NEGATIVE DATA AUGMENTATION
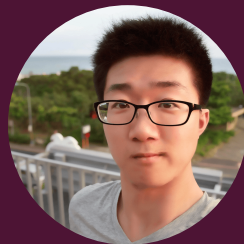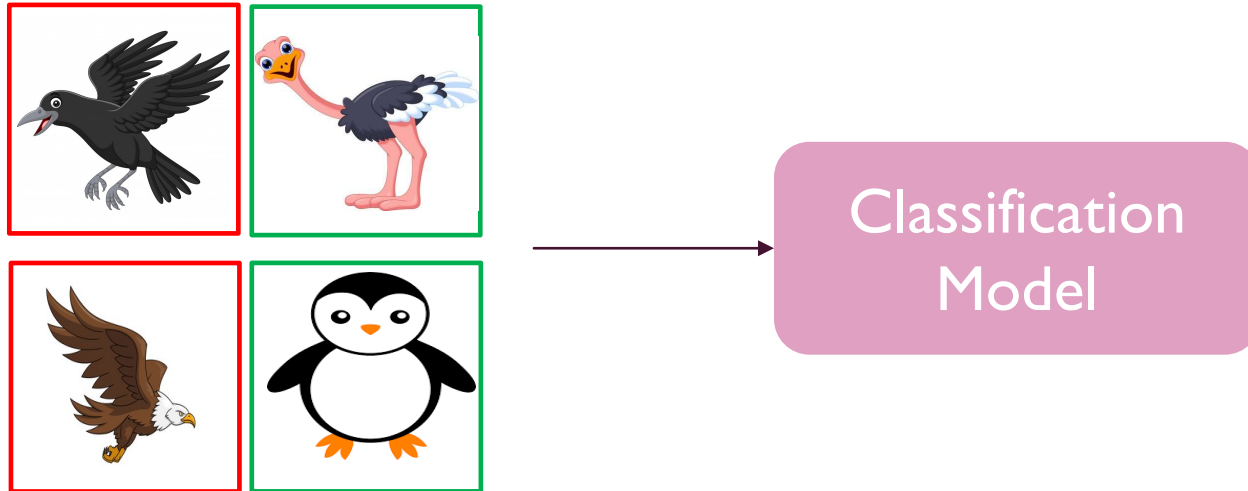
ABHISHEK SINHA*, KUMAR AYUSH*, JIAMING SONG*, BURAK UZKENT, HONGXIA JIN, STEFANO ERMON
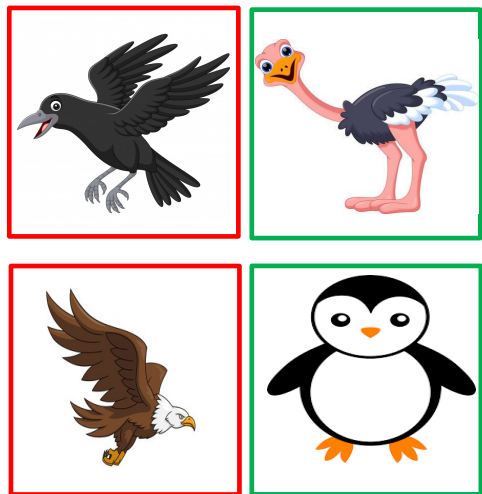
Classification Model

Samples from p_{data}

Samples from p_{data}

Classification Model

Multiple possible decision boundaries
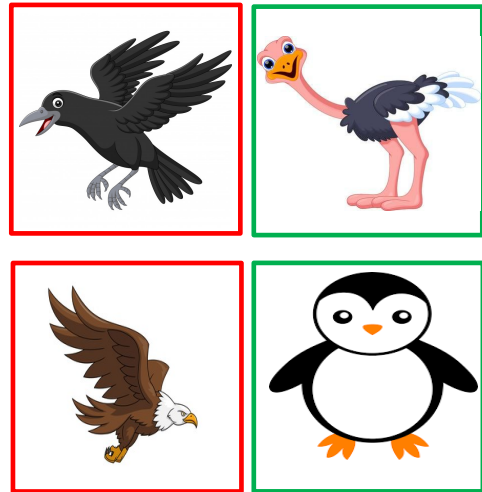
Samples from p_{data}

Classification Model

Samples from p_{data}

Classification Model

Correct Solution
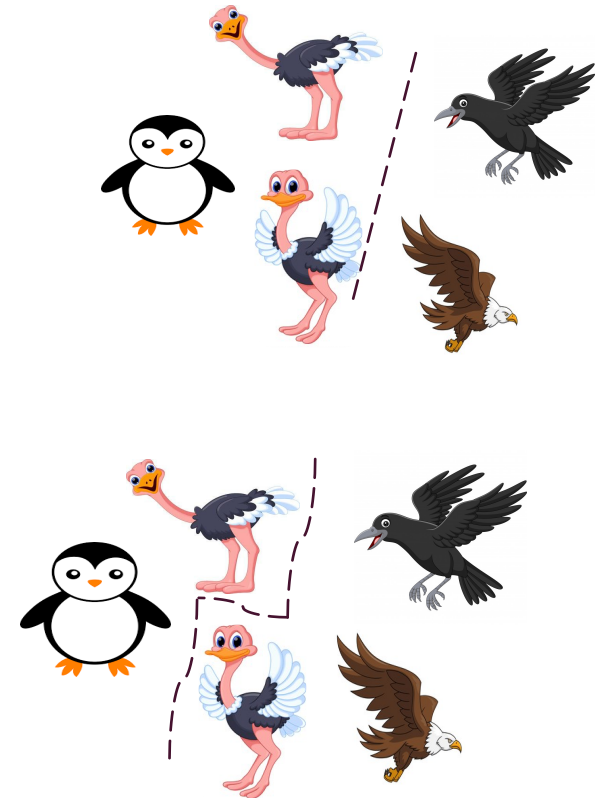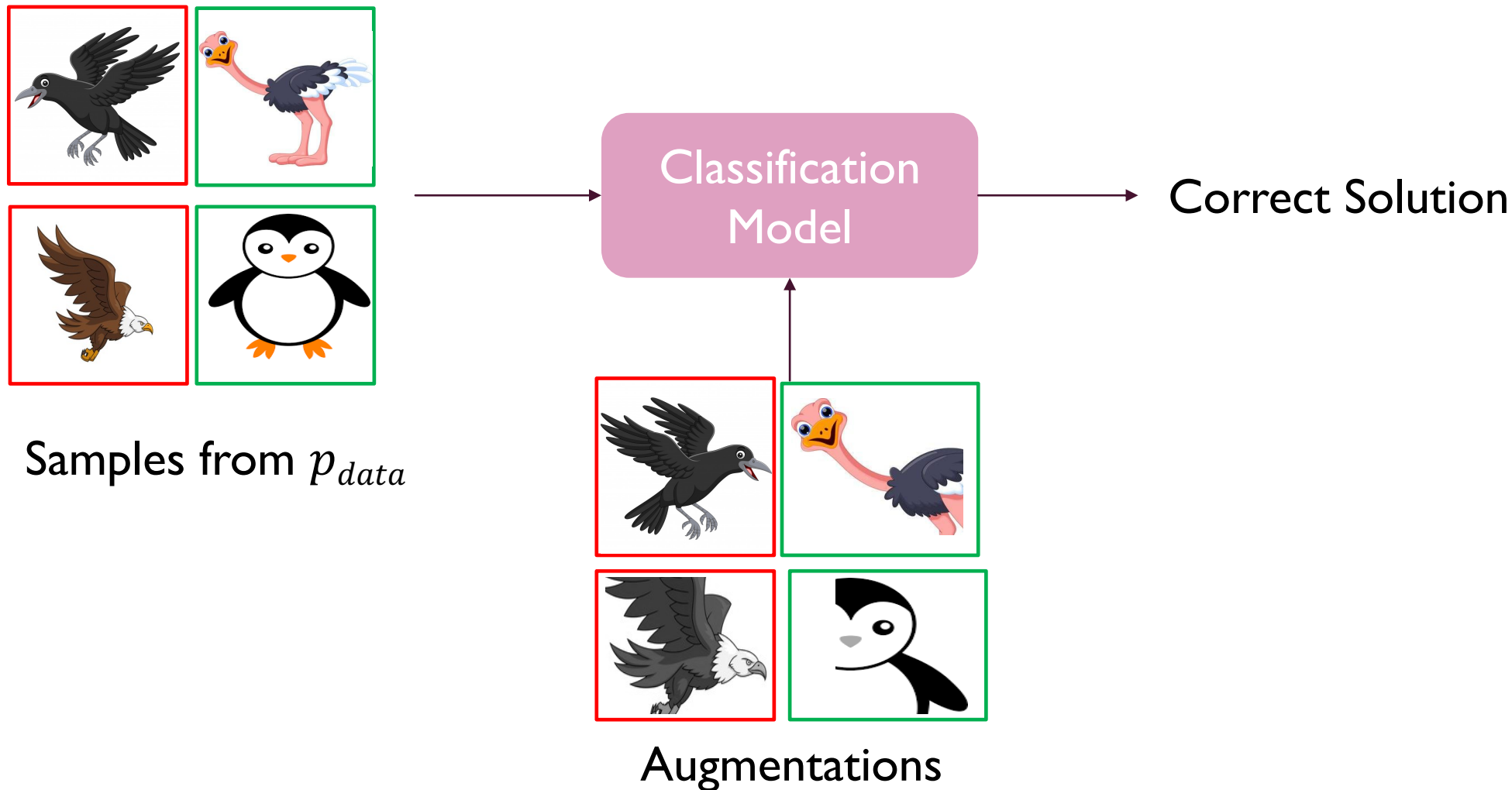
Augmentations

Samples from p_{data}

Classification Model
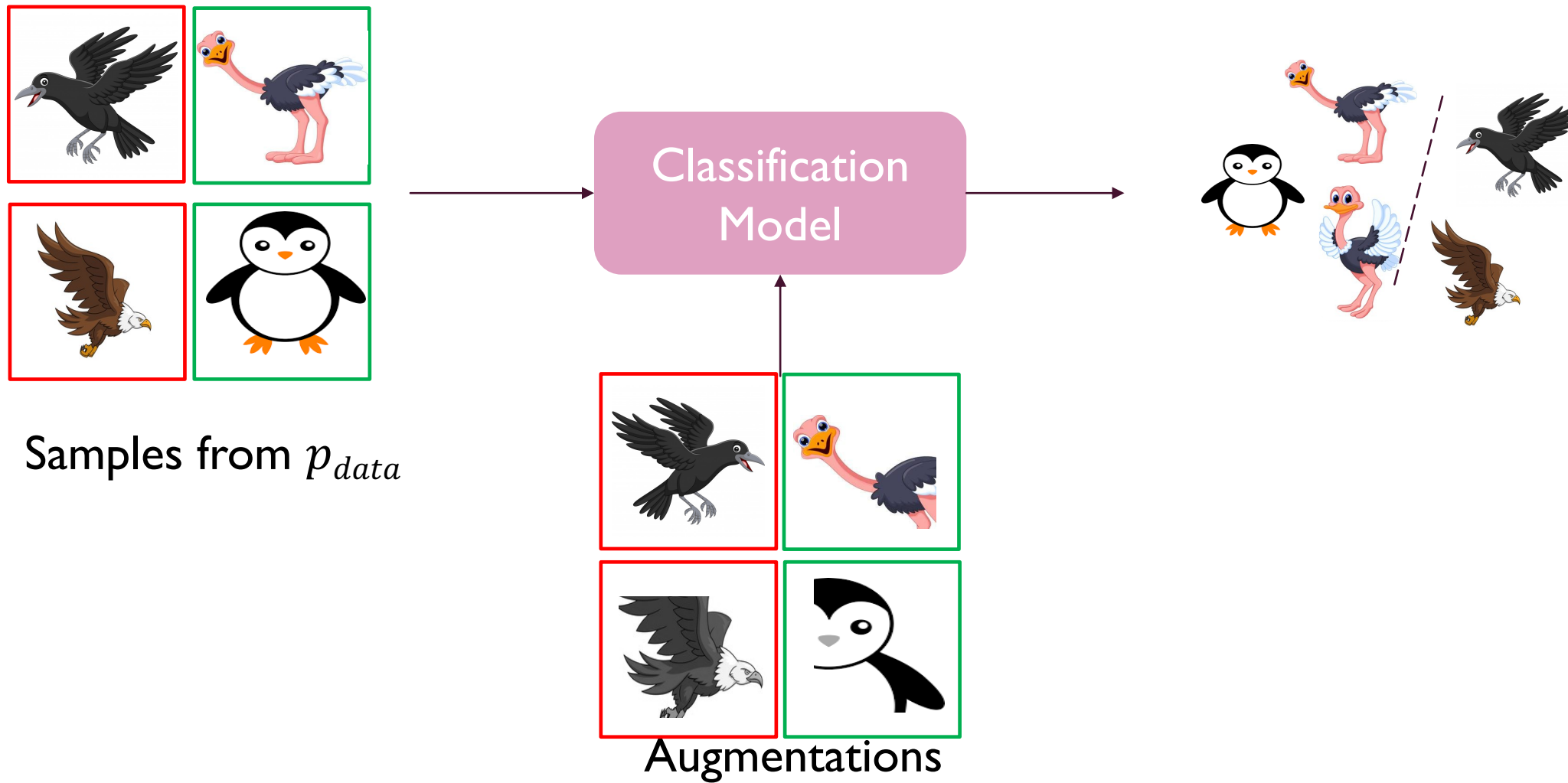
Augmentations

DATA AUGMENTATION FOR GAN

Samples from p_{data}

Discriminator

Samples from generator

Samples from p_{data}

Discriminator

Samples from generator

Augmentations

Samples from p_{data}

Discriminator

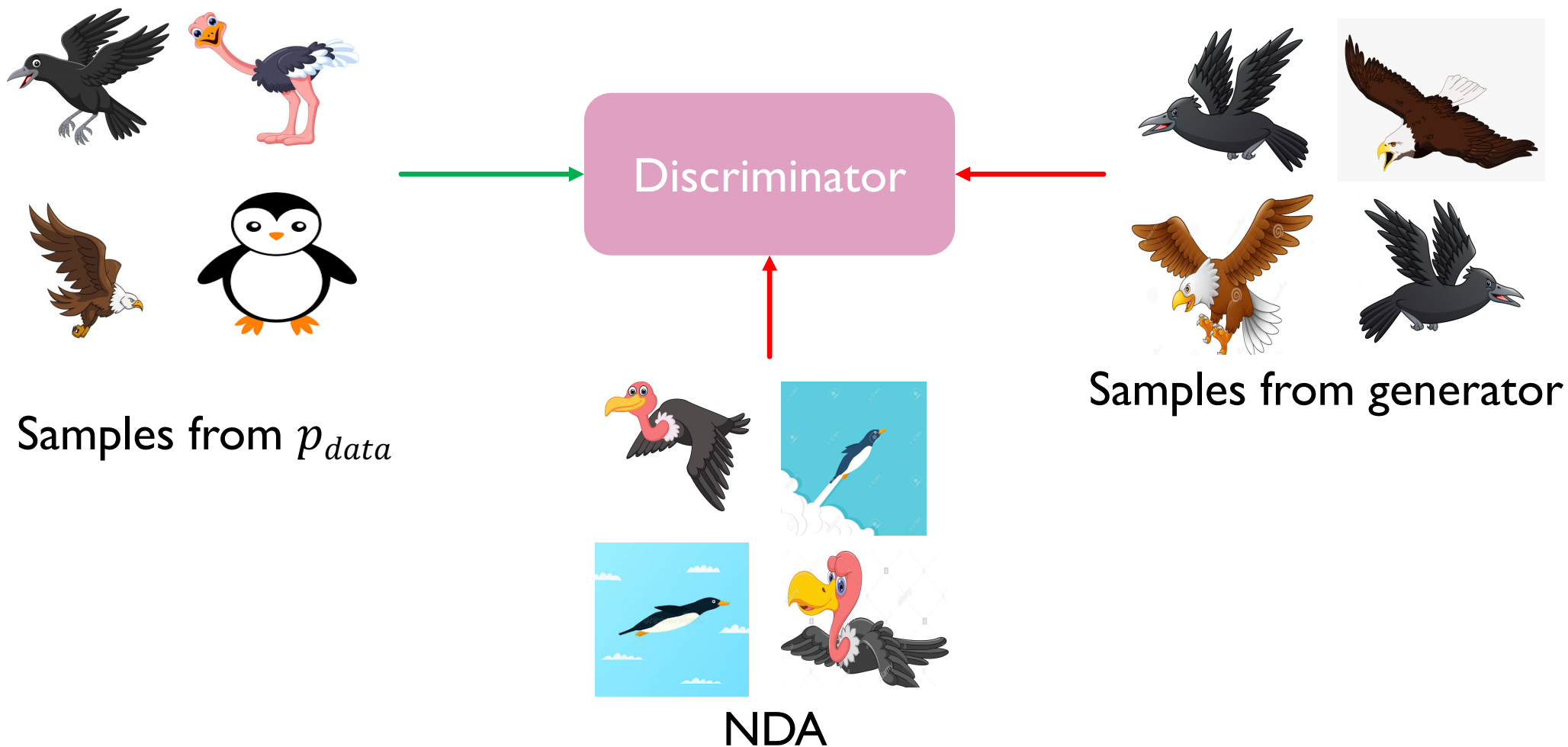Samples from generator
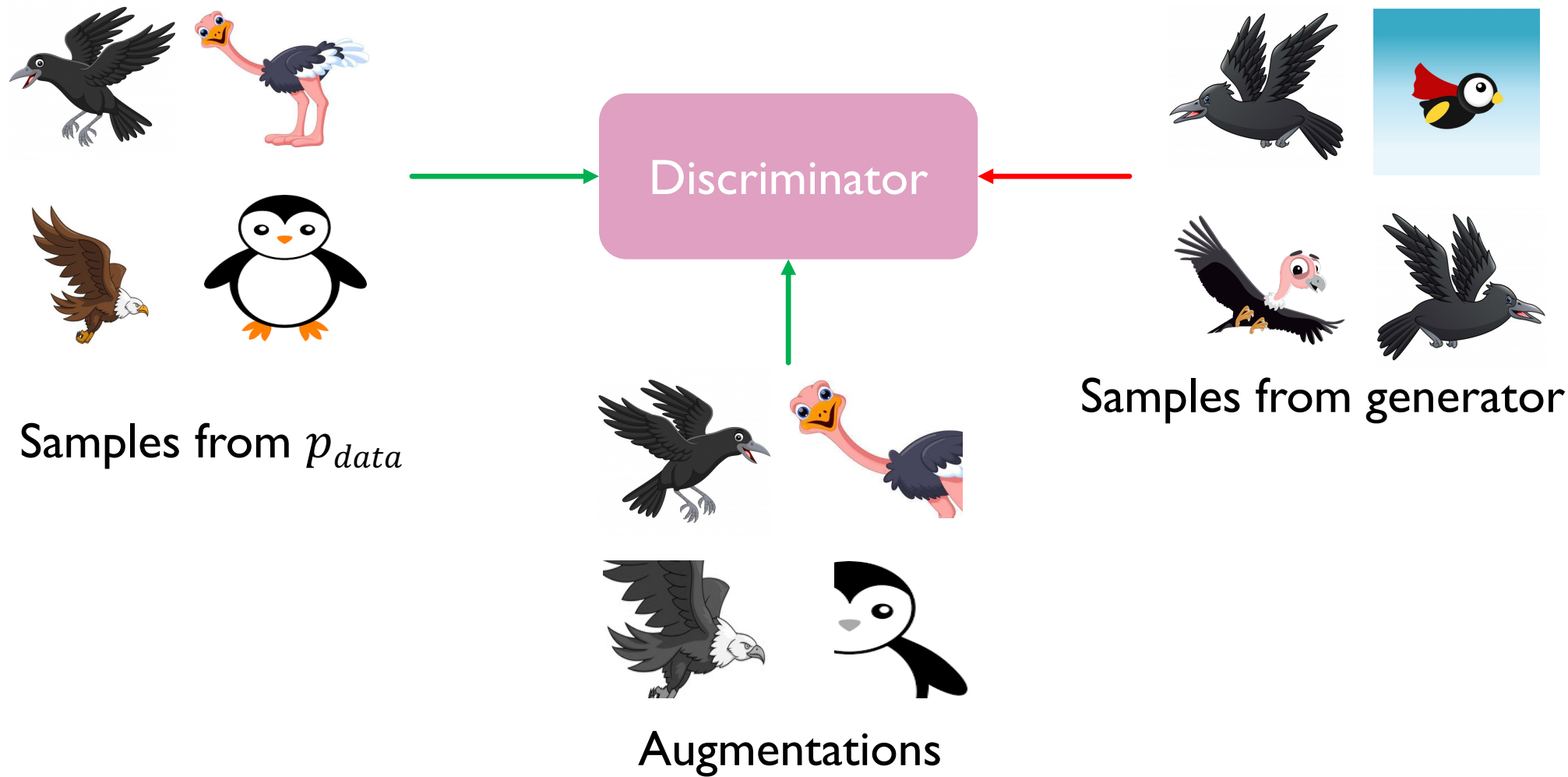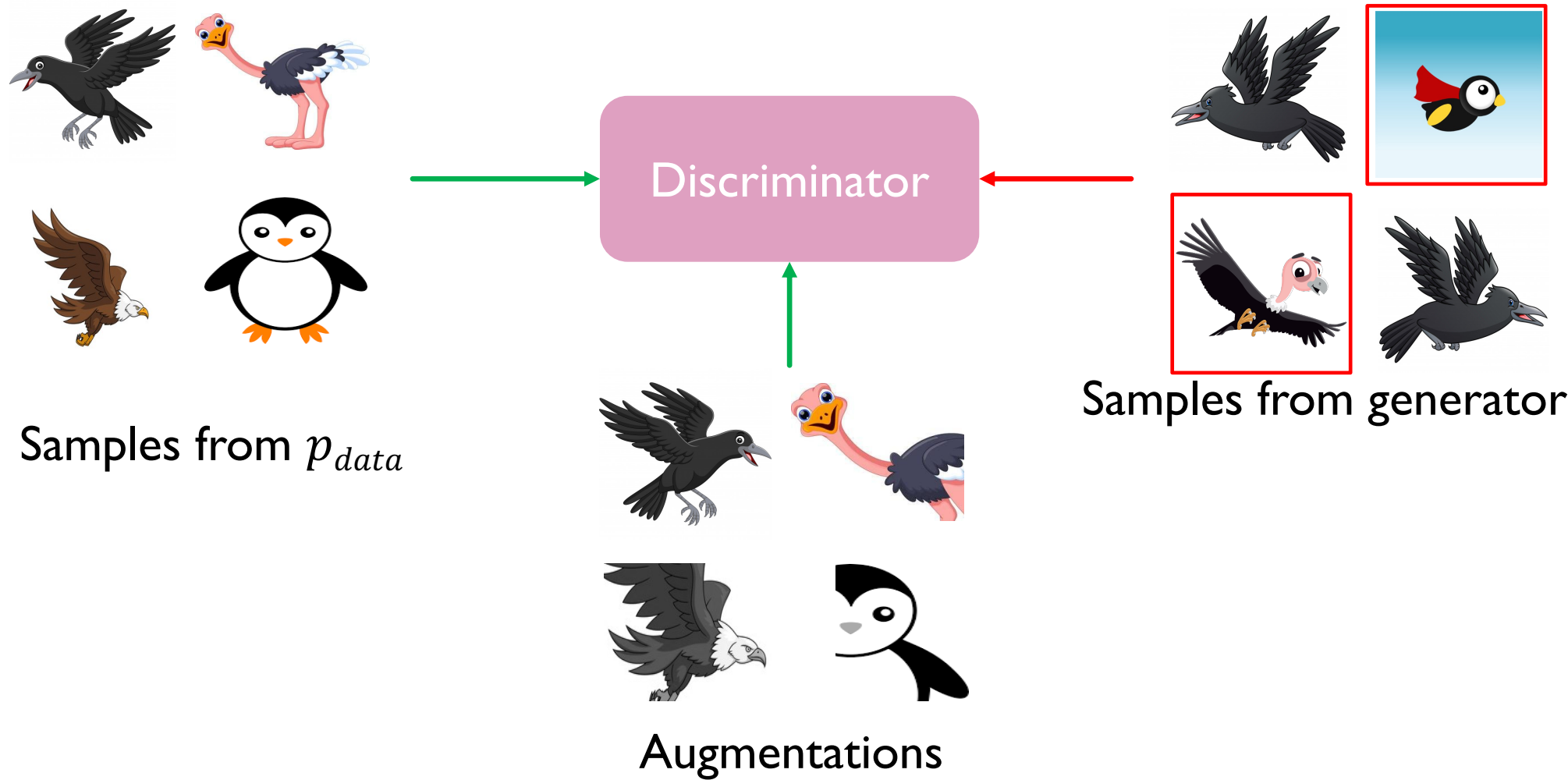
Augmentations

DATA AUGMENTATION FOR GAN

HOW CAN WE ADDRESS THIS ISSUE ?

NEGATIVE DATA AUGMENTAION (NDA)

Samples from p_{data}

Discriminator

Samples from generator

NDA

Samples from p_{data}

Discriminator

Samples from generator

Jigsaw NDA

NDA FOR GENERAL IMAGE DATASETS

Samples from p_{data}

Cutout NDA

Samples from generator
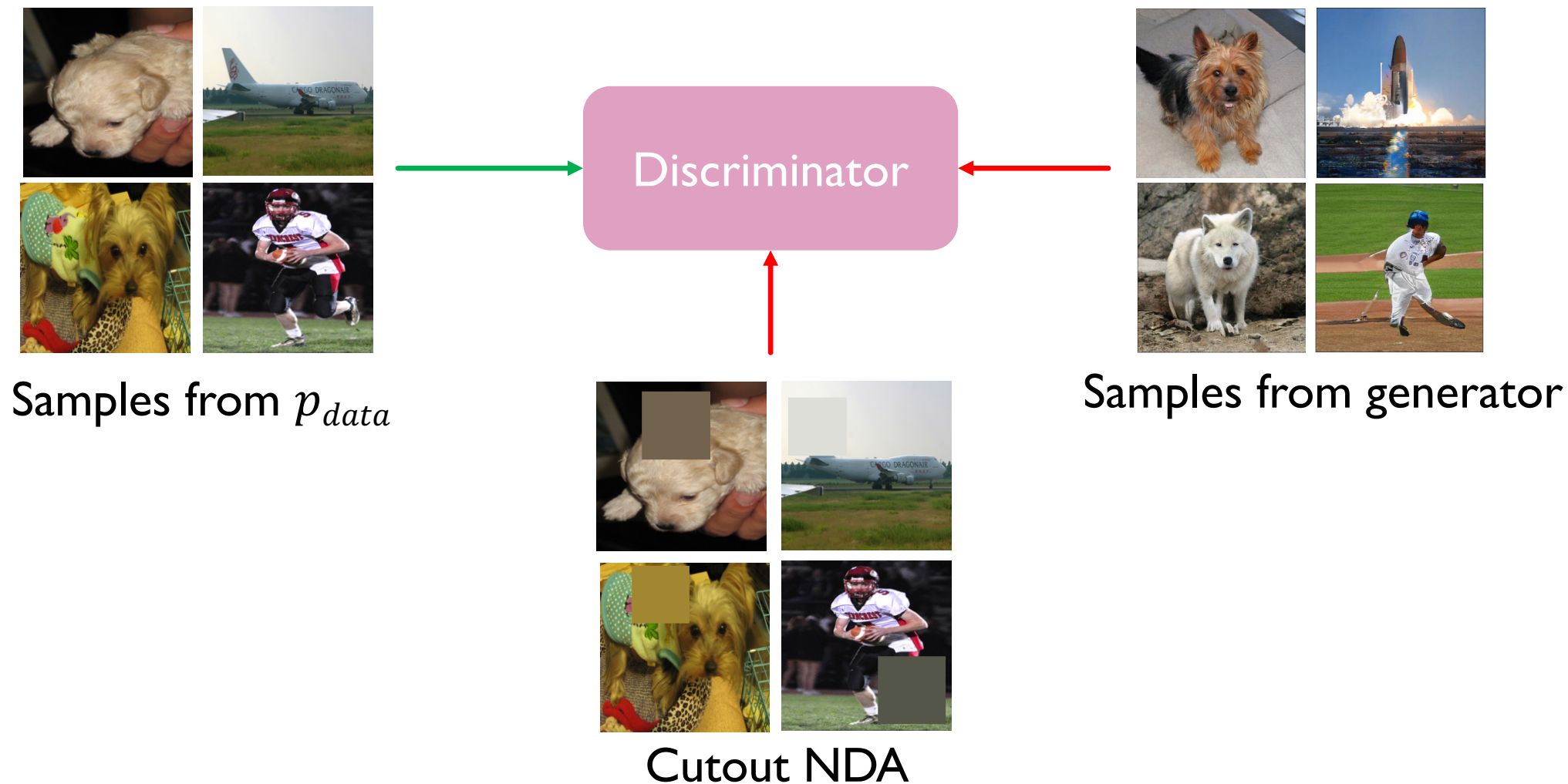
RESULTS – UNCONDITIONAL IMAGE GENERATION
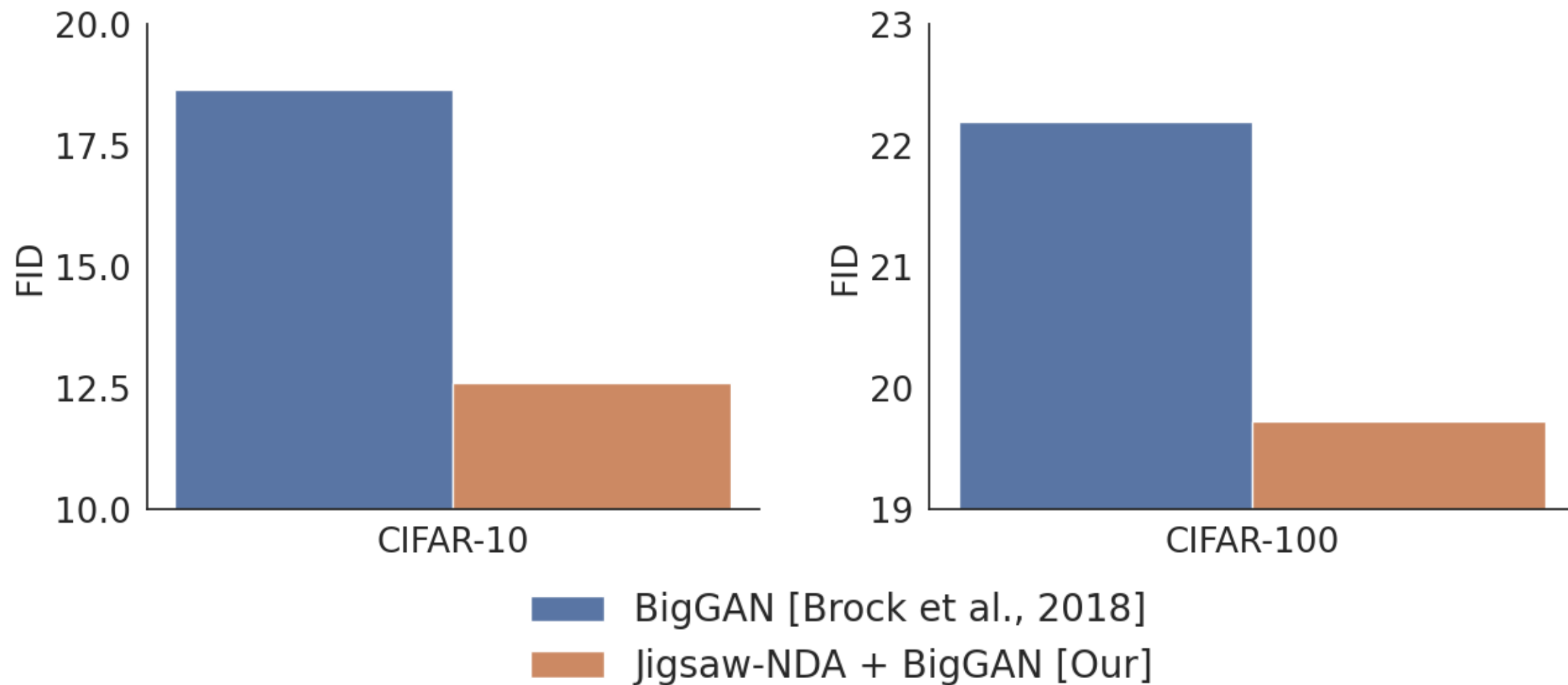
RESULTS – CONDITIONAL IMAGE GENERATION
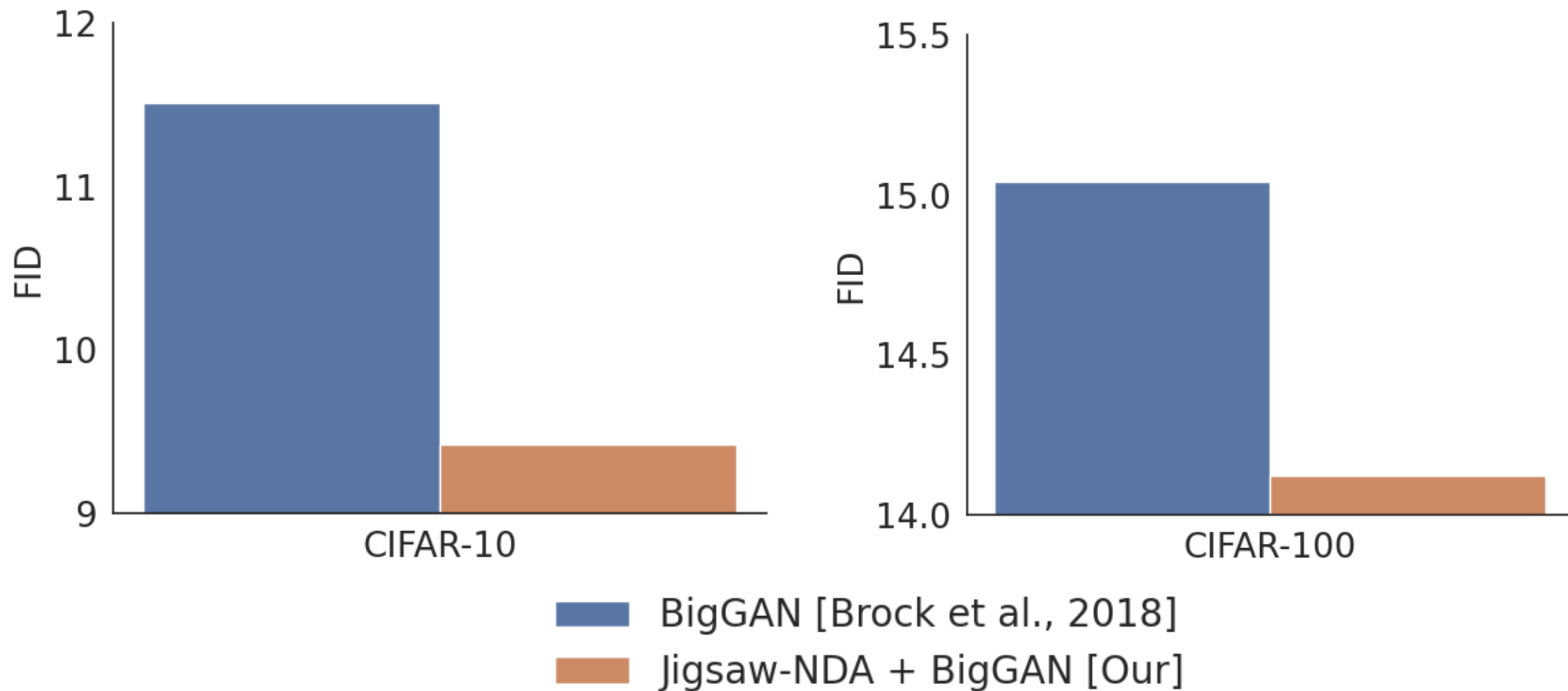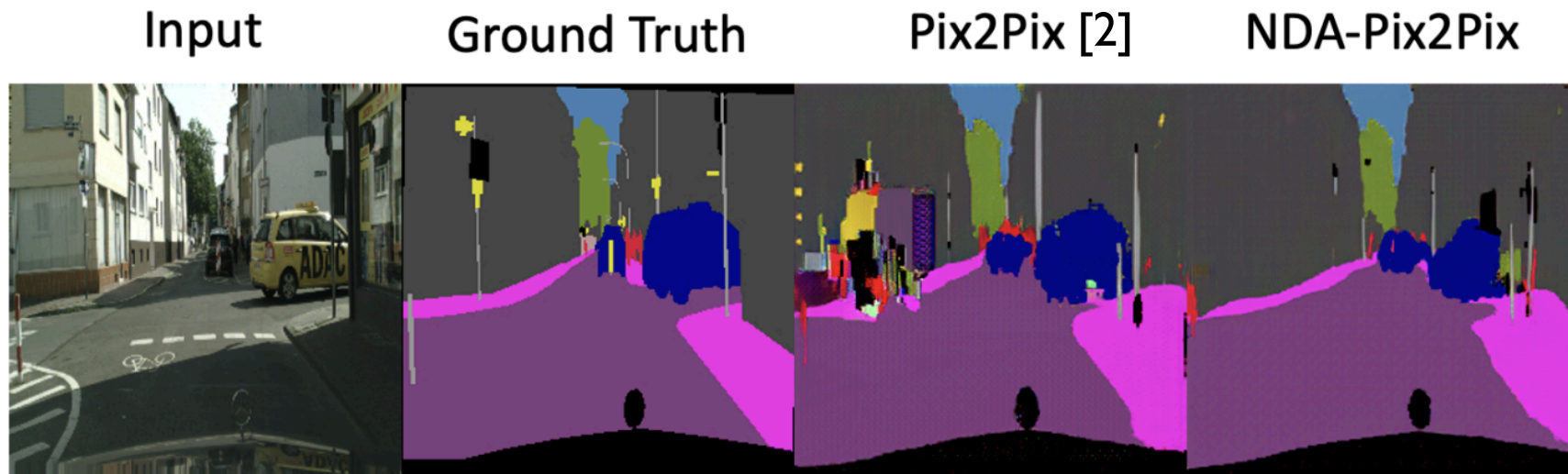
BigGAN [Brock et al., 2018]

Jigsaw-NDA + BigGAN [Our]

RESULTS – IMAGE TRANSLATION

[2] Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, and Alexei A Efros. Image-to-image translation with conditional adversarial networks. CVPR 2017
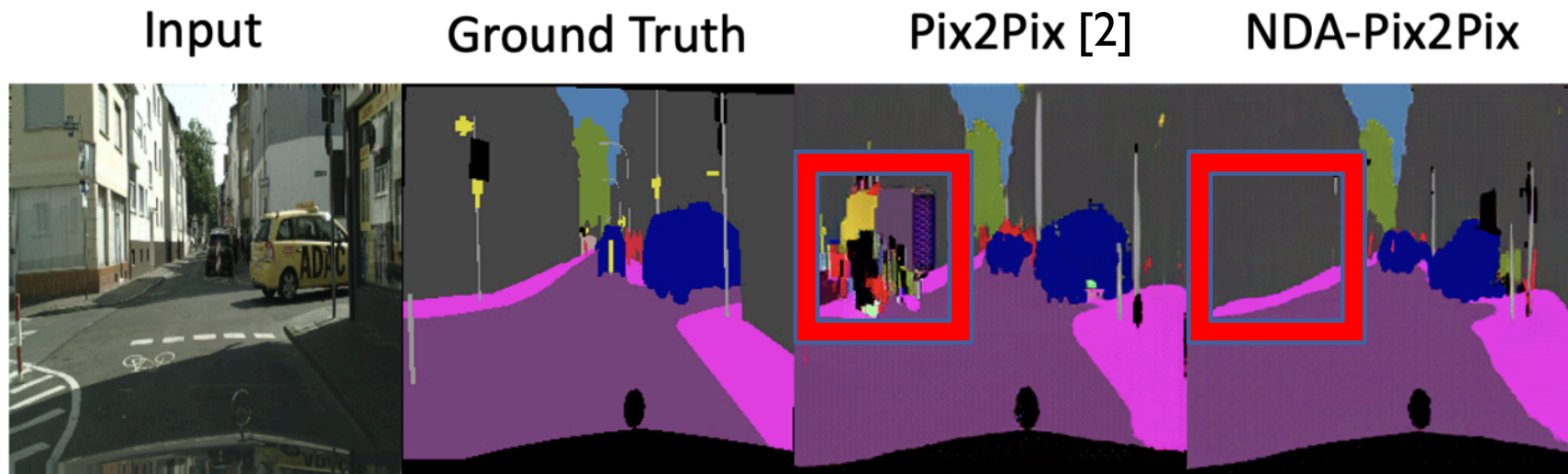
RESULTS – IMAGE TRANSLATION

[2] Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, and Alexei A Efros. Image-to-image translation with conditional adversarial networks. CVPR 2017

CONCLUSION

- NDA can be used to improve representation learning performance for images and videos too.

  - Results in the paper

| Original | Jigsaw | Stitching | Mixup | Cutout | CutMix |

NDA improves conditional/unconditional image generation, image translation and representation learning

THANK YOU!

- Paper link: https://openreview.net/forum?id=Ovp8dvB8IBH

- Code link: https://github.com/ermongroup/NDA

- Contact Info – a7b23@cs.stanford.edu, kayush@cs.stanford.edu, tsong@cs.stanford.edu