
Supplemental Material

1 ALGORITHMS FOR TRAINING DASCN

We describe the detailed algorithm for training DASCN as following:

Algorithm 1 Training processing of the proposed DASCN

Input: the maximal loops M , the batch size m , the primal GAN with generator parameters θ_A , discriminator parameters ω_A and iteration n_1 , the dual GAN with generator parameters θ_B and discriminator parameters ω_B and iteration n_2 .

randomly initialize $\omega_t, \theta_t, t \in A, B$

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1: for iter=1 to  $M$  do
2:   for i=1 to  $n_1$  do
3:     Sample a minibatch of  $x$ , matched  $a$ , random noise  $z$ 
4:      $x' \leftarrow G_{SV}(a, z)$ 
5:     Update  $\omega_A$  to minimize Eq. (6)
6:   end for
7:   for j=1 to  $n_2$  do
8:     Sample random noise  $z$ 
9:      $a' \leftarrow G_{VS}(G_{SV}(a, z))$ 
10:    Update  $\omega_B$  to minimize Eq. (8)
11:   end for
12:   Sample random noise  $z$ 
13:    $a' \leftarrow G_{VS}(G_{SV}(a, z))$ 
14:   Update  $\theta_B$  to minimize Eq. (9)
15:   Sample random noise  $z, z'$ 
16:    $x' \leftarrow G_{SV}(a, z)$ 
17:    $x'' \leftarrow G_{SV}(G_{VS}(G_{SV}(a, z)), z')$ 
18:   Update  $\theta_A$  to minimize Eq. (7)
19: end for
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