

9번째 미팅발표

2021-12-01

1. 손실함수 통합 케이스로 나눠서 결과 비교
2. Teacher model이 fixed 되어있는지 확인
3. Diversity Matters When Learning From Ensembles 논문 리뷰

손실 함수 통합

```
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.feats_list = self.G(self.input)
    self.out_g, self.feats_fake = self.D(self.fake)
    _, self.feats_real = self.D(self.input)

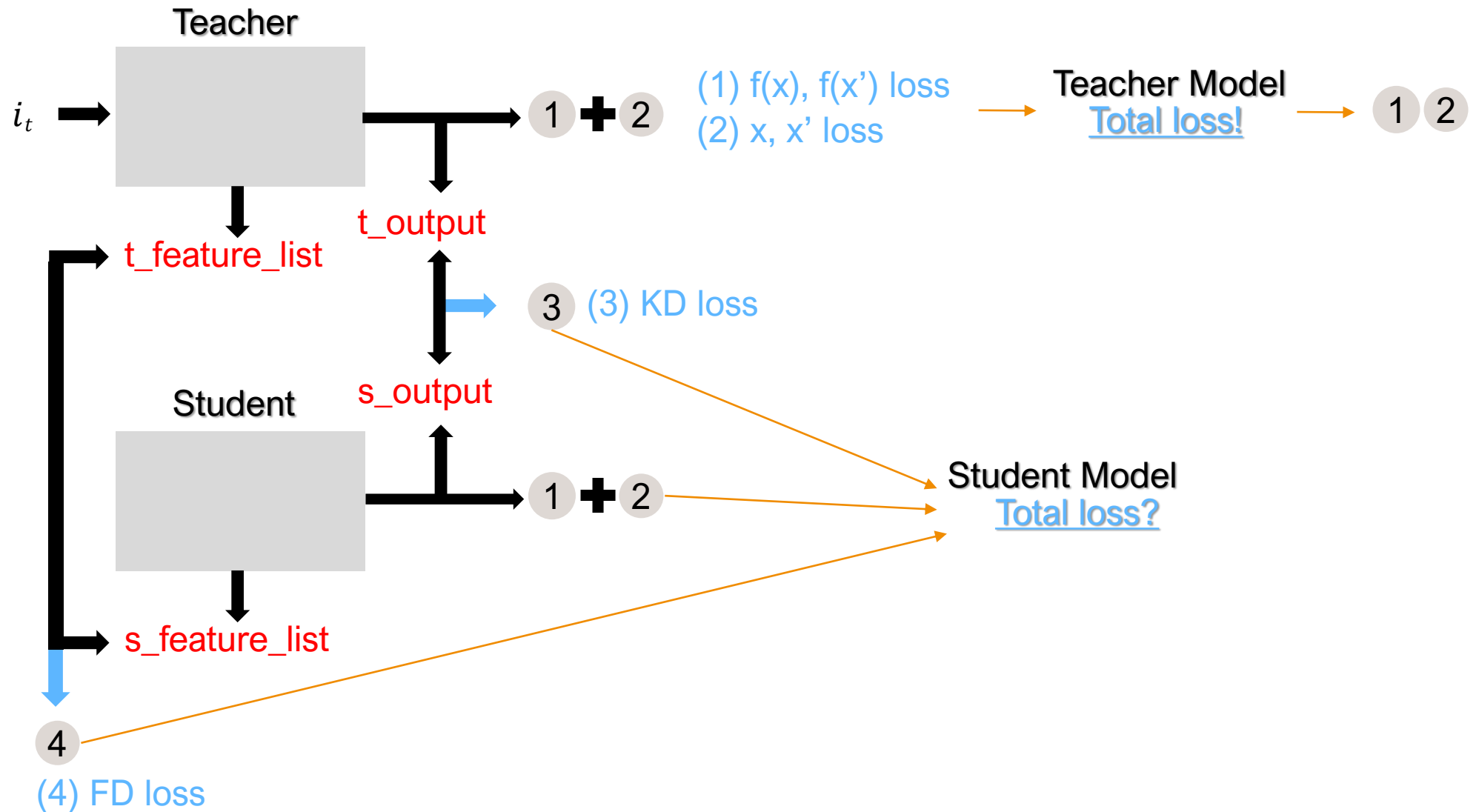
    # self.err_g_adv = self.bce_criterion(self.out_g, self.label) # loss for ce
    1 self.err_g_adv = self.mse_criterion(self.feats_fake, self.feats_real) # loss for feature matching
    2 self.err_g_rec = self.mse_criterion(self.fake, self.input) # constrain x' to look like x

    # 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
    3 self.err_g += self.kd_criterion(self.y, self.teacher.y_pred_t) # knowledge distillation
    4 self.err_g += self.ft_criterion(self.feats_list, self.teacher.feats_list) # feature distillation

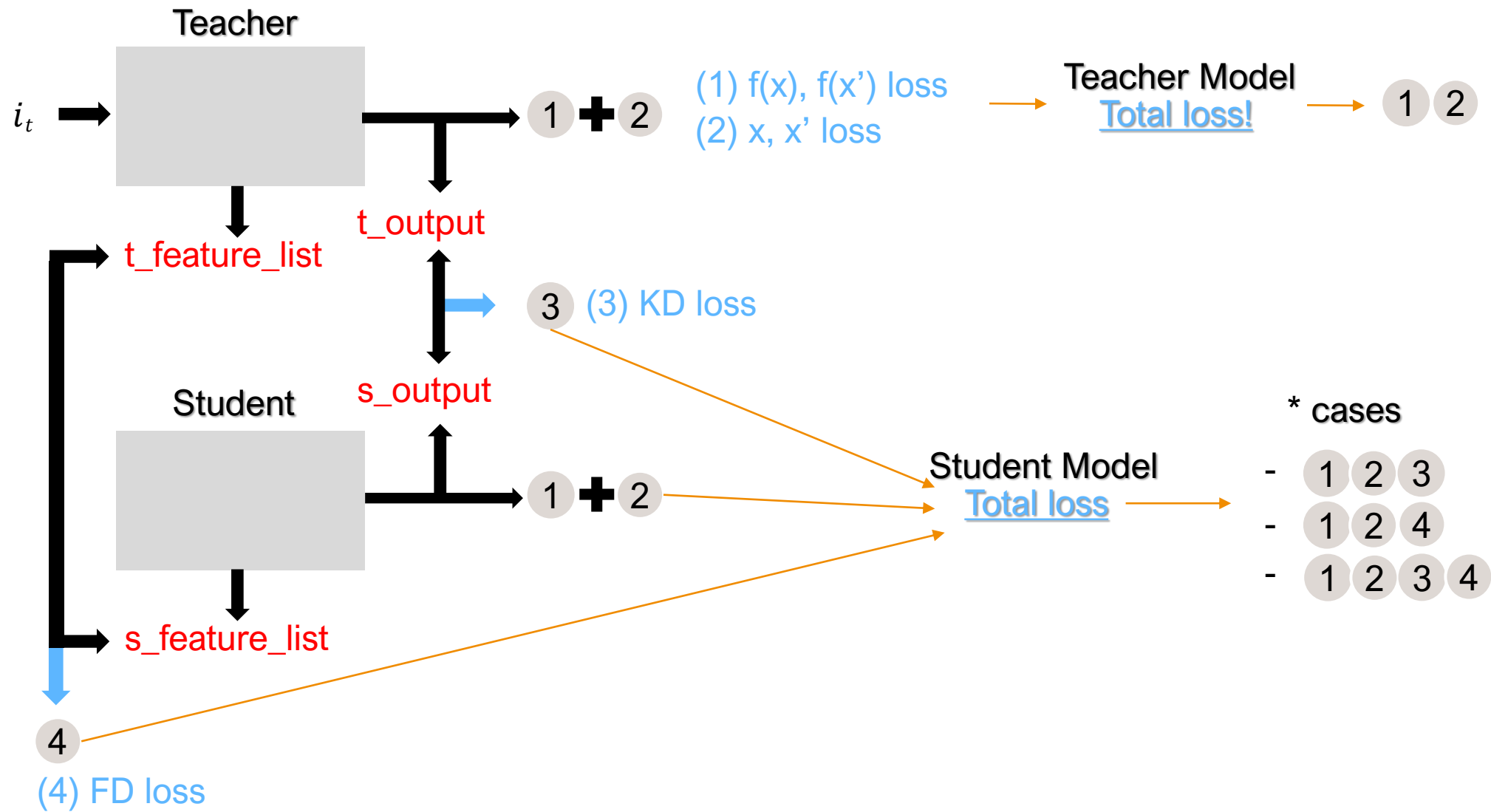
    self.err_g.backward()
    self.optimizerG.step()
```

- ① $f(x)$ 와 $f(x')$ 의 손실
- ② x 와 x' 의 손실
- ③ knowledge distillation 손실
- ④ feature distillation 손실

structure



structure



teacher model & train/eval student model Result

1 2
3 4

+KD loss
+FD loss

(Pretrained)
Teacher

```
#####  
##### Result #####  
ap:0.9107557515425027  
auc:0.9436909619756461  
best th:0.005304079037159681 --> best f1:0.8191078654821154  
(py37)  
edin@DESKTOP-FF4AVFF MINGW64 ~/Desktop/4-2/캡|1/코드/BeatGAN-master (master)  
$
```

Train
Student

```
Epoch: [100] [ 800/ 975] D_loss(R/F): 0.000105/0.000011, G_loss: 0.235535  
Epoch: [100] [ 900/ 975] D_loss(R/F): 0.000068/0.000456, G_loss: 0.174014  
[100] auc:0.9217 th:0.0312 f1:0.6793 best auc:0.9277 in epoch[66]  
  
Avg one epoch time: 59.00, total 100 epochs time: 6302.07
```

Test
Student

```
#####  
##### Result #####  
ap:0.9121933388443195  
auc:0.9454800831184896  
best th:0.004598231520503759 --> best f1:0.8219613711827153  
(py37)  
edin@DESKTOP-FF4AVFF MINGW64 ~/Desktop/4-2/캡|1/코드/BeatGAN-master (master)  
$
```

load, save G/D models

BeatGAN-master > experiments > ecg > output > beatgan_s > ecg > model

	이름	수정한 날짜	유형	크기
Teacher	beatgan_folder_0_D.pkl	2021-11-30 오후 4:26	PKL 파일	2,765KB
	beatgan_folder_0_G.pkl	2021-11-30 오후 4:26	PKL 파일	7,505KB
Student	beatgan_s_folder_0_D.pkl	2021-11-30 오후 6:04	PKL 파일	2,765KB
	beatgan_s_folder_0_G.pkl	2021-11-30 오후 6:04	PKL 파일	7,505KB
	beatgan_s_history.pkl	2021-11-30 오후 6:16	PKL 파일	1,716KB

load, save G/D models

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```
def copy(self):
    #load teacher model
    save_dir = os.path.join(self.outf, "beatgan", self.dataset, "model")
    self.G.load_state_dict(torch.load(os.path.join(save_dir, "beatgan"+"_folder_"+str(self.opt.folder) + '_G.pkl')))
    self.D.load_state_dict(torch.load(os.path.join(save_dir, "beatgan"+"_folder_"+str(self.opt.folder) + '_D.pkl')))

    #save teacher model to student folder path (==def save_weight_GD)
    save_dir = os.path.join(self.outf, self.model, self.dataset, "model")

    if not os.path.exists(save_dir):
        os.makedirs(save_dir)

    torch.save(self.G.state_dict(), os.path.join(save_dir, "beatgan"+"_folder_"+str(self.opt.folder) + '_G.pkl'))
    torch.save(self.D.state_dict(), os.path.join(save_dir, "beatgan"+"_folder_"+str(self.opt.folder) + '_D.pkl'))
```

기존에는
self.model로 save해서
beatgan_s_folder..로 저장됨

하지만 distill되어야할 모델은
변경되어서는 안되므로
파일명을 달리하여 저장하여
변경하도록 수정

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- FD loss

(Pretrained)
Teacher

```
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```

Train
Student

```
Epoch: [100] [ 800/ 975] D_loss(R/F): 0.660797/0.700865, G_loss: 0.010308  
Epoch: [100] [ 900/ 975] D_loss(R/F): 0.262663/1.314311, G_loss: 0.015475  
[100] auc:0.9142 th:0.0260 f1:0.6826 best_auc:0.9247 in epoch[40]  
  
Avg one epoch time: 48.18, total 100 epochs time: 5223.70  
(py37)
```

Test
Student

```
#####  
##### Result #####  
ap:0.8978925461343555  
auc:0.9296884328658325  
best th:0.011898485943675041 --> best f1:0.7991463596208249  
(py37)  
edin@DESKTOP-FF4AVFF MINGW64 ~/Desktop/4-2/캡|1/코드/BeatGAN-master (master)  
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teacher model & train/eval student model Result

1 2
4

- KD loss
+FD loss

(Pretrained)
Teacher

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(py37)  
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$
```

Train
Student

```
Epoch: [100] [ 800/ 975] D_loss(R/F): 0.000773/0.000491, G_loss: 0.130965  
Epoch: [100] [ 900/ 975] D_loss(R/F): 0.003038/0.000828, G_loss: 0.142661  
[100] auc:0.9099 th:0.0504 f1:0.6818 best_auc:0.9228 in epoch[99]  
Avg one epoch time: 56.75, total 100 epochs time: 6092.91
```

Test
Student

```
#####  
##### Result #####  
ap:0.9018369128817183  
auc:0.9340727981965814  
best th:0.009869868867099285 --> best f1:0.8056621880998082  
(py37)  
edin@DESKTOP-FF4AVFF MINGW64 ~/Desktop/4-2/캡치1/코드/BeatGAN-master (master)  
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$
```

Train
Student

```
Epoch: [100] [ 800/ 975] D_loss(R/F): 0.006353/0.001838, G_loss: 0.160169  
Epoch: [100] [ 900/ 975] D_loss(R/F): 0.002276/0.000725, G_loss: 0.174733  
[100] auc:0.9158 th:0.0169 f1:0.6744 best_auc:0.9242 in epoch[89]  
  
Avg one epoch time: 61.63, total 100 epochs time: 6573.39
```

Test
Student

```
#####  
##### Result #####  
ap:0.8875291196398069  
auc:0.9119630947632182  
best th:0.004932912532240152 --> best f1:0.7937380379840016  
(py37)  
edin@DESKTOP-FF4AVFF MINGW64 ~/Desktop/4-2/캡치1/코드/BeatGAN-master (master)  
$
```