Proposed model

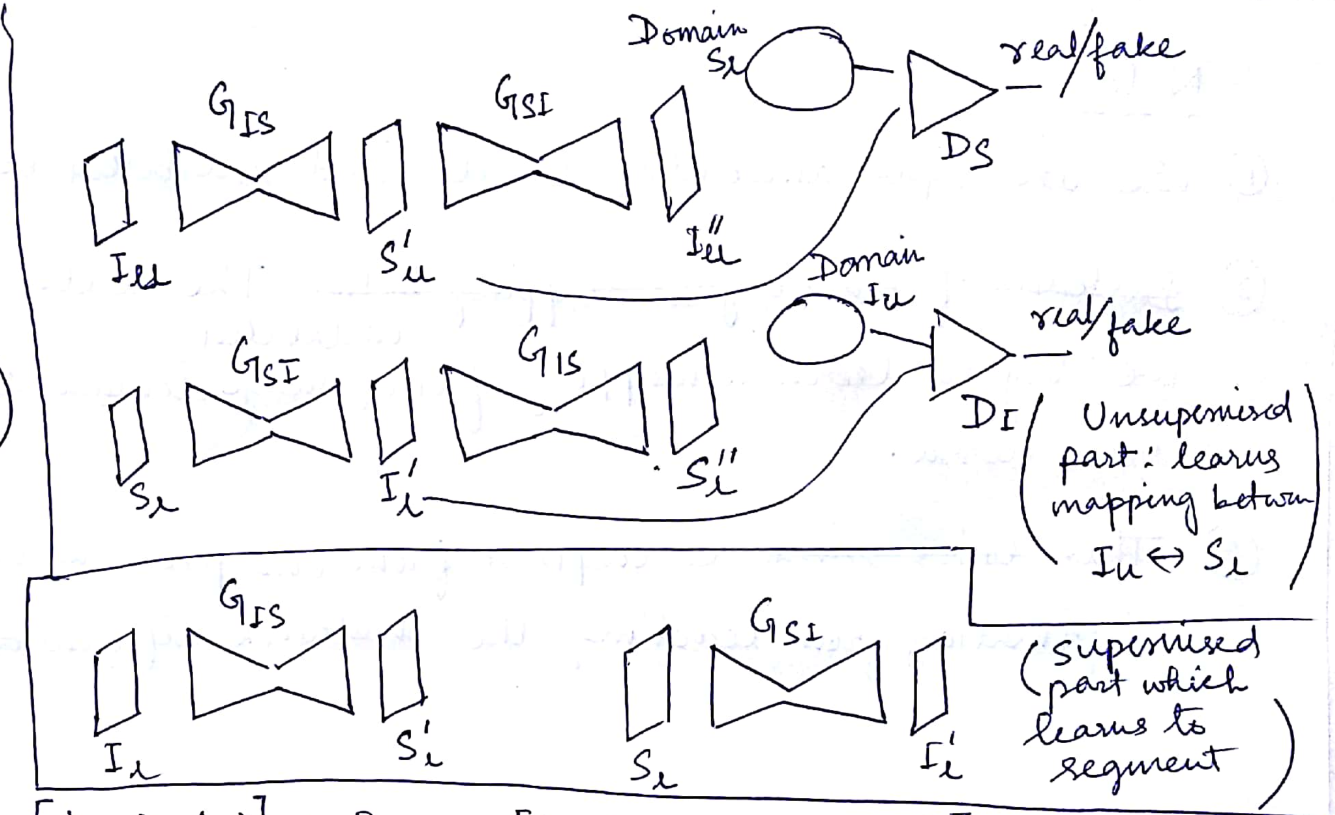
Domain I — images

Domain S — segmented output

Labeled Images for training : $I_l \rightarrow S_l$ (corresponding segmented output)

Unlabeled Images : I_u

I_l I_u S_l



$$\mathcal{L}_{unlabGAN}(G_{IS}, D_S) = E_{s\sim S_l}[\log D_S(s)] + E_{i\sim I_u}[\log(1 - D_S(G_{IS}(i)))] \quad \text{— (I)}$$

$$\mathcal{L}_{cycle}(G_{IS}, G_{SI}) = E_{i\sim I_u}[\| G_{SI}(G_{IS}(i)) - i \|_1] + E_{s\sim S_l}[\| G_{IS}(G_{SI}(s)) - s \|_1] \quad \text{— (II)}$$

$$\mathcal{L}_{CE}(G_{IS}) = E_{i,s\sim I_l, S_l} \cancel{[\log(s|i)]} [\log P_{G_{IS}}(s|i)] \quad \text{— (III)}$$

Equation (I) & (II) are completed for unlabelled data & (III) for labeled data

We aim to solve

$$G^*_{SI}\ G^*_{IS} = \underset{G_{IS}, G_{SI}}{\arg\min} \underset{D_S, D_S}{\max} \underbrace{\left(\mathcal{L}_{unlabGAN}(G_{IS}, D_S) + \mathcal{L}_{unlabGAN}(G_{SI}, D_I) + \cancel{\lambda}\mathcal{L}_{cycle} + \gamma \mathcal{L}_{CE}(G_{IS}) + \gamma \mathcal{L}_{CE}(G_{SI}) \right)}_{\text{min-max training of this combined objective.}}$$

to control the weight

~~we want this~~

Notes

① We use equal amount of labeled and unlabelled data in each batch to train the model.

② ~~Instead of learning a mapping betw~~ The extra information is obtained when we try to learn a mapping from unlabeled image domain to segmented output domain and vice versa.

③ This ~~tooks simil~~ is inspired from our previous work where we learn extra information from teaching the network differentiate between real unlabeled & fake images.