

Vehicle Image Generation

Generative Adversarial Nets (GAN)

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Motivation

- Generate pose-specified vehicles

Input Image



Target Pose



Target Image



Some Final Results

input



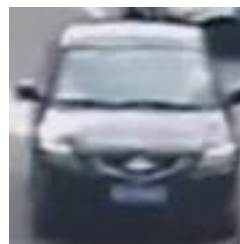
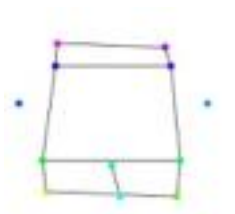
pose



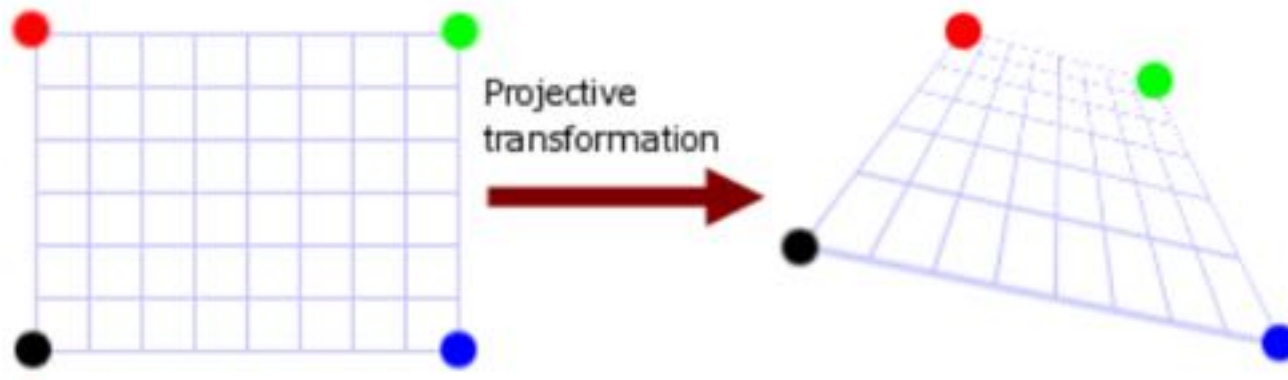
ground truth



ours



1 : Perspective Transformation



Perspective transformation is a function that maps one vector space into another.

When watching an object, if the view point of the observer changes, the perceived object will also change.

1 : Perspective Transformation

- In this work, we try to synthesis a vehicle image by only using perspective transformation.
- As vehicles are rigid objects, there are many plains on the surface
- For each plain, we shuttle the patch to target location by using perspective transformation and introduce plain mask to stitch these patches together.

1 : Perspective Transformation

input



target
orientation



perspective
transform.



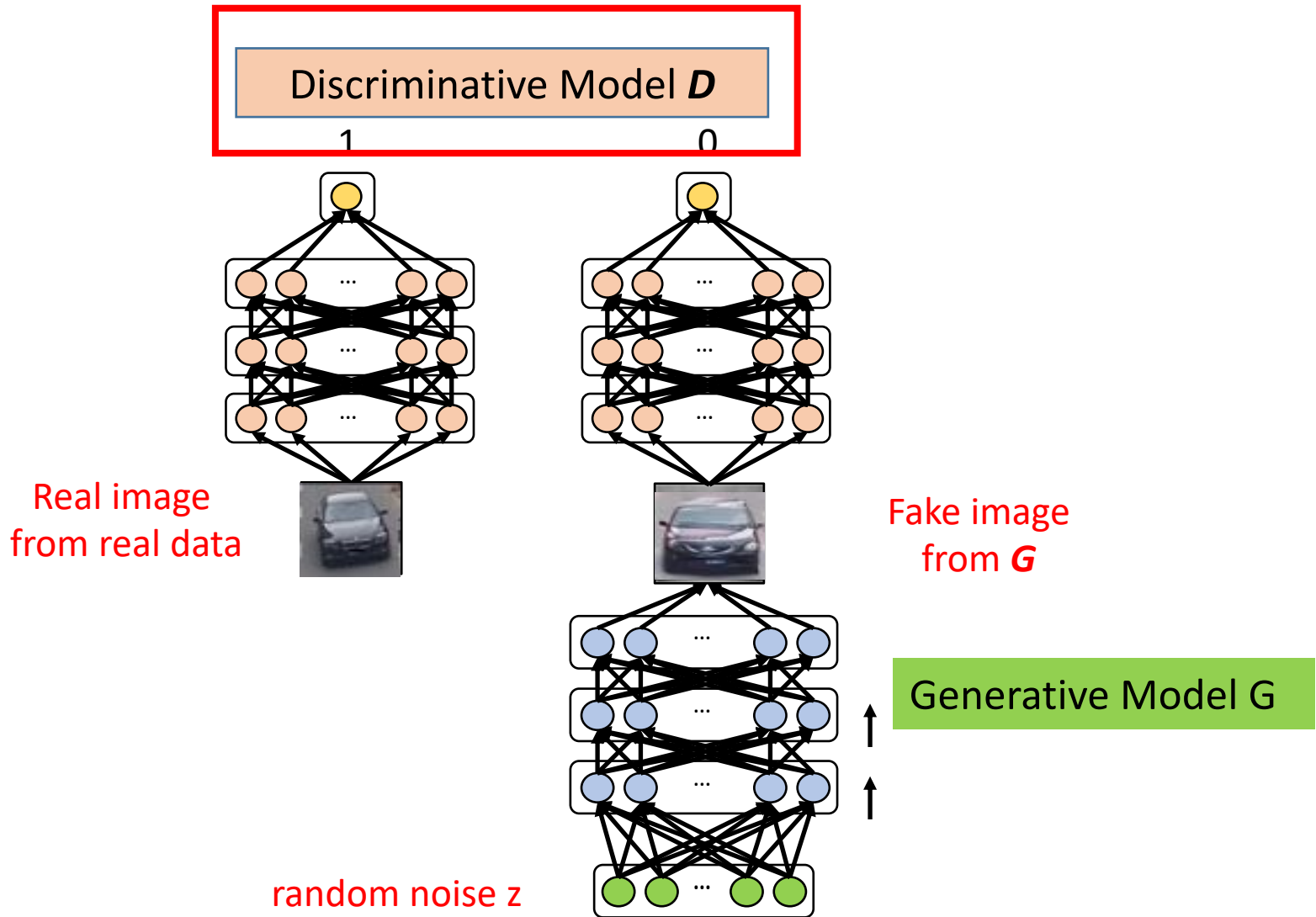
1 : Perspective Transformation

- This method can only transform some plains and dose not have the ability to generate invisible parts.
- Meanwhile, because perspective transformation only shuttle vehicle patches, the background can not be generated and is left unprocessed.

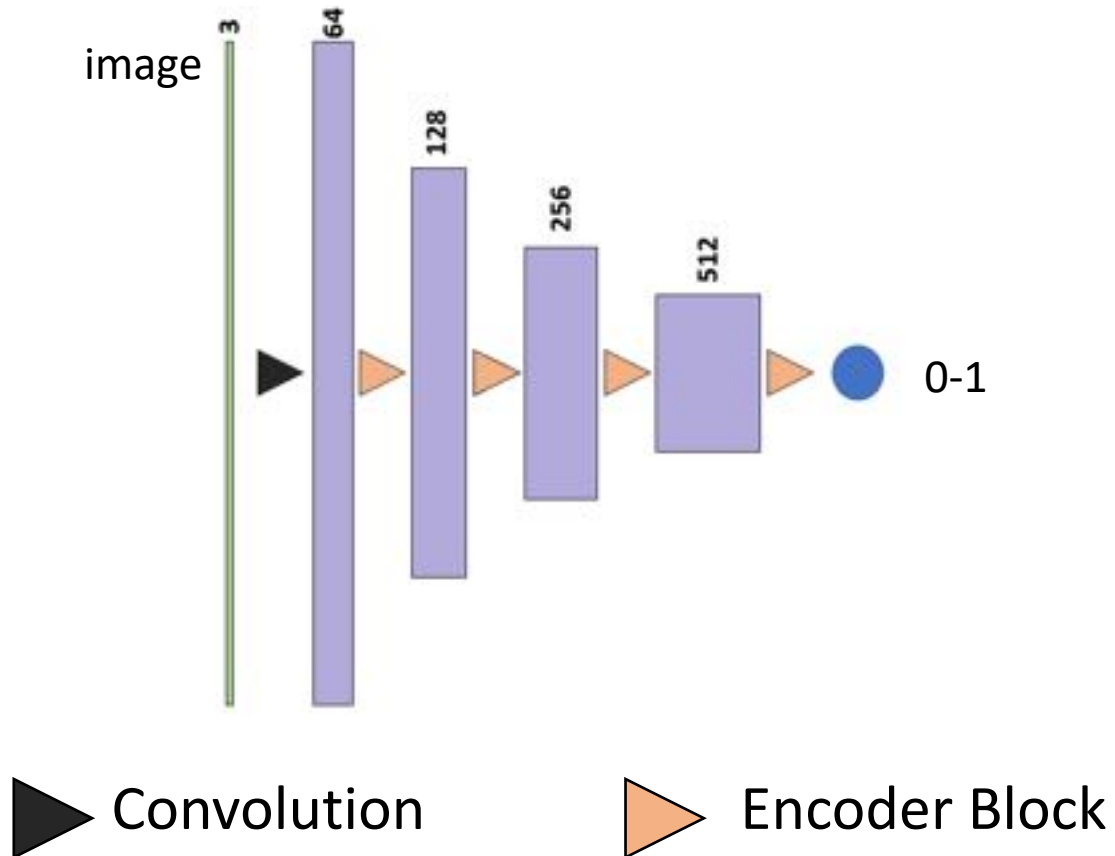
1 : Perspective Transformation

- Conclusion:
 - Perspective transformation method can well preserve local details
 - Perspective transformation can not generate a complete vehicle

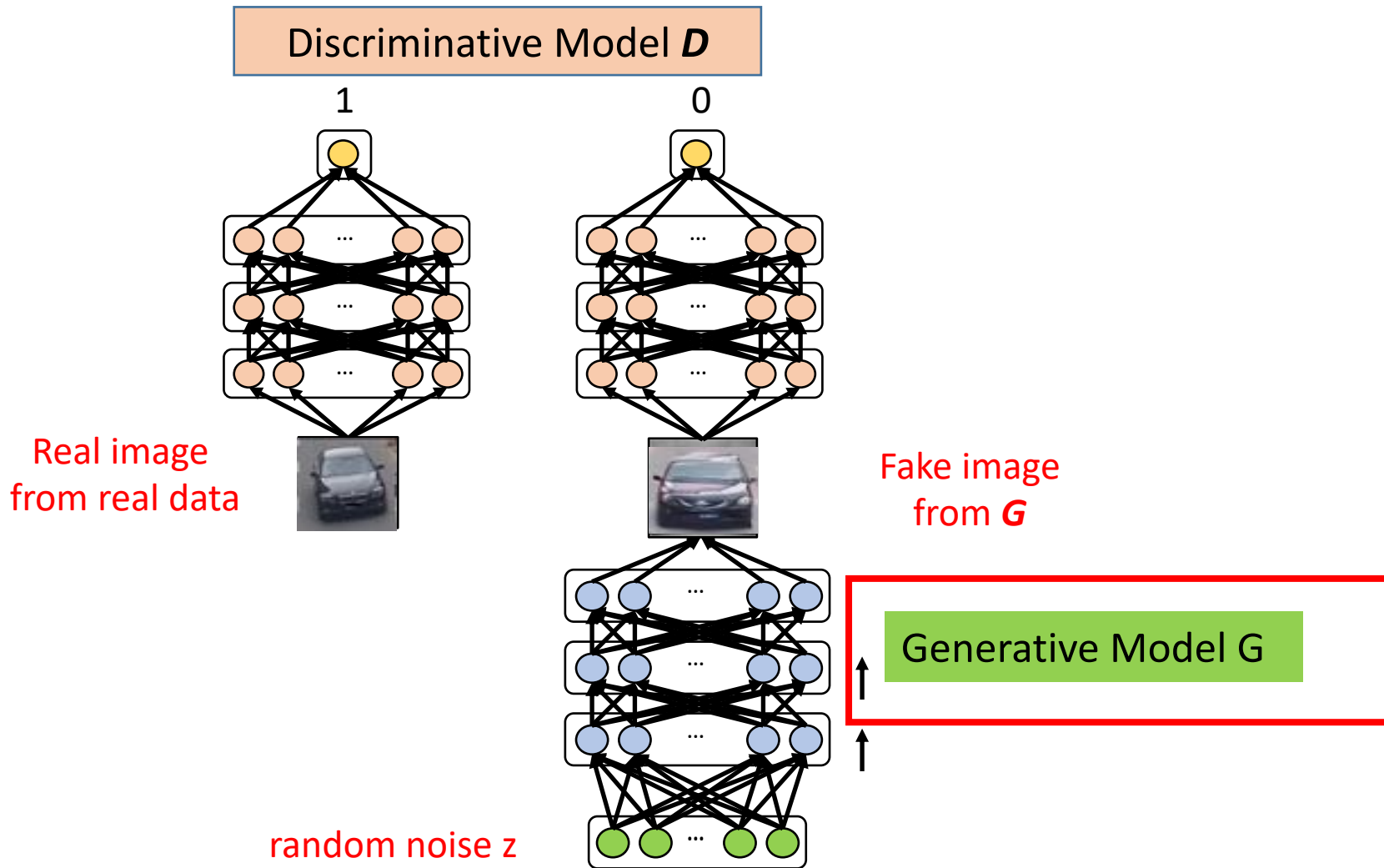
2: Generative adversarial network (GAN)



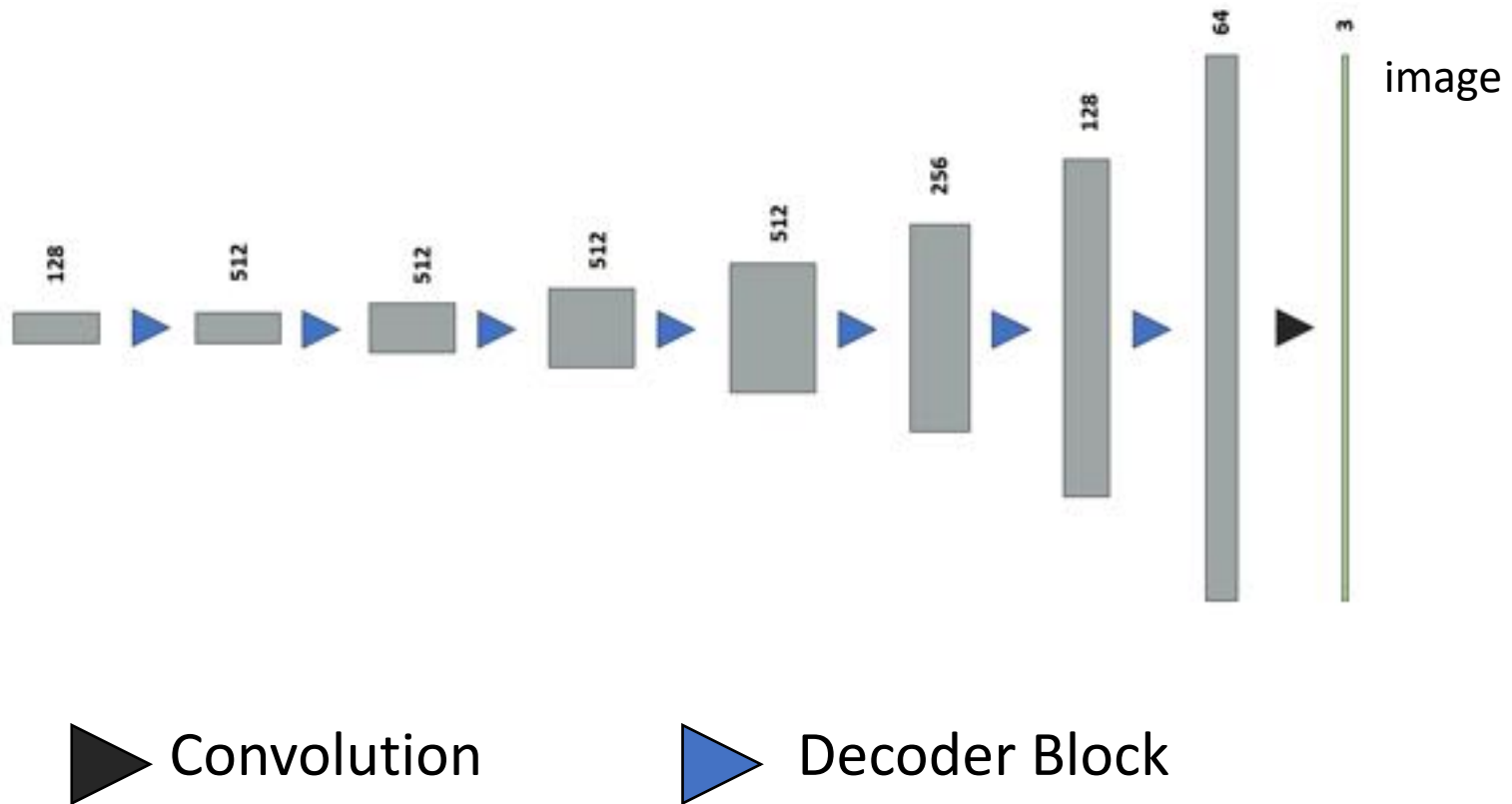
Discriminative Model D



Generative adversarial network (GAN)

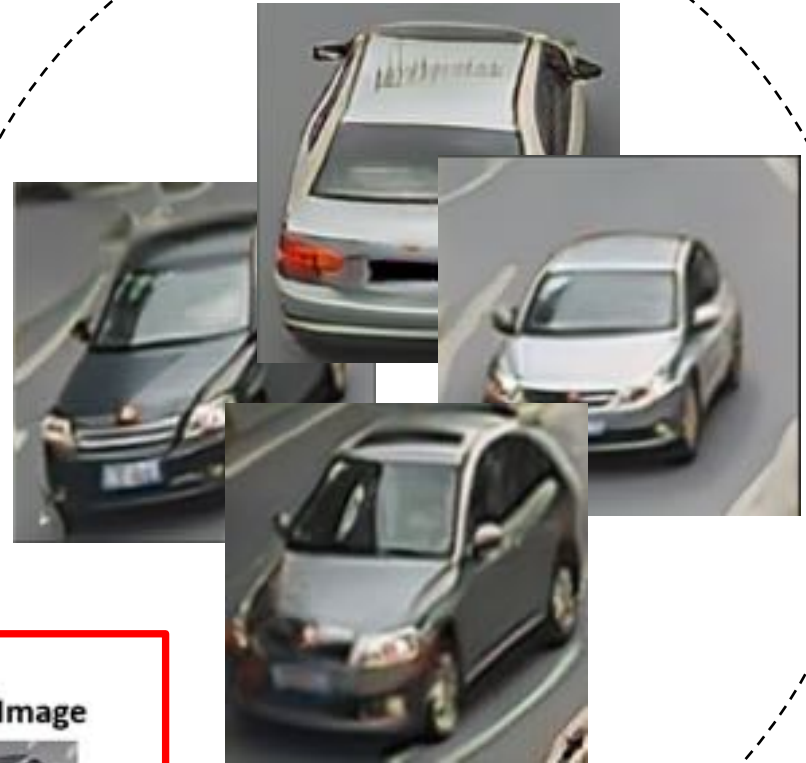
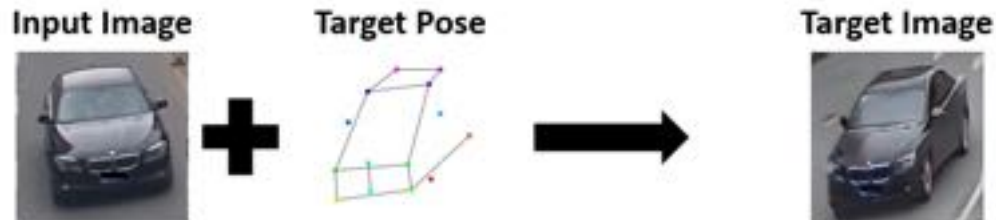


Generative Model G

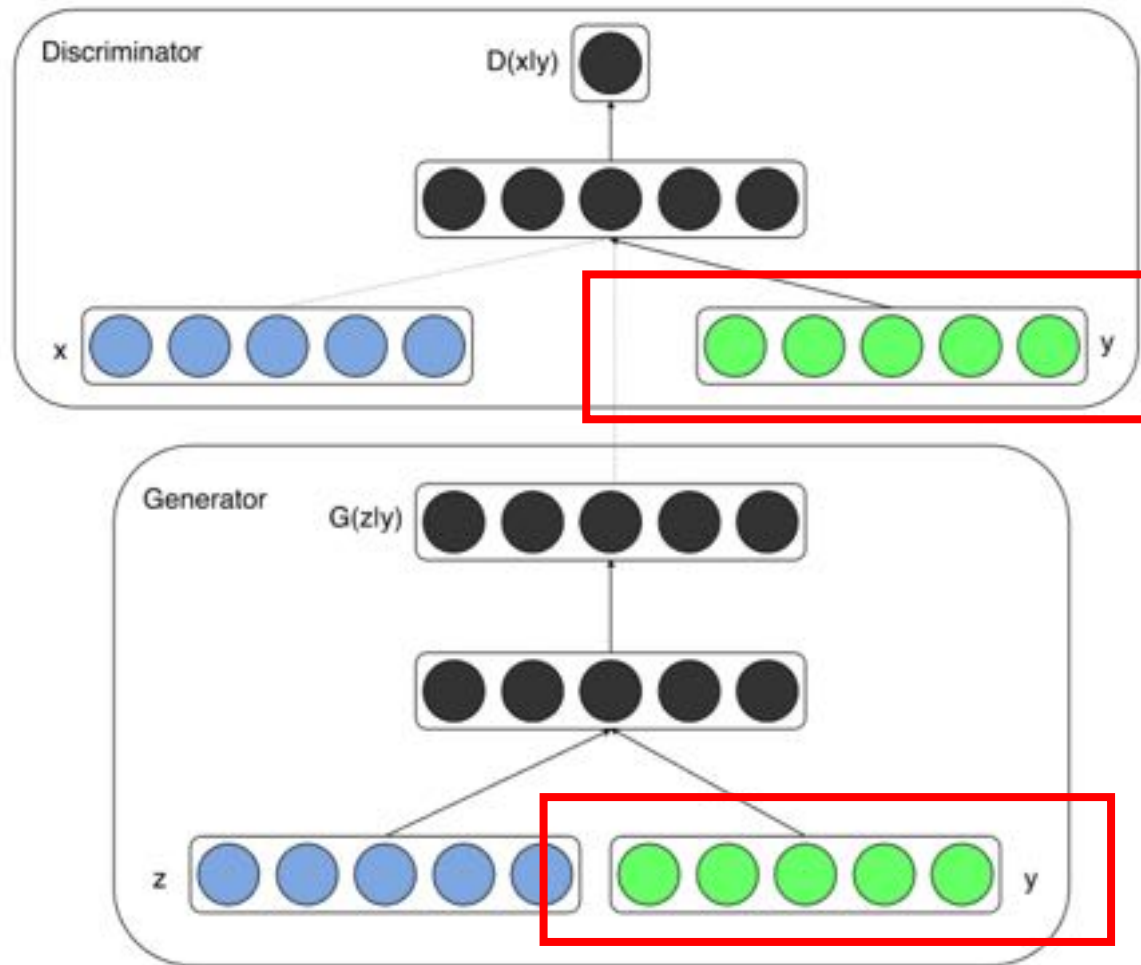


Results

The images are generated by some random noises and can not be controlled.



3: Conditional GAN



Conditions

Input Image



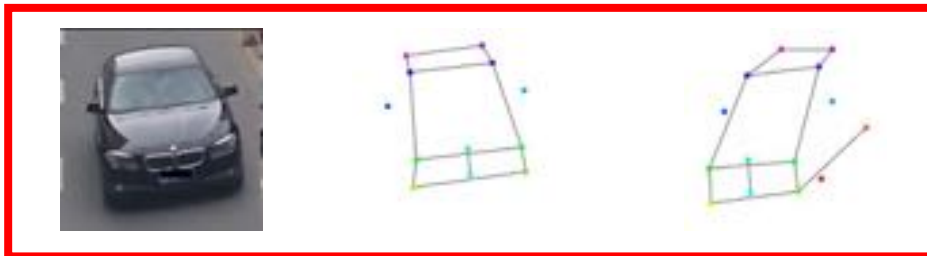
Target Pose



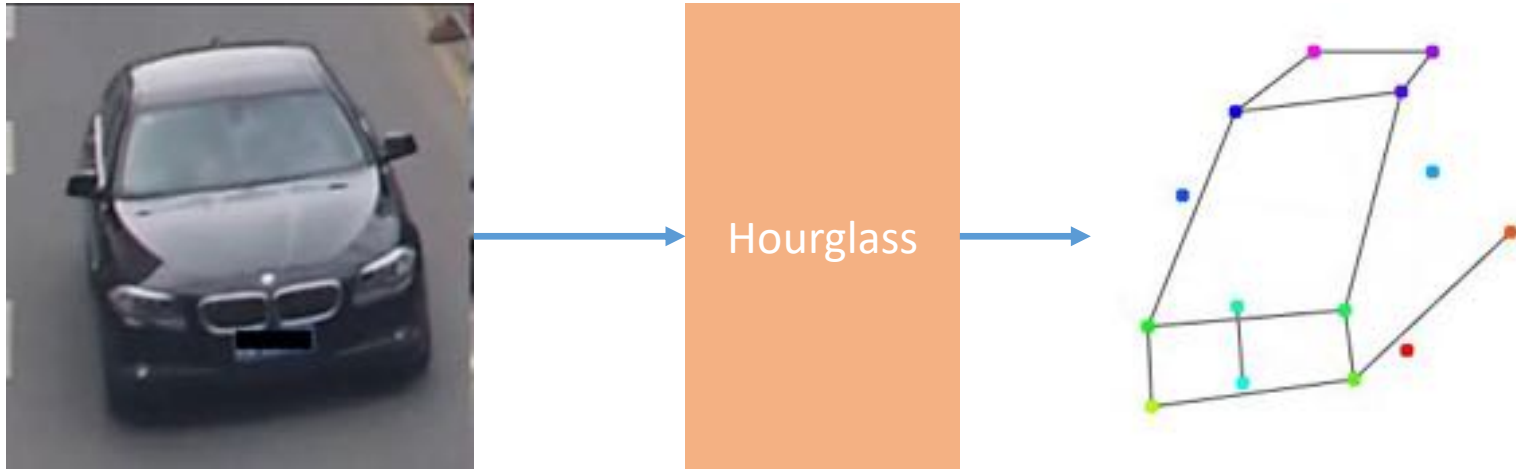
Target Image



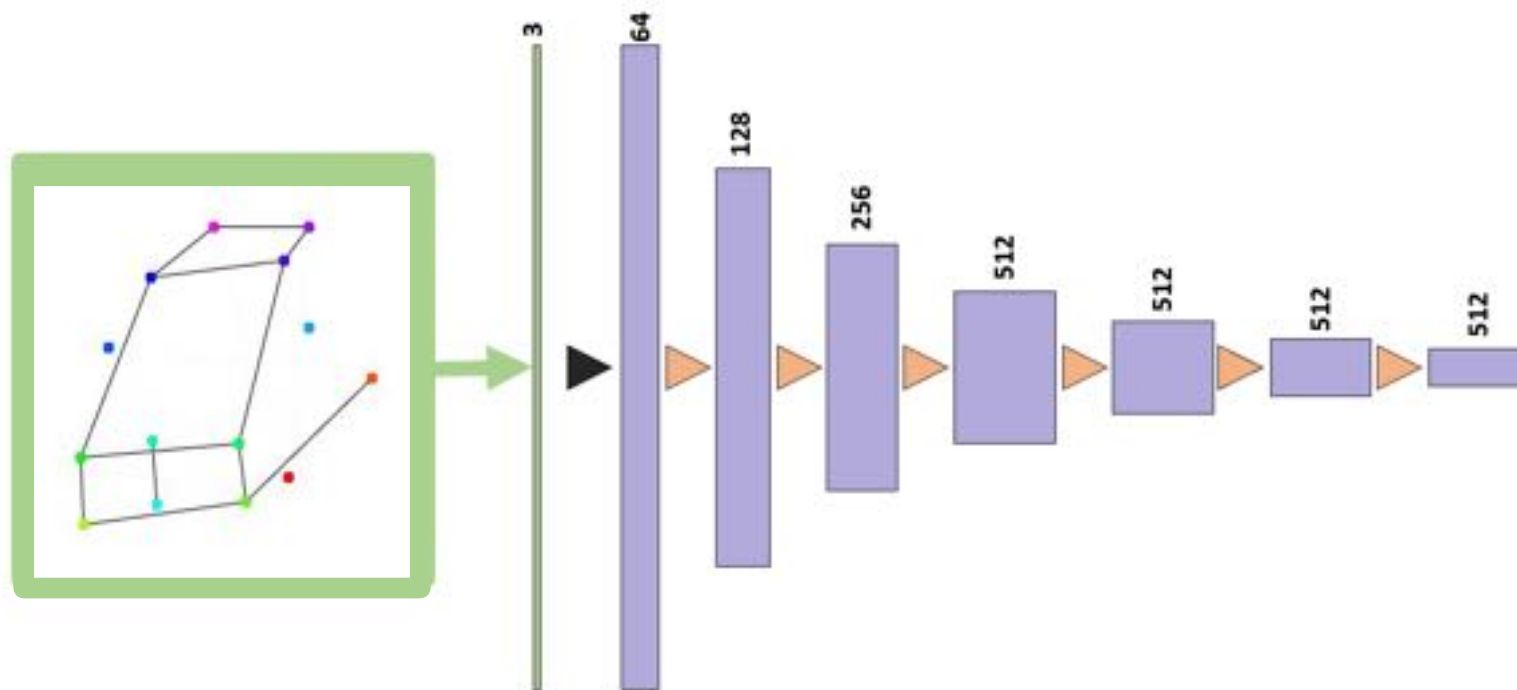
- 1: Input Image
- 2: the pose of input
- 3: target pose

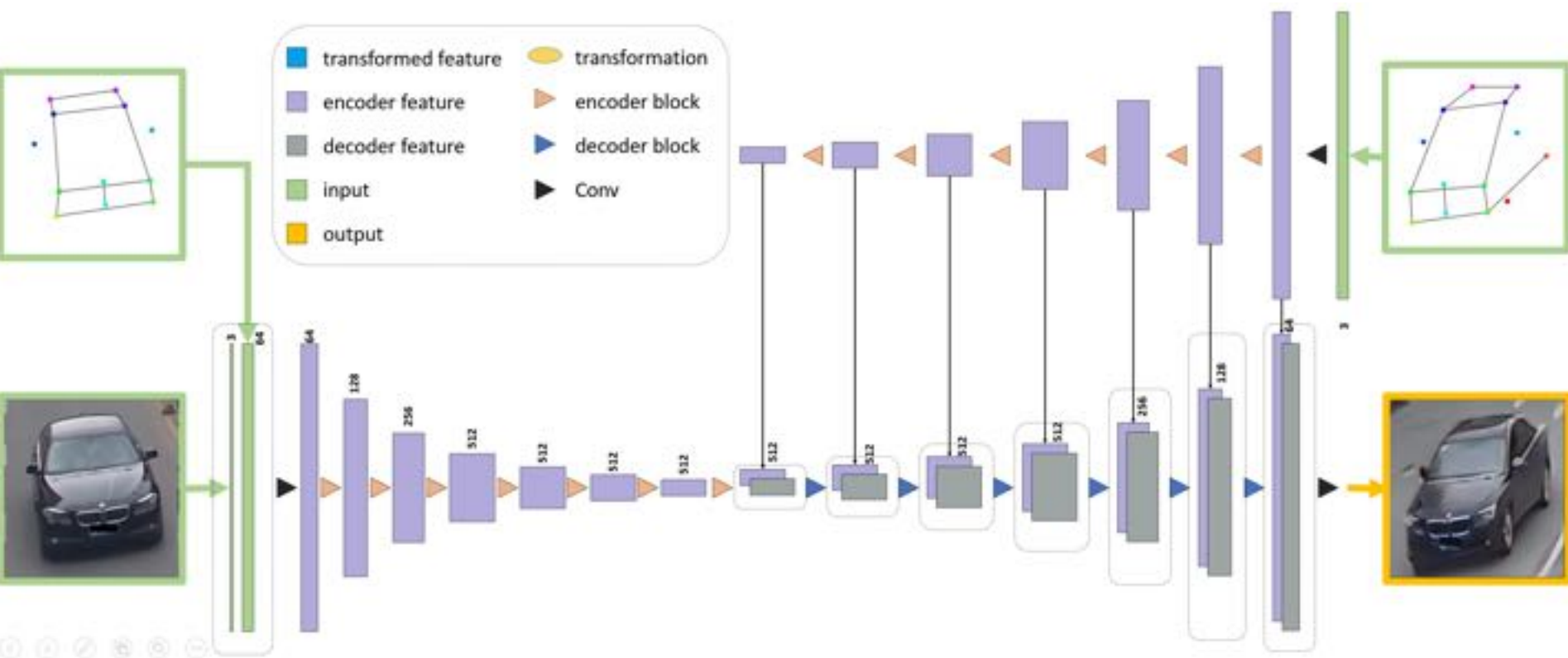


Conditions



Conditions





Result

input



ground truth



CGAN



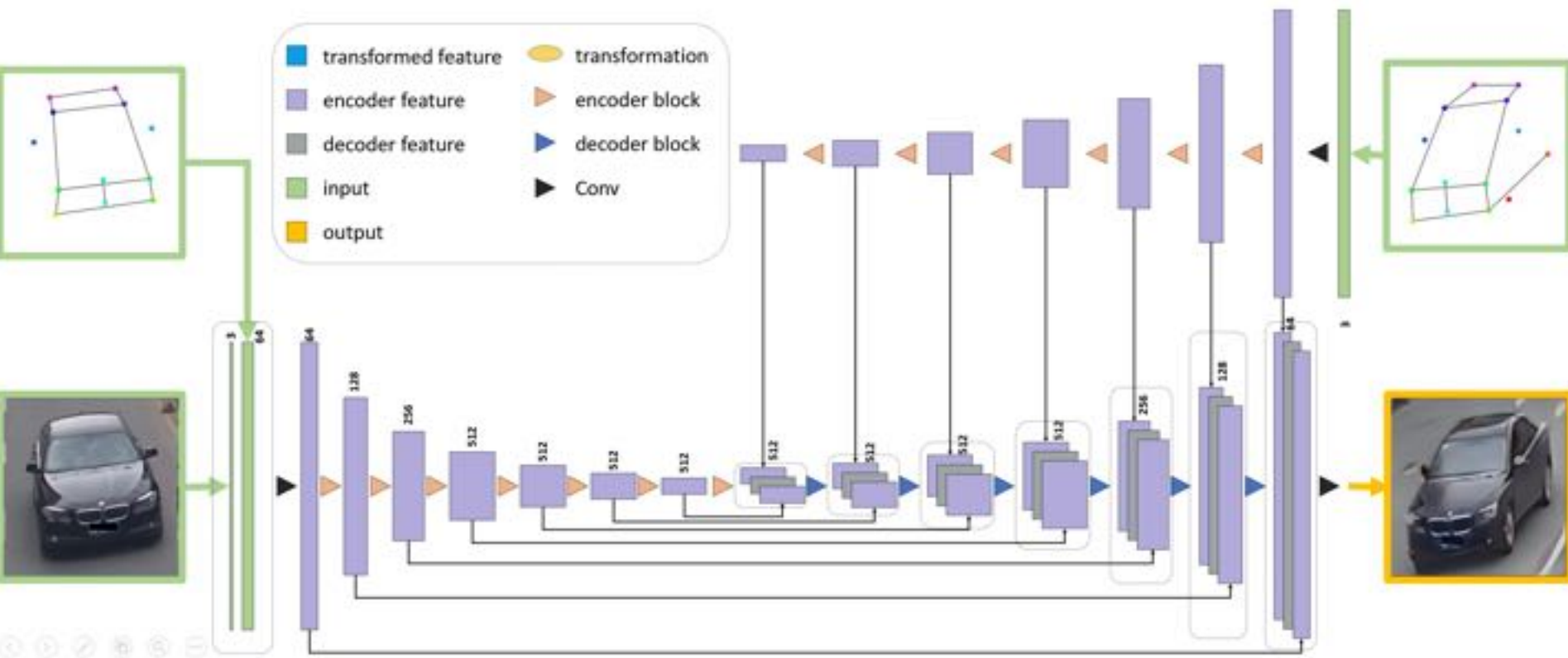
3: Conditional GAN

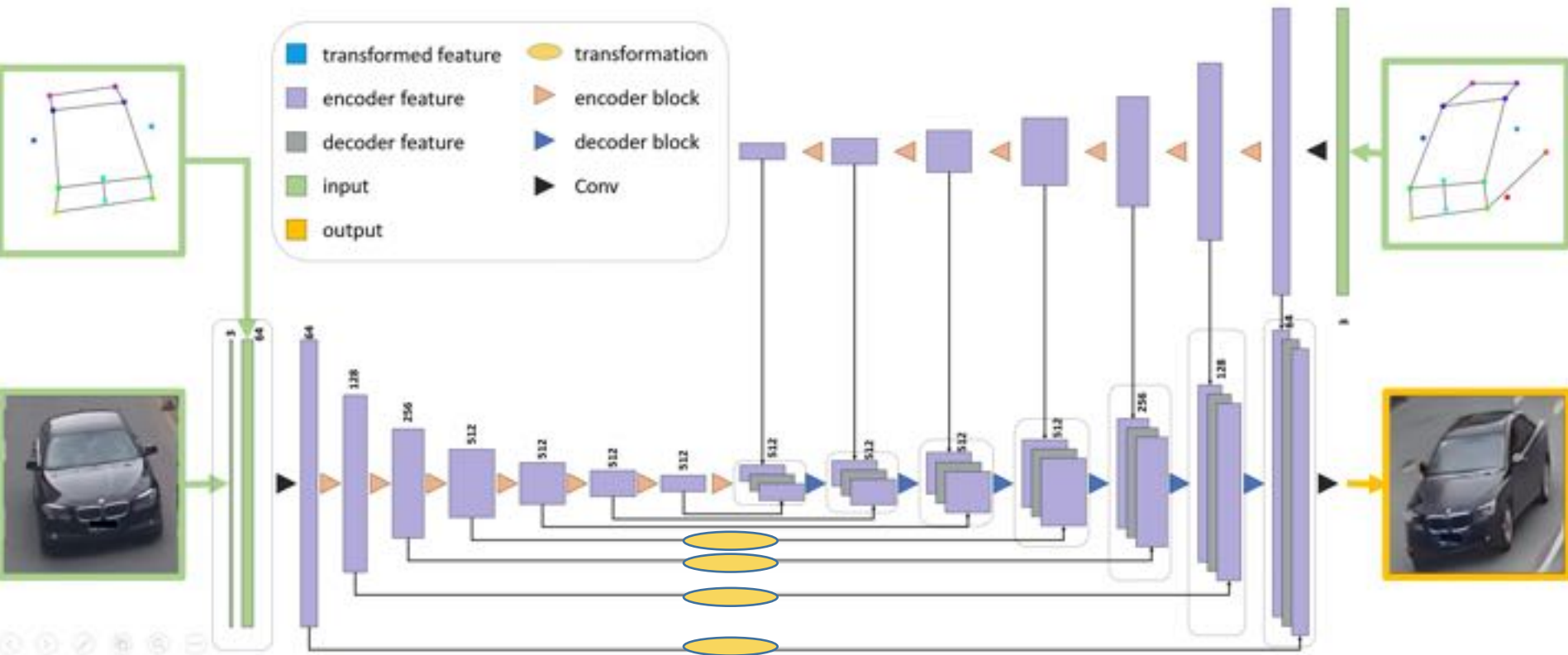
- Although the generated images look like real vehicles, the details in generated image is almost not same with the input image and seem to be randomly generated.
- For example, the logs generated by CGAN are all different from input images.

3: Conditional GAN

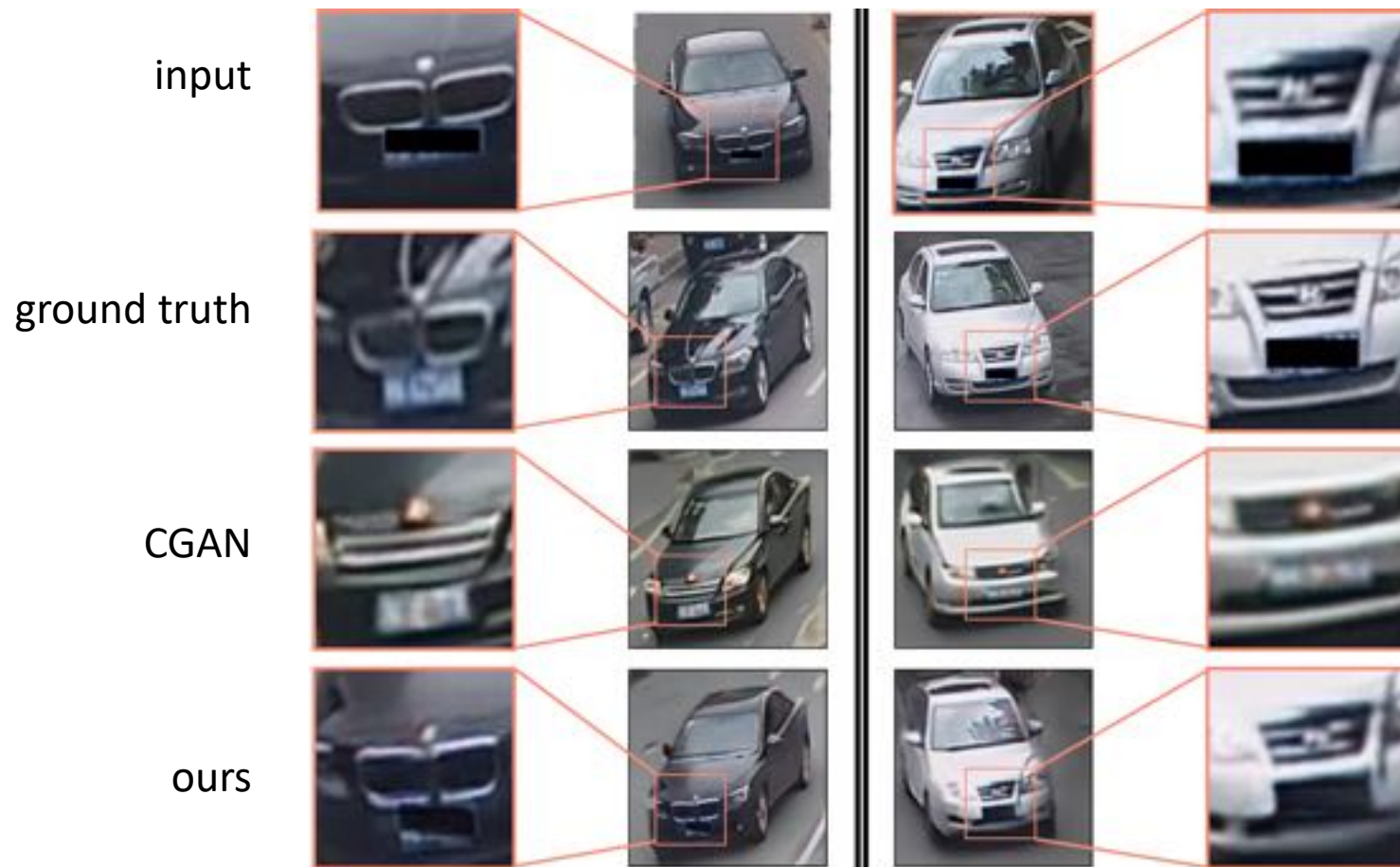
- Conclusion:
 - Conditional GAN can not well preserve local details
 - Conditional GAN can generate a complete vehicle
- Conclusion(Perspective Transformation):
 - Conditional GAN can not well preserve local details
 - Conditional GAN can generate a complete vehicle

4 : GAN+Perspec. Trans.





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Thank you