**Supplementary**

1. **Ablation Study**

* FID(lower is better)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model | StarGAN v2 | + G1 loss | + Percep. loss | + G1, Percep loss |
| male2female | 12.215 | 12.147 | 24.343 | 11.894 |
| female2male | 23.335 | 24.459 | 27.400 | 23.495 |
| mean | 17.775 | 18.303 | 25.872 | 17.694 |

* LPIPS(Higher is better)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model | StarGAN v2 | + G1 loss | + Percep. loss | + G1, Percep loss |
| male2female | 0.205 | 0.224 | 0.252 | 0.229 |
| female2male | 0.186 | 0.200 | 0.220 | 0.203 |
| mean | 0.195 | 0.212 | 0.236 | 0.216 |

* Visual Comparison



In the first row of the image, the leftmost column represents the content images, while the remaining columns in the first row depict the same style images. Starting from the second row, the images are arranged in the following order: StarGAN v2, StarGAN v2 with only G1 loss applied, StarGAN v2 with only Perceptual loss applied, and StarGAN v2 with both G1 and Perceptual losses applied. The comparison demonstrates that the addition of G1 and Perceptual losses results in lower FID scores and higher LPIPS values, indicating improved performance in terms of image quality and perceptual similarity.

1. **Changes in FID by Iteration**

* Train AFHQ Datasets

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Figure presents a comparison of the Fréchet Inception Distance (FID) values between StarGAN v2 (Folder 1) and SagaGAN (Folder 2) on the AFHQ dataset. The graph on the left shows the FID Latent Mean values, while the graph on the right displays the FID Reference Mean values, both plotted against the file index. The FID Latent Mean values for SagaGAN consistently remain lower than those of StarGAN v2 across all file indices, indicating that SagaGAN generates images with a closer distribution to the real images in the latent space. Similarly, the FID Reference Mean values for SagaGAN are also lower than those of StarGAN v2, suggesting that SagaGAN produces images that more closely resemble the reference images. These results demonstrate that SagaGAN outperforms StarGAN v2 in terms of image quality and similarity to the target distribution on the AFHQ dataset.