10번째 미팅발표

2021-12-08

임에딘

1. Knowledge distillation 훈련 후 결과
2. 저번 미팅시간에 나온 아이디어(선택적 KD) 구현

손실 함수

```python
def update_netg(self):
    self.G.zero_grad()
    self.label.data.resize_(self.opt.batchsize).fill_(self.real_label)
    self.fake, self.latent_i = self.G(self.input)
    self.out_g, self.feat_fake = self.D(self.fake)
    _, self.feat_real = self.D(self.input)


    # self.err_g_adv = self.bce_criterion(self.out_g, self.label)   # loss for ce
    self.err_g_adv=self.mse_criterion(self.feat_fake,self.feat_real)  # loss for feature matching
    self.err_g_rec = self.mse_criterion(self.fake, self.input)  # constrain x' to look like x

    #self.err_g =  self.err_g_rec + self.err_g_adv * self.opt.w_adv
    self.err_g = self.err_g_rec + self.err_g_adv * self.opt.w_adv
    self.err_g+= self.kd_criterion(self.y_pred,self.teacher.y_pred_t) #knowledge distillation
    #self.err_g+= self.ft_criterion(self.feat_list,self.teacher.feat_list)# feature distillation

    self.err_g.backward()
    self.optimizerG.step()
```
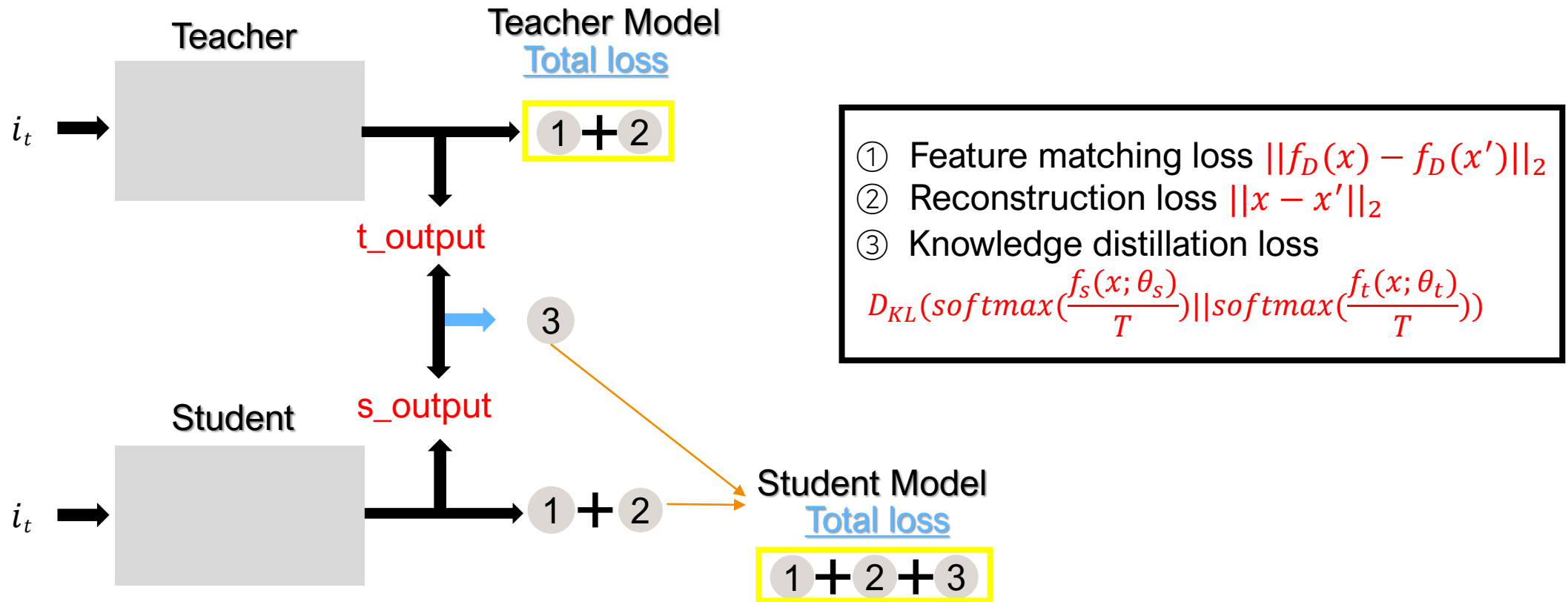
① f(x)와 f(x')의 손실
② x와 x'의 손실
③ knowledge distillation 손실

(1) self.err_g_adv=self.mse_criterion(self.feat_fake,self.feat_real)
(2) self.err_g_rec = self.mse_criterion(self.fake, self.input)
(3) self.err_g = self.err_g_rec + self.err_g_adv * self.opt.w_adv

structure

Teacher

Teacher Model
Total loss

i_t → Teacher

t_output

1 + 2

3

s_output

Student

i_t → Student

1 + 2

Student Model
Total loss

1 + 2 + 3

① Feature matching loss $||f_D(x) - f_D(x')||_2$
② Reconstruction loss $||x - x'||_2$
③ Knowledge distillation loss

$$D_{KL}(softmax(\frac{f_s(x;\theta_s)}{T})||softmax(\frac{f_t(x;\theta_t)}{T}))$$

teacher model & train/eval student model Result

Train Teacher

```
Epoch: [100] [ 800/ 975] D_loss(R/F): 0.000369/0.000094, G_loss: 0.196678
Epoch: [100] [ 900/ 975] D_loss(R/F): 0.000258/0.001400, G_loss: 0.164528
[100] auc:0.9098 th:0.0261 f1:0.6863      best_auc:0.9224 in epoch[90]

Avg one epoch time: 39.50, total 100 epochs time: 4319.18
```

Eval Teacher

```
#############################
######## Result ###########
ap:0.9048475383974509
auc:0.9372428545643987
best th:0.00561209162697196 --> best f1:0.807537273566121
```

1 **+** 2

1 **+** 2 **+** 3

Train Student

```
Epoch: [100] [ 800/ 975] D_loss(R/F): 0.014615/0.019411, G_loss: 0.112398
Epoch: [100] [ 900/ 975] D_loss(R/F): 0.001484/0.016102, G_loss: 0.139853
[100] auc:0.9193 th:0.0228 f1:0.6915      best_auc:0.9325 in epoch[81]

Avg one epoch time: 40.17, total 100 epochs time: 4389.76
```

Eval Student

```
#############################
######## Result ###########
ap:0.9134274215853668
auc:0.9464238429047412
best th:0.00557134812697682 --> best f1:0.8223677964492547
```