SW중심대학 공동 AI 경진대회 2023

TEAM 0601p

Satellite Image Building Area Segmentation

CONTENTS

초기 훈련 세팅 .... 파라미터 튜닝 후 .... 시각화 후 .... 제출

- Model

- Dataset

- Threshold

- Etc

- Augmentation

- Scheduler

- Noisy Label Learning

- Ensemble

InternImage

$H \times W \times 3$

stem

stage 1
basic block $\times L_1$ — $H/4 \times W/4 \times C_1$

downsampling

stage 2
basic block $\times L_2$ — $H/8 \times W/8 \times C_2$

downsampling

stage 3
basic block $\times L_3$ — $H/16 \times W/16 \times C_3$

downsampling

stage 4
basic block $\times L_4$ — $H/32 \times W/32 \times C_4$

cls, det, seg, ...

stem
3×3 conv, s2, p1
LN, GELU
3×3 conv, s2, p1
LN

downsampling
3×3 conv, s2, p1
LN

stage i
$L_i \times$
LN
FFN
LN
DCNv3 (G_i)
Δp, **m**

stacking rules
(1) $C_i = 2^{i-1} C_1$
(2) $G_i = C_i / C'$
(3) $L_1 = L_2 = L_4$
(4) $L_1 \leq L_3$

UPerNet
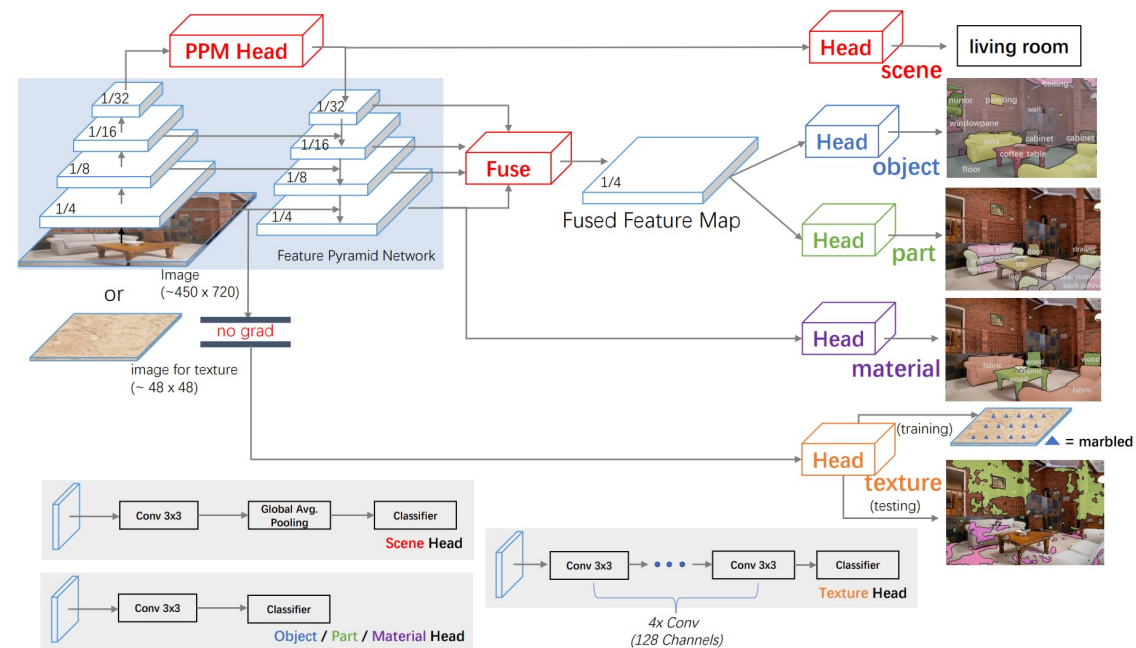
TrainData

1024x1024

TestData
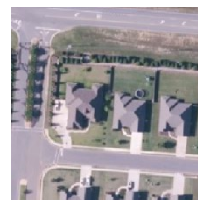
224x224

TrainData

95%	5%
TrainSet	ValidSet

이미지 디코딩 + 전처리

Root

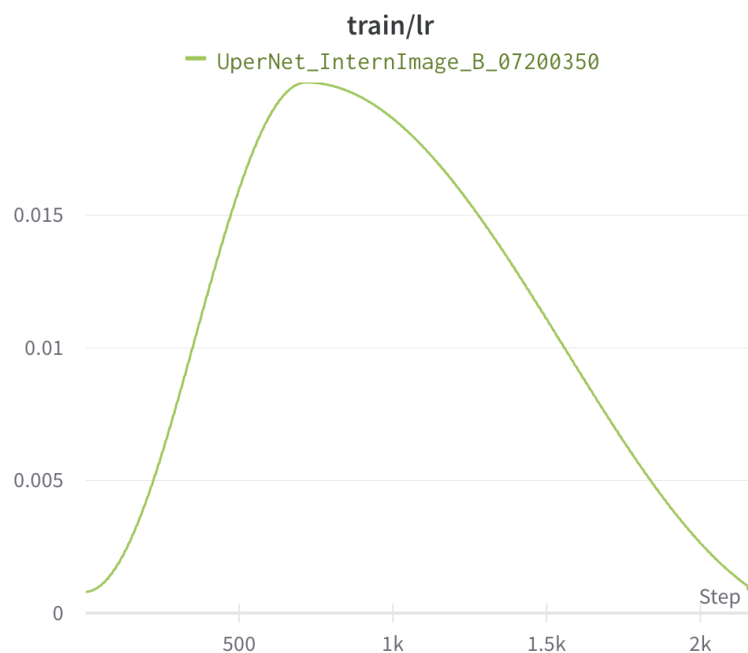|		
📄	train_images.npy	19.8GB
📄	train_masks.npy	6.62GB
📄	valid_images.npy	12.8GB
📄	valid_masks.npy	1.06GB

로딩 한 번만, 5초만에!

Binary Cross Entropy

$$BCE = \begin{cases} -log(\hat{y}),\ where\ y = 1 \\ -log(1 - \hat{y}),\ where\ y = 0 \end{cases}$$

Threshold

- <u>Sliding Window</u>

- Youden's Index

OneCycleLr

train/lr

— UperNet_InternImage_B_07200350

873251

UperNet_InternImage_B_07230400.csv

pretrained_backbone_UperNet_InternImage_B_415_threshold_0.35 edit

2023-07-23
13:18:20

0.8065750019
-

```
Test Dice Score: 0.8572664920355425
Epoch 486 / train loss: 0.030683339436483735,
Epoch 487 / train loss: 0.03088393741670777, ]
Epoch 488 / train loss: 0.030397942289710045,
Epoch 489 / train loss: 0.030587186653386143,
Epoch 490 / train loss: 0.030794070650111225,
Test loss: 0.03503637126337851
Test Dice Score: 0.8622918786788855
Epoch 491 / train loss: 0.03094469925717396, ]
Epoch 492 / train loss: 0.030748703023966623,
Epoch 493 / train loss: 0.0302677725014441, ]
Epoch 494 / train loss: 0.031057186068638283,
Epoch 495 / train loss: 0.03028381887056372, ]
Test loss: 0.03517369529757014
Test Dice Score: 0.8605761558067899
Epoch 496 / train loss: 0.030642813729012713,
Epoch 497 / train loss: 0.030247466173022985,
Epoch 498 / train loss: 0.030249991563751417,
Epoch 499 / train loss: 0.030402076485402444,
Epoch 500 / train loss: 0.030660340891164893,
Test loss: 0.03550230505607827
Test Dice Score: 0.8591974145558035
```

Test score
0.8065750019 VS ### Validation score
0.8622918786

CONTENTS

파라미터 튜닝 후 – 성능 차이? *After Parameter Tuning*

Test score   Validation score

0.8065750019 (VS) **0.8622918786**

- Valid Set에 overfitting

- Valid Set과 Test Set에 유의미한 분포 차이

```python
train_transform = albumentations.Compose([
    albumentations.augmentations.geometric.resize.RandomScale(scale_limit=0.2, interpolation=1, always_apply=False, p=0.5),
    albumentations.RandomCrop(224, 224),
    albumentations.VerticalFlip(p=0.5),
    albumentations.HorizontalFlip(p=0.5),
    albumentations.Normalize(),
    ToTensorV2()
])
```

OneCycleLr

train/lr
— UperNet_InternImage_B_07200350
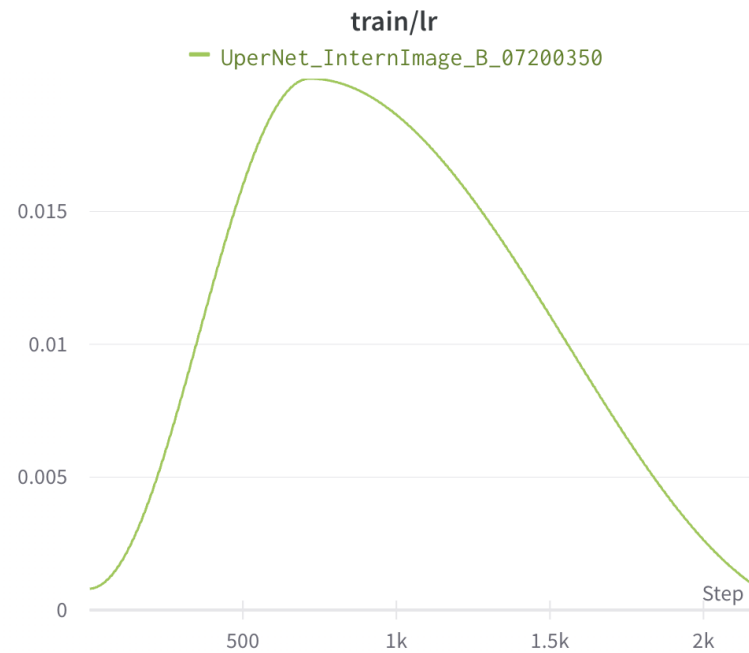
CosineAnnealing WarmupRestarts

train/lr

873251 **UperNet_InternImage_B_07230400.csv**

pretrained_backbone_UperNet_InternImage_B_415_threshold_0.35 edit

2023-07-23 13:18:20   0.8065750019 -

875463 **UperNet_InternImage_B_07252005.csv**

pretrained_backbone_UperNet_InternImage_B_470_threshold_0.35 with augmentation

https://vessl.ai/2023-SUMMER/0601p/experiments/39 edit

2023-07-26 05:16:08   0.8131358797 -

CONTENTS

M-Net   **Decoupling**   **Co-teaching**
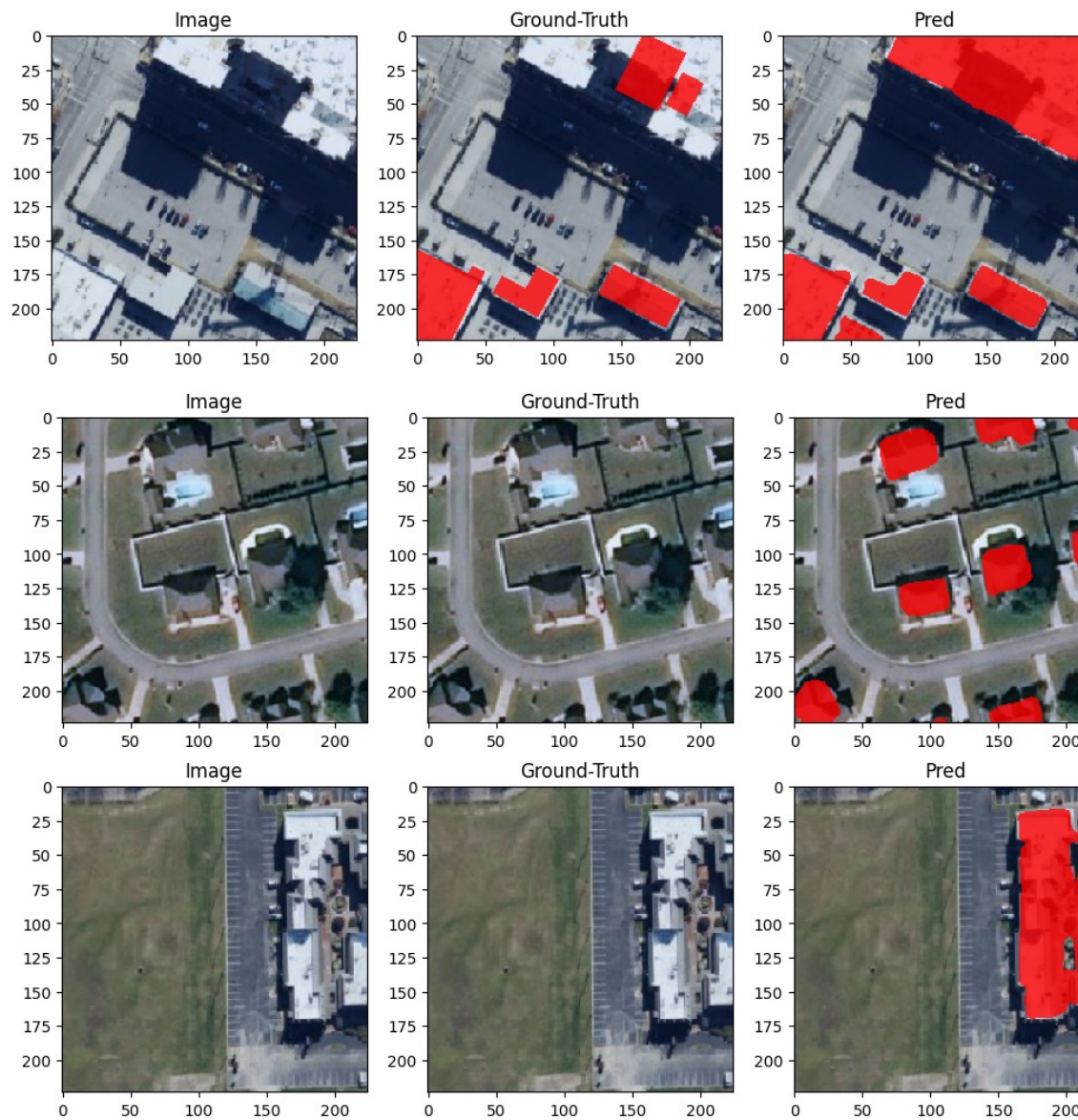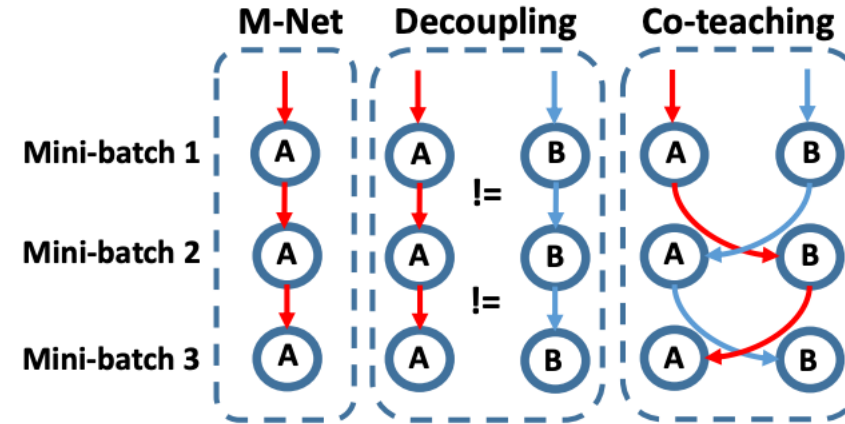
Algorithm 1 Co-teaching Algorithm.

1: **Input** w_f and w_g, learning rate η, fixed τ, epoch T_k and $T_{\max}$, iteration $N_{\max}$;

for $T = 1, 2, \ldots, T_{\max}$ **do**

    2: **Shuffle** training set $\mathcal{D}$;   //noisy dataset

    for $N = 1, \ldots, N_{\max}$ **do**

        3: **Fetch** mini-batch $\bar{\mathcal{D}}$ from $\mathcal{D}$;

        4: **Obtain** $\bar{\mathcal{D}}_f = \arg\min_{\mathcal{D}':|\mathcal{D}'|\geq R(T)|\bar{\mathcal{D}}|} \ell(f, \mathcal{D}')$;   //sample $R(T)\%$ small-loss instances

        5: **Obtain** $\bar{\mathcal{D}}_g = \arg\min_{\mathcal{D}':|\mathcal{D}'|\geq R(T)|\bar{\mathcal{D}}|} \ell(g, \mathcal{D}')$;   //sample $R(T)\%$ small-loss instances

        6: **Update** $w_f = w_f - \eta\nabla\ell(f, \bar{\mathcal{D}}_g)$;   //update w_f by $\bar{\mathcal{D}}_g$;

        7: **Update** $w_g = w_g - \eta\nabla\ell(g, \bar{\mathcal{D}}_f)$;   //update w_g by $\bar{\mathcal{D}}_f$;

    end

    8: **Update** $R(T) = 1 - \min\left\{\frac{T}{T_k}\tau, \tau\right\}$;

end

9: **Output** w_f and w_g.

877146 **UperNet_InternImage_B_07271456.csv**

co_teaching tau 0.04 (maybe,,) edit

2023-07-27 0.8080039912
23:57:50 -

```
Case 3935: SOTA5,SOTA6,SOTA19,SOTA21,SOTA25,SOTA27
Dice score: 0.8722449147066816

Case 3936: SOTA5,SOTA6,SOTA19,SOTA23,SOTA25,SOTA27
Dice score: 0.8729224562311039

Case 3937: SOTA5,SOTA6,SOTA20,SOTA21,SOTA23,SOTA25
Dice score: 0.87256802096754423

Case 3938: SOTA5,SOTA6,SOTA20,SOTA21,SOTA23,SOTA27
Dice score: 0.8729192055240065

Case 3939: SOTA5,SOTA6,SOTA20,SOTA21,SOTA25,SOTA27
Dice score: 0.87216803315602728

Case 3940: SOTA5,SOTA6,SOTA20,SOTA23,SOTA25,SOTA27
Dice score: 0.8728311364056349

Case 3941: SOTA5,SOTA6,SOTA21,SOTA23,SOTA25,SOTA27
Dice score: 0.8724009329531374

Case 3942: SOTA5,SOTA7,SOTA18,SOTA19,SOTA20,SOTA21
Dice score: 0.8741588240244141

Case 3943: SOTA5,SOTA7,SOTA18,SOTA19,SOTA20,SOTA23
Dice score: 0.874786498165932

Case 3944: SOTA5,SOTA7,SOTA18,SOTA19,SOTA20,SOTA25
Dice score: 0.87411254193625

Case 3945: SOTA5,SOTA7,SOTA18,SOTA19,SOTA20,SOTA27
Dice score: 0.874190926857384

Case 3946: SOTA5,SOTA7,SOTA18,SOTA19,SOTA21,SOTA23
Dice score: 0.874299349237223

Case 3947: SOTA5,SOTA7,SOTA18,SOTA19,SOTA21,SOTA25
Dice score: 0.8735378948914236

Case 3948: SOTA5,SOTA7,SOTA18,SOTA19,SOTA21,SOTA27
Dice score: 0.8737598637572858
```

```
threshold : 0.42    dice score : 0.8756919331243392
threshold : 0.43    dice score : 0.8757768244970412
threshold : 0.44    dice score : 0.8756654833545204
threshold : 0.45    dice score : 0.875591595633691
threshold : 0.46    dice score : 0.8754710139346724
threshold : 0.47    dice score : 0.8753663221327197
threshold : 0.48    dice score : 0.8751597407819176
threshold : 0.49    dice score : 0.8747536383089232
threshold : 0.5     dice score : 0.8744907905073727
threshold : 0.51    dice score : 0.8739792138588529
threshold : 0.52    dice score : 0.8736521758619142
threshold : 0.53    dice score : 0.873170691711896
threshold : 0.54    dice score : 0.8726385516278884
threshold : 0.55    dice score : 0.872062952244649
threshold : 0.56    dice score : 0.8712188743409657
threshold : 0.57    dice score : 0.8704968397022963
threshold : 0.58    dice score : 0.86963388231956
threshold : 0.59    dice score : 0.868913375863842
threshold : 0.6     dice score : 0.8681124996404354
threshold : 0.61    dice score : 0.8672329816831594
threshold : 0.62    dice score : 0.8663639836952466
threshold : 0.63    dice score : 0.8652342825042767
threshold : 0.64    dice score : 0.8640226265963387
threshold : 0.65    dice score : 0.8627758293258709
threshold : 0.66    dice score : 0.8613957784422973
threshold : 0.67    dice score : 0.8599668100100606
threshold : 0.68    dice score : 0.8584658107837709
threshold : 0.69    dice score : 0.8568145844782767
threshold : 0.7     dice score : 0.8551520265340618
```

877346

best_ensemble_3.csv

Case 3943: SOTA5,SOTA7,SOTA18,SOTA19,SOTA20,SOTA23

Dice score: 0.874786498165932 threshold=0.43 edit

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06:07:01

0.8213737639
-

☑

877214

best_ensemble_2.csv

Case 1657: SOTA1,SOTA2,SOTA4,SOTA5,SOTA6,SOTA7, Dice score: 0.875 threshold=0.43 edit

2023-07-28
00:43:48

0.8216144412
-

☑

결론!

Public Score

6	ApexRegeno		0.82605	67	6일 전
7	Hallym_MMC		0.82444	48	7일 전
8	Hallym_AIAC		0.82331	53	6일 전
9	AIM		0.82284	32	6일 전
10	픽셀		0.82261	49	6일 전
11	0601p		0.82161	22	6일 전
12	노인과바다		0.82095	30	6일 전
13	DfX		0.81982	33	6일 전
14	SSUAI		0.81959	47	6일 전
15	동고동락		0.81853	64	6일 전

Private Score

5	AiRLab		0.82506	45	6일 전
6	Hallym_MMC		0.82372	48	10일 전
7	ApexRegeno		0.82312	67	6일 전
8	Hallym_AIAC		0.82121	53	6일 전
9	0601p		0.82059	22	6일 전
10	픽셀		0.8205	49	6일 전
11	AIM		0.81963	32	12일 전
12	노인과바다		0.81926	30	6일 전
13	SSUAI		0.81875	47	6일 전
14	338		0.81786	37	8일 전
15	DfX		0.81685	33	6일 전

Thank you!