Better Image De-occlusion using Image search

Papers:

Ehsani, Kiana, et al. "Segan: Segmenting and generating the invisible." *CVPR 2018*
Yan, Xiaosheng, et al. "Visualizing the Invisible: Occluded Vehicle Segmentation and Recovery." *ICCV 2019*
Zhan, Xiaohang, et al. "Self-Supervised Scene De-occlusion." *arXiv, to appear in CVPR 2020*

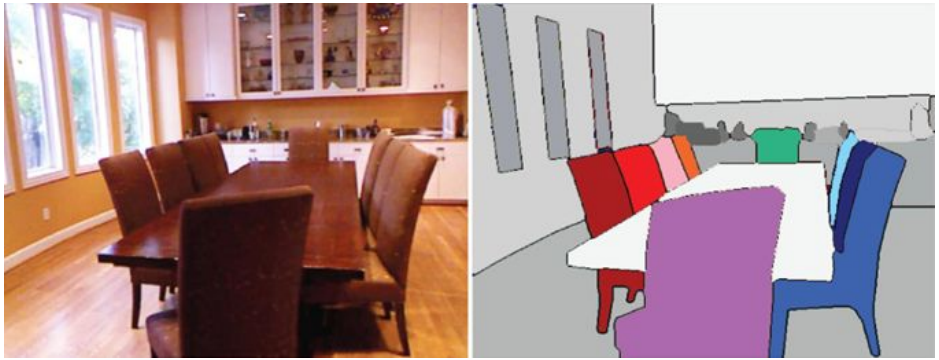
Team #8
Guoyuan An (20184637), Saelyne Yang (20193338), Heeju Wi (20203388), Junyong Park (20205146)

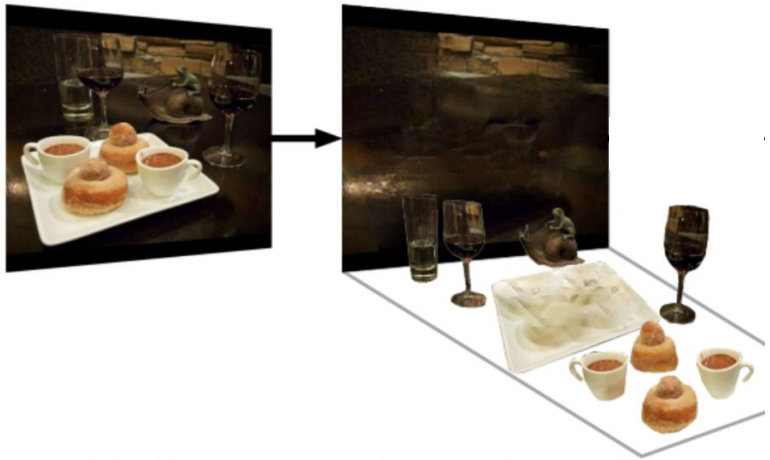
Problem

Scene de-occlusion / Amodal mask & content generation

Amodal perception:

"perceiving the **whole** of a physical structure when **only a portion** of it is **visible**"





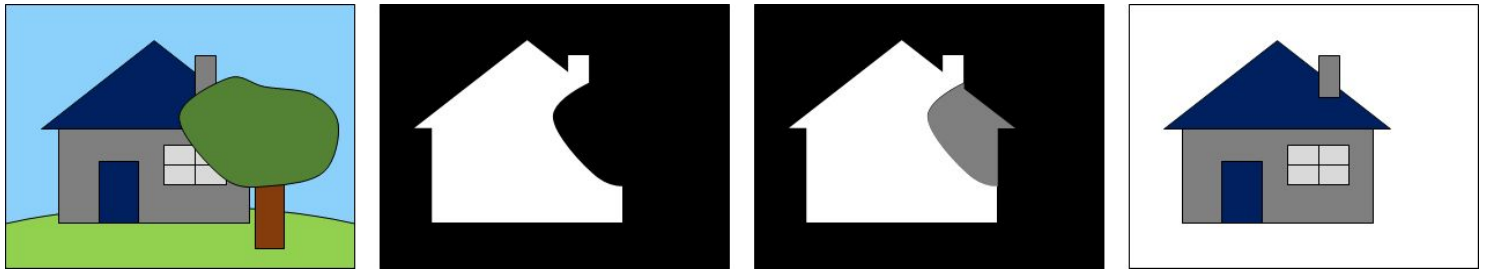
(a) original image (b) scene de-occlusion

Problem

Scene de-occlusion / Amodal mask & content generation

Amodal perception:

perceiving the **whole** of a physical structure when **only a portion** of it is **visible**

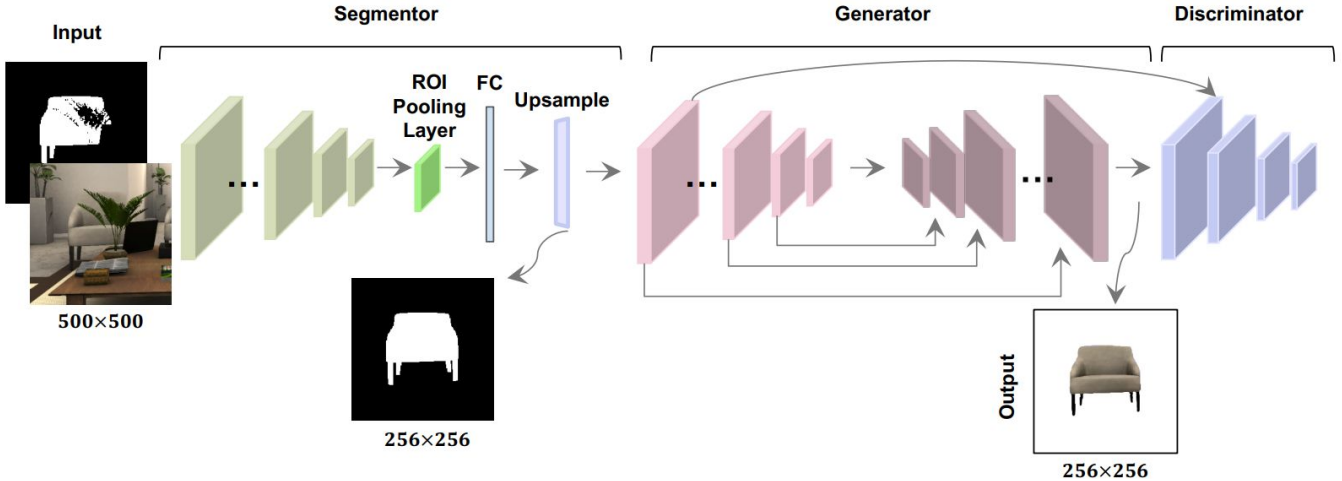


(a) Input image (b) Modal mask (c) Amodal mask (d) De-occlusion

1. SeGAN: Segmenting and Generating the Invisible (CVPR 2018)

Inputs: 1) the RGB image
2) **segmentation mask** for the **visible** regions of an object *
* masks for visible regions can be obtained from any segmentation method

Output: RGB image where the occluded regions of the object have been reconstructed



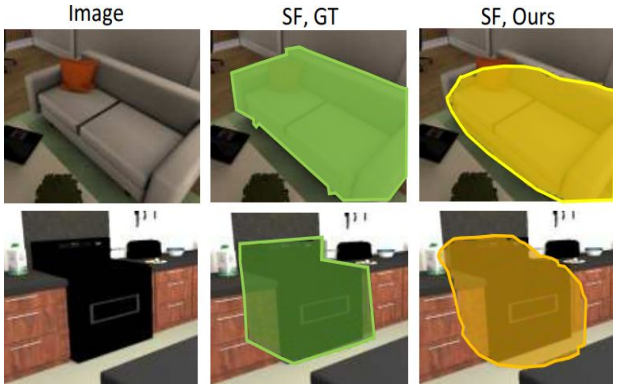
Ehsani, Kiana, et al. "Segan: Segmenting and generating the invisible." *CVPR 2018*

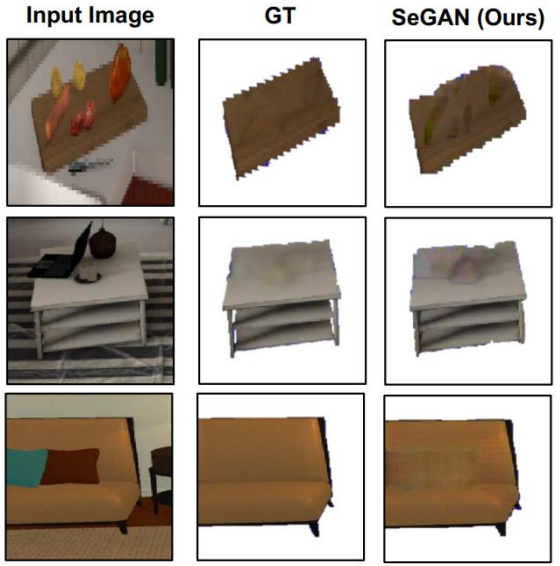
1. SeGAN: Segmenting and Generating the Invisible (CVPR 2018)

Dataset: DYCE

- a dataset of synthetic occluded objects

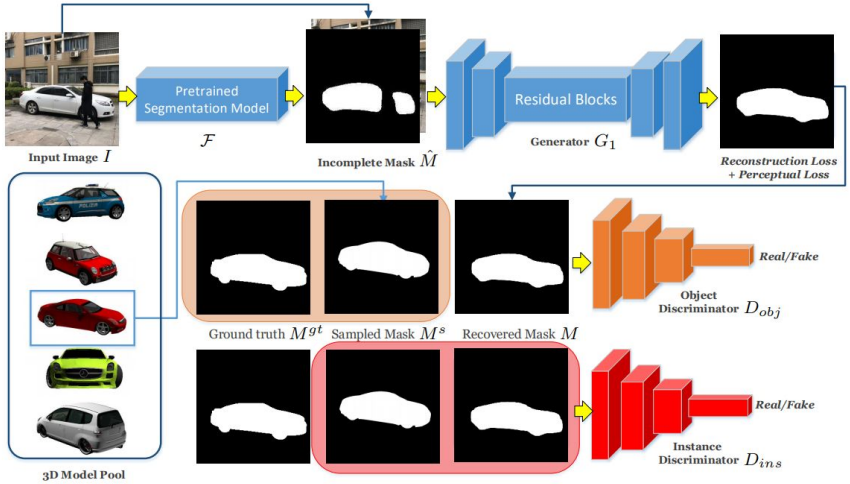
Results:





Ehsani, Kiana, et al. "Segan: Segmenting and generating the invisible." *CVPR 2018*

2. Visualizing the Invisible: Occluded Vehicle Segmentation and Recovery (ICCV 2019)



Segmentation completion

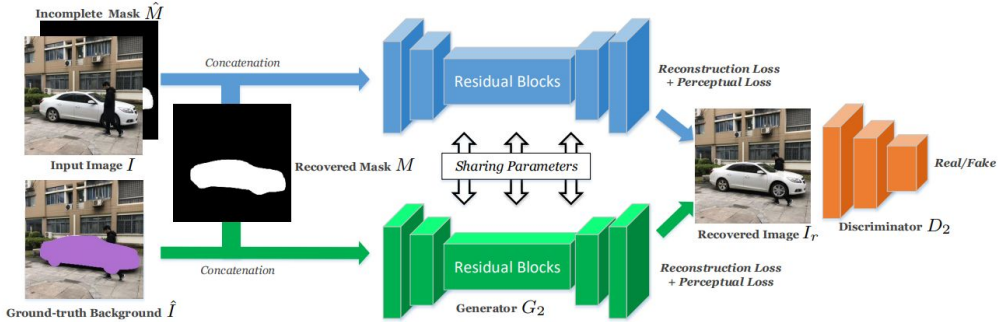
Use two Discriminators:

- Object Dis. - Real vehicle masks?
- Instance Dis. - Mask of the input image?

Appearance recovery

Path 1 - Fill in colors of invisible parts

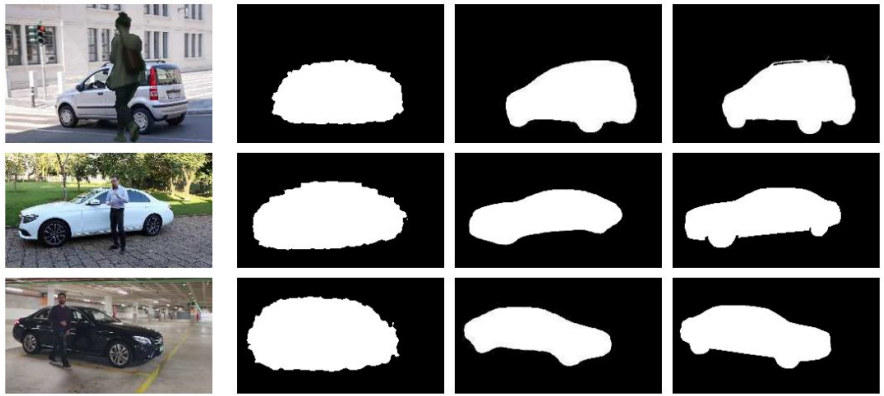
Path 2 - Inpaint whole vehicle based on background



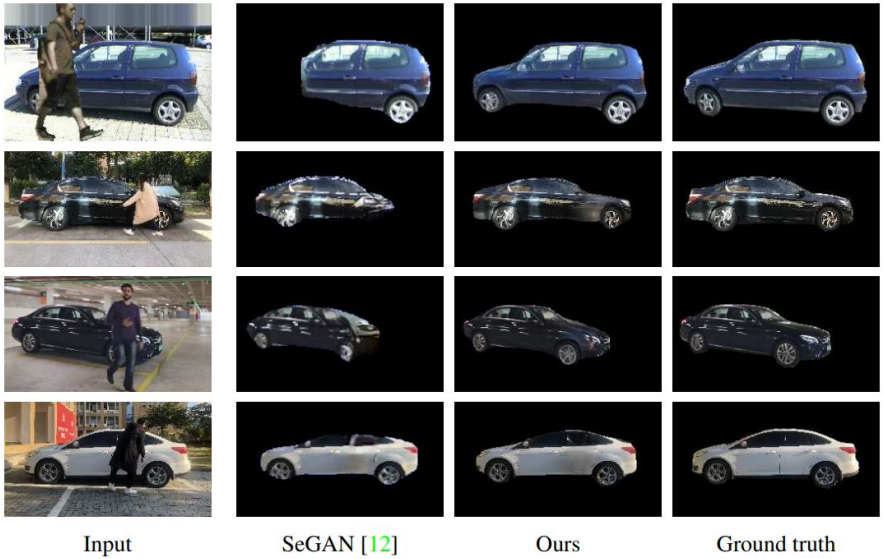
Yan, Xiaosheng, et al. "Visualizing the Invisible: Occluded Vehicle Segmentation and Recovery." *ICCV 2019*

2. Visualizing the Invisible: Occluded Vehicle Segmentation and Recovery (ICCV 2019)

Results: **Segmentation completion**



Results: **Appearance recovery**



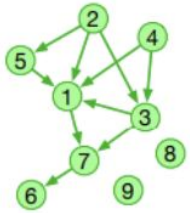
Yan, Xiaosheng, et al. "Visualizing the Invisible: Occluded Vehicle Segmentation and Recovery." *ICCV 2019*

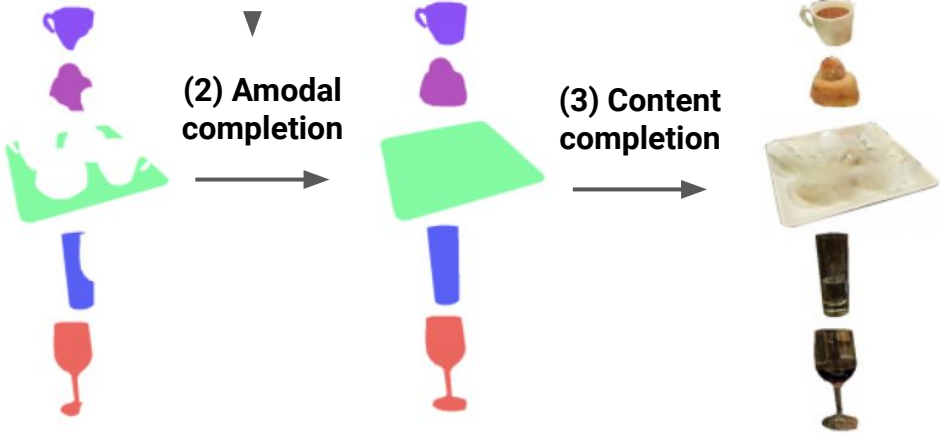
3. Self-Supervised Scene De-occlusion (CVPR 2020) *replication paper

Modal masks

Input image

(1) Ordering recovery





(2) Amodal completion

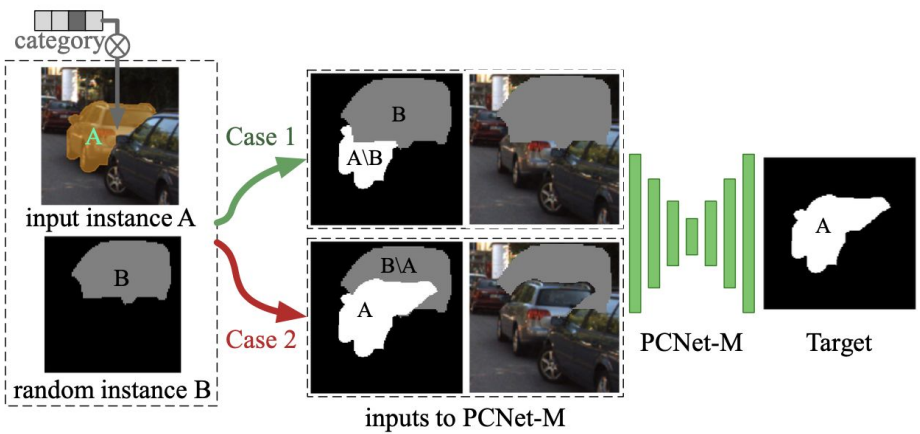
(3) Content completion

Zhan, Xiaohang, et al. "Self-Supervised Scene De-occlusion." arXiv, accepted to CVPR 2020

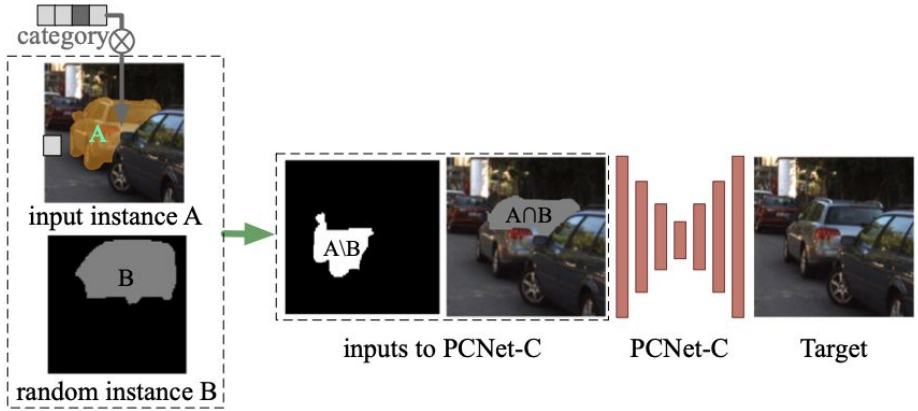
3. Self-Supervised Scene De-occlusion (CVPR 2020) *replication paper

PCNet-M
:Mask Completion

PCNet-C
:Content Completion



(a) training of Partial Completion Network (Mask)

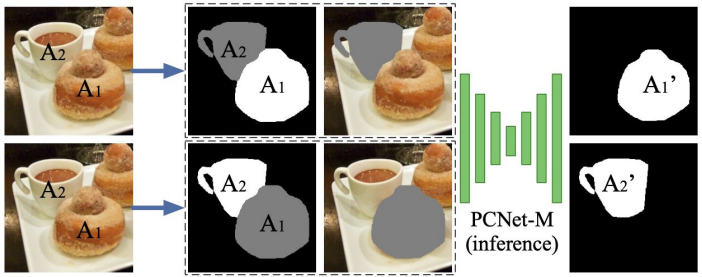


(b) training of Partial Completion Network (Content)

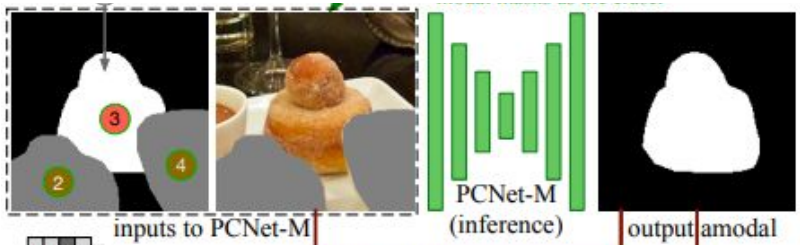
Zhan, Xiaohang, et al. "Self-Supervised Scene De-occlusion." arXiv, accepted to CVPR 2020

3. Self-Supervised Scene De-occlusion (CVPR 2020) *replication paper

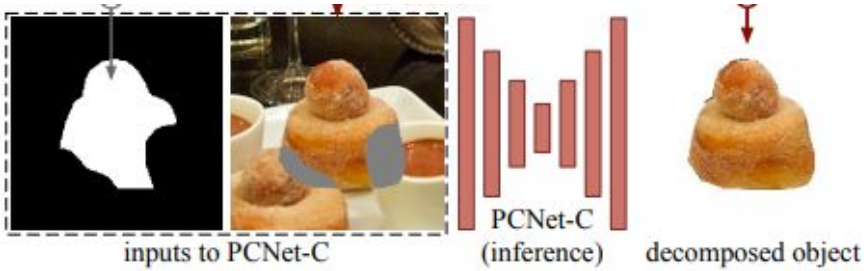
PCNet-M
:Mask Completion



(Ordering Recovery)



PCNet-C
:Content Completion



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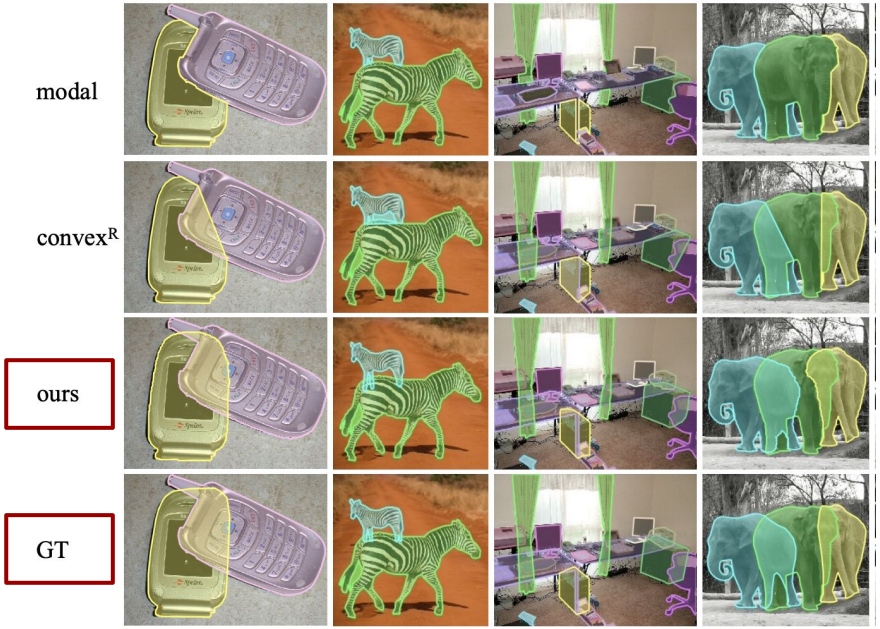
Amodal completion results



Final results (including Content completion)

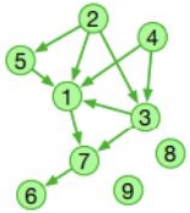
Zhan, Xiaohang, et al. "Self-Supervised Scene De-occlusion." arXiv, accepted to CVPR 2020

Our Improvements - Current approach

Modal masks

Input image

(1) Ordering recovery



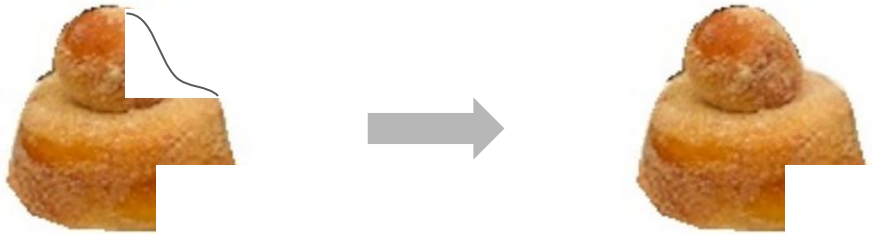
(2) Amodal completion

(3) Content completion

Zhan, Xiaohang, et al. "Self-Supervised Scene De-occlusion." arXiv, accepted to CVPR 2020

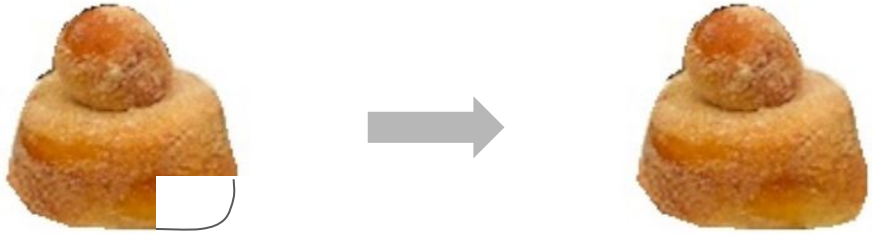
Our Improvements - Current approach

Training: erase a batch artificially, and learn to padding the erased content.



It's good to fill in some orange pixels with some white points.

Testing: fill in the occluded part of the original image.



Ok, I will fill in orange pixels with some white points!!

Our Improvements - Problems

Problems: simply filling in pixels with similar color.

E.g. Another example in the paper:

Dissatisfied performance for complex batch

Our Improvements - de-occlusion with image search

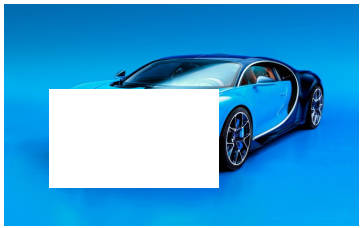
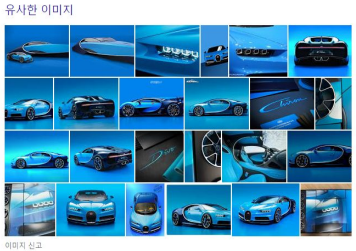
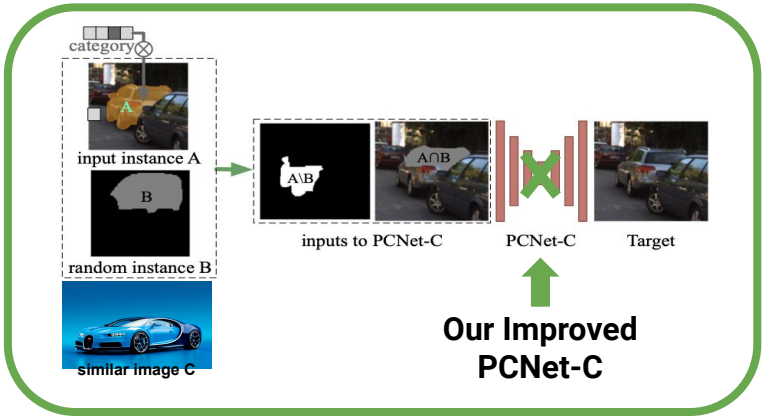


Image search

using local features
(e.g. SIFT...)

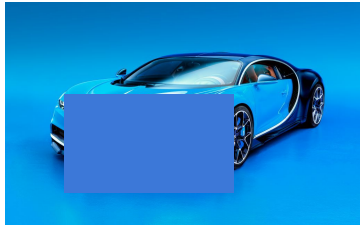


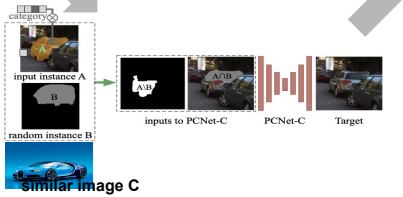
Choose the most similar one

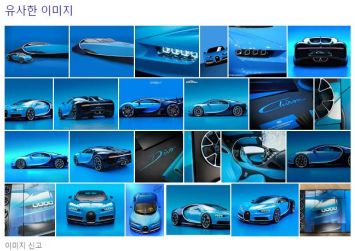


Completion

Our Improvements - de-occlusion with image search

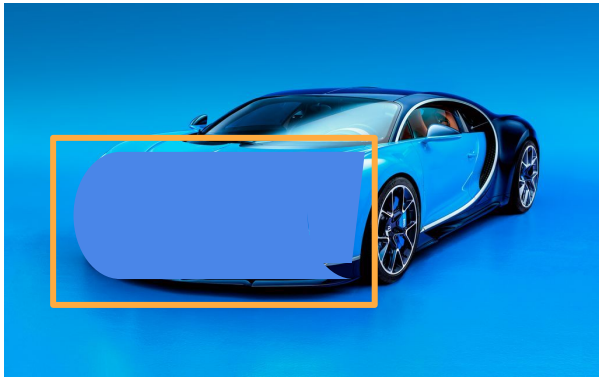




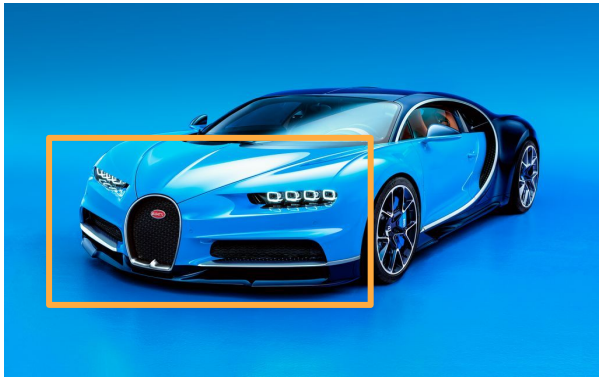


Our Improvements - evaluation metric

Qualitative approach: Compare through examples



Current approach



New approach

Quantitative approach:

- L1, L2 distance

Data

1. KINS

- Public , subset data of **KITTI**
- A large-scale traffic dataset with **annotated modal** and **amodal** masks of instances
- Training data: **7474** images, **95311** instances
- Testing data: **7517** images, **92492** instances

2. COCOA

- Public, subset data of **COCO**
- Pairwise ordering, **modal and amodal** masks
- Training data: **2500** images, **22163** instances
- Testing data: **1323** images, **12753** instances

Plan

	Heeju	Saelyne	Guoyuan	Junyong
May W2	Prepare the dataset	Learn about Image similarity		Set our evaluation metrics
May W3	Replicate our target paper		Replicate & Get the metrics of comparison papers	
May W4				
May W5	Prepare Progress Presentation			
June W1	Implement ‘Select the best appropriate image’ Algorithm.		Make Google-Image Search & Download API	
June W2	Give feedback to our model		Implement improved PCNet-C	
June W3	Modify our model & Compute the metrics of our improved model			
June W4	Write Final Report / Prepare Final Presentation			

Thanks for listening