID by 17% - 48%

Self-attention and reference attention modules

Significant FID improvements over traditional losses on several datasets