최종 정리

2022.08.12 Fri.

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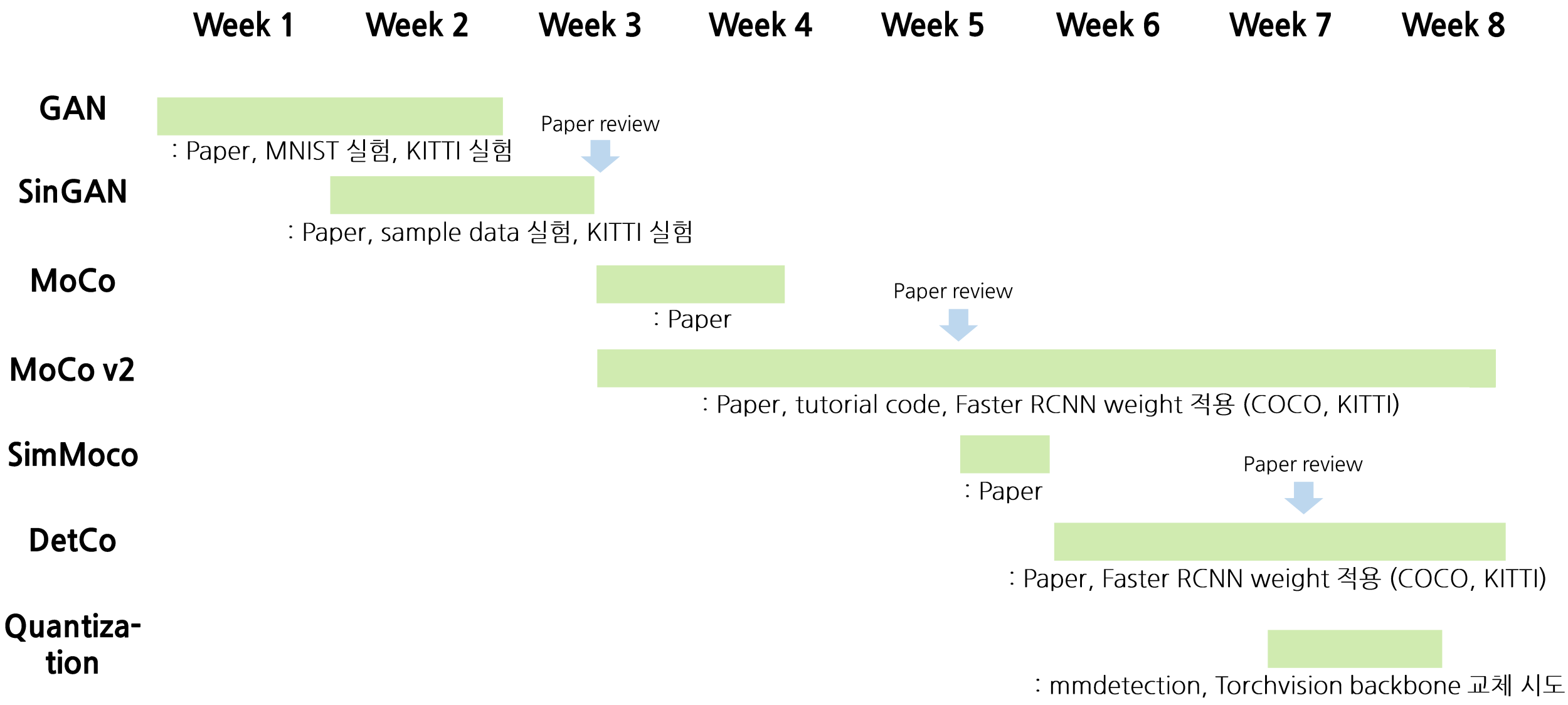
STRADVISION

Project Timeline



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~~*Task 1. GAN을 활용한 특수 케이스 이미지 생성*~~

~~*1. GAN*~~

~~*2. SinGAN*~~

→ *중간 발표*

Task 2. Faster-RCNN에 MoCo v2 weight를 적용한 것과 from_scratch 비교

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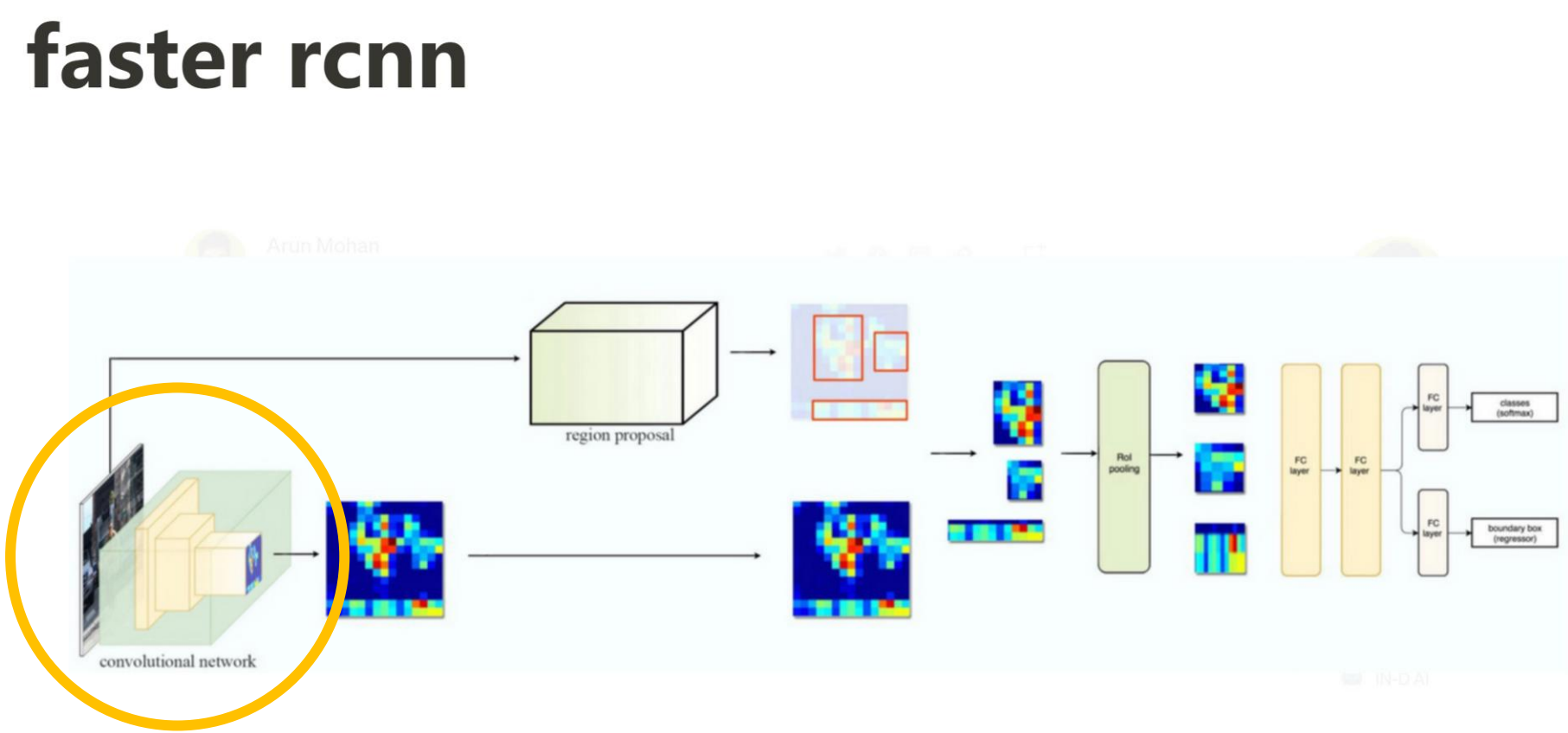
~~*Task 2. Faster-RCNN에 MoCo v2 weight를 적용한 것과 from_scratch 비교*~~

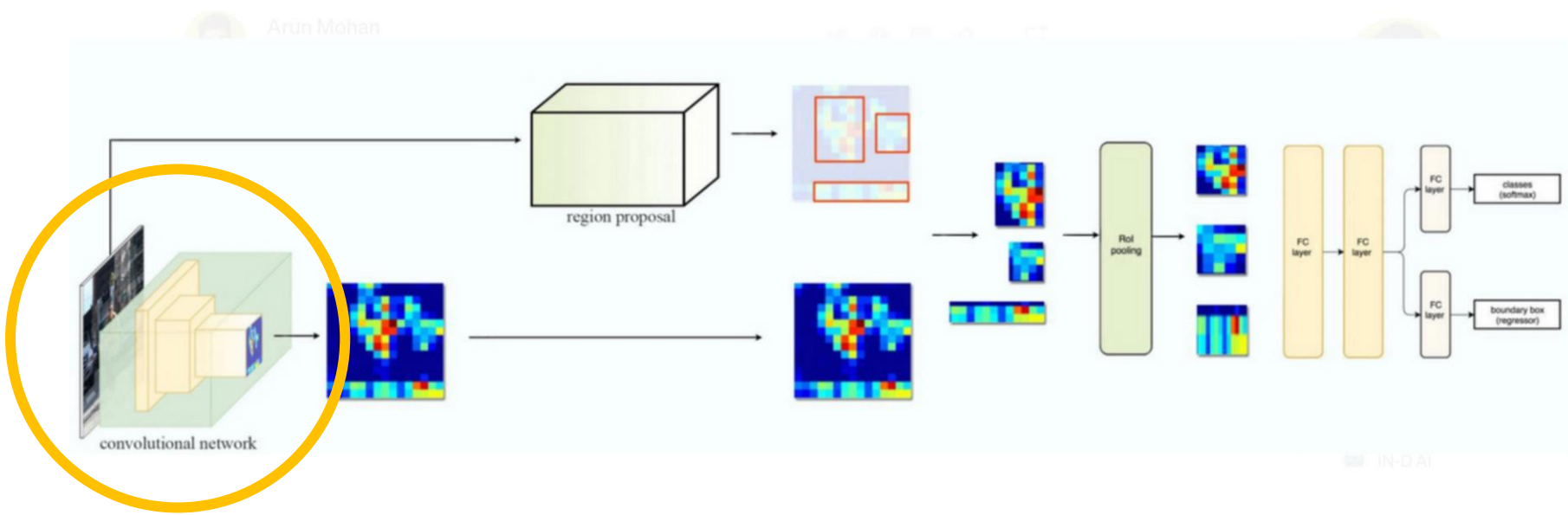
→ Task 2. Faster-RCNN에 Resnet50, MoCo v2, Detco weight 적용 & 비교

Faster RCNN Architecture



Backbone : Resnet50

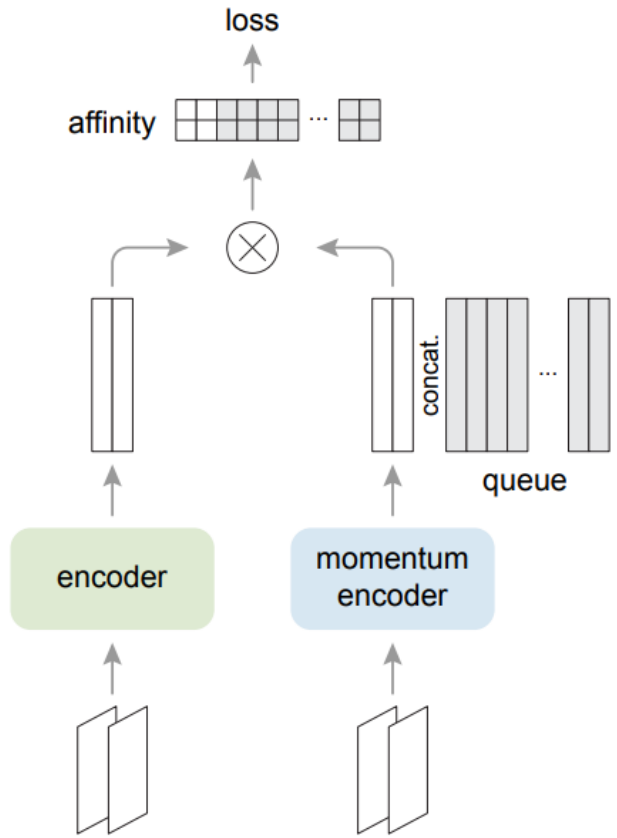
Faster RCNN Architecture



Backbone : Resnet50

- Backbone weight 교체 & 비교
- Default : Resnet50 on ImageNet
- MoCo v2, DetCo pre-trained model on ImageNet

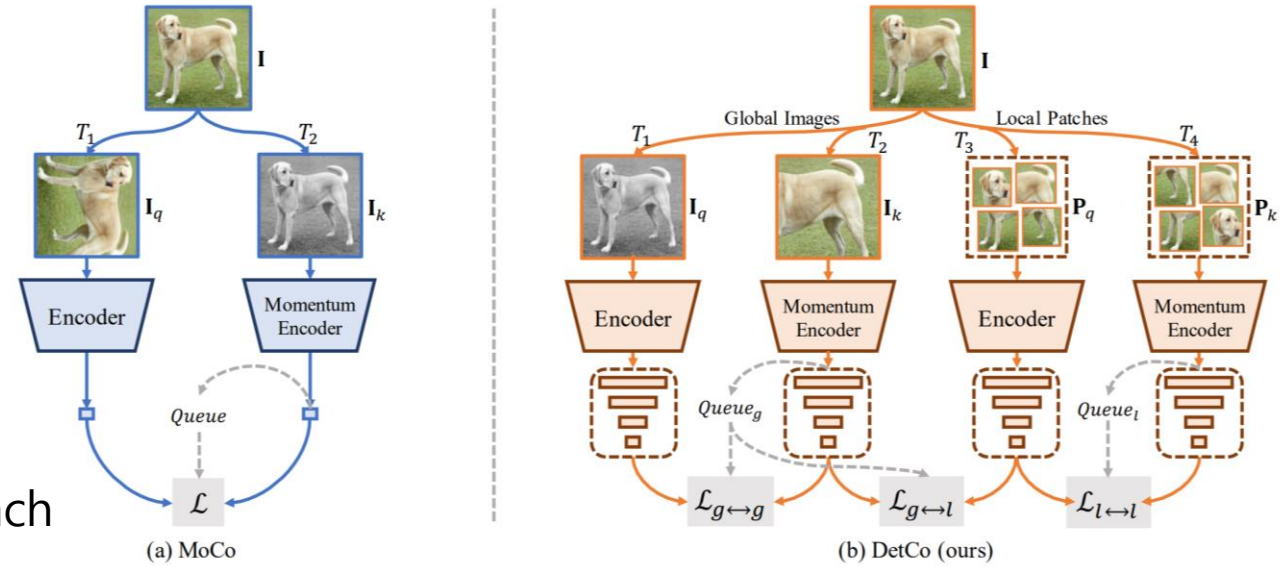
MoCo v2



(b) Momentum Contrast

- Unsupervised representation learning
- Contrastive learning → good image representation
- Large dictionary, momentum encoder → key consistency
- Encoder : Resnet50
- 효과적인 image feature 추출 → Faster RCNN backbone에 MoCo v2 weight 적용

DetCo



- Self-supervised approach
- unsupervised representation learning
- Encoder : Resnet50
- Object detection, image classification 모두 효과적인 image representation 학습
- **MoCo v2 base** + multi-level supervision + contrastive learning between global and local patch
- 효과적인 image feature 추출 → Faster RCNN backbone에 DetCo weight 적용

Result – Validation Set

Backbone weight	Epoch	Learning Rate	mAP	mAP_50	mAP_75
Resnet50	12	0.0025	0.376	**0.584**	0.409
MoCo v2	12	0.0025	0.351	0.548	0.378
DetCo	12	0.0025	**0.377**	0.583	**0.410**

Object detection on COCO using Faster RCNN

Result – Validation Set

Backbone weight	Epoch	Learning Rate	mAP
Resnet50	12	0.0025	0.884
MoCo v2	12	0.00025	0.848
DetCo	12	0.0025	**0.891**

Object detection on KITTI using Faster RCNN

Conclusion

- Data augmentation을 통한 contrastive learning으로 image feature를 생성하는 모델인 MoCo, DetCo
- Classification, object detection에 fine-tuned task에서 supervised learning 보다 좋은 성능
- COCO, KITTI 데이터 셋에 대하여 Faster RCNN backbone에 각 weight 적용 & 비교
- 최신 모델인 DetCo가 기존 ResNet50 이상의 결과
- Unsupervised learning 방식으로, unlabeled & large 데이터셋에 대해 학습한다면
  - Downstream task에서 더 좋은 성능을 보일 것 기대

References

[Paper]

He, K., Fan, H., Wu, Y., Xie, S., & Girshick, R. (2020). Momentum contrast for unsupervised visual representation learning. In *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition* (pp. 9729-9738).

Chen, X., Fan, H., Girshick, R., & He, K. (2020). Improved baselines with momentum contrastive learning. *arXiv preprint arXiv:2003.04297*.

Xie, E., Ding, J., Wang, W., Zhan, X., Xu, H., Sun, P., ... & Luo, P. (2021). Detco: Unsupervised contrastive learning for object detection. In *Proceedings of the IEEE/CVF International Conference on Computer Vision* (pp. 8392-8401).

[Paper Review]
https://github.com/Dahee9532/paper_review_ss2022

[Code]
https://github.com/Dahee9532/2022si

Thank you ☺