Generative Adversarial Networks (GANs)

What if we just want to sample?

Idea: don't explicitly model density, and instead just sample to generate new instances.

Problem: want to sample from complex distribution – can't do this directly!

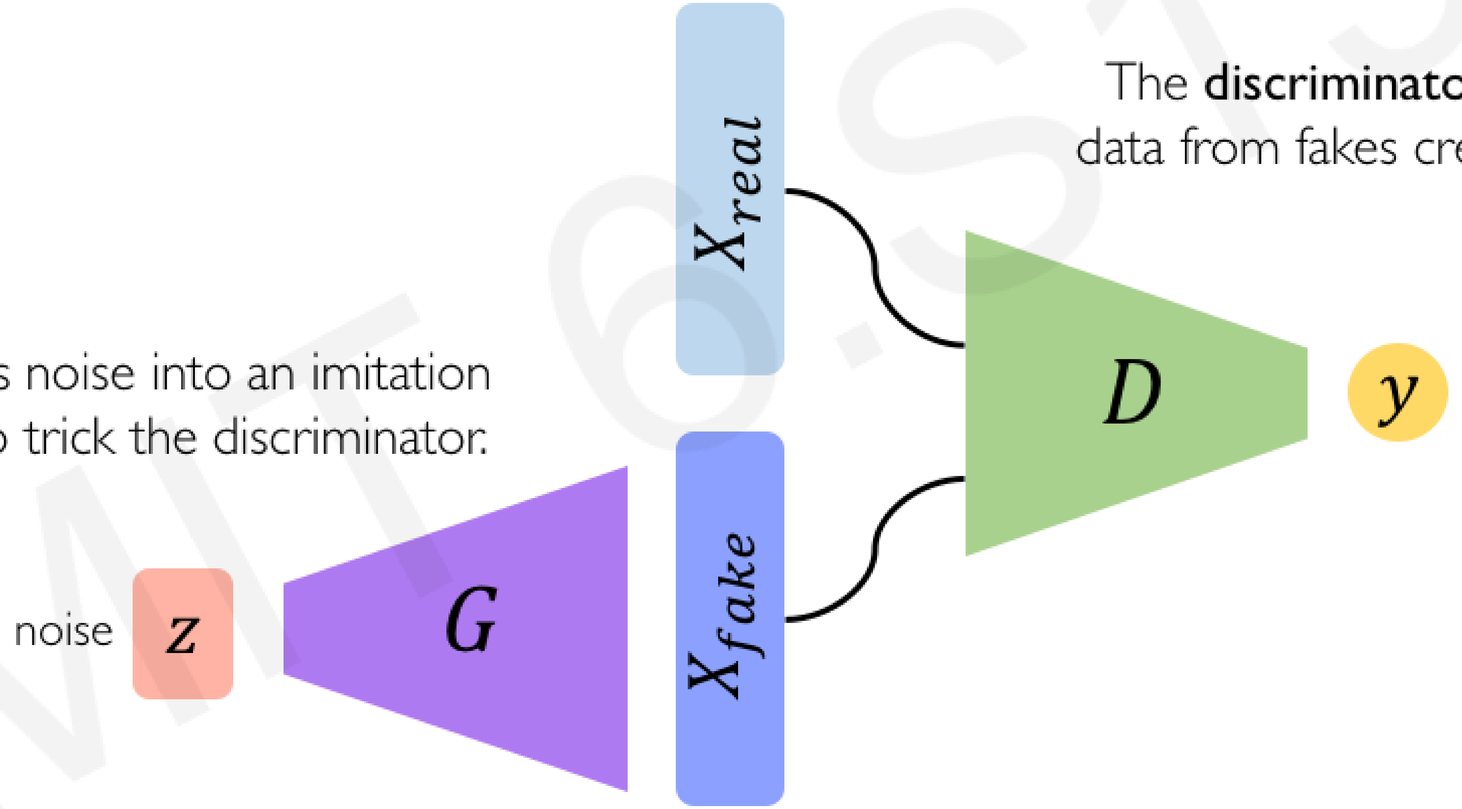
Solution: sample from something simple (noise), learn a transformation to the training distribution.

Generative Adversarial Networks (GANs)

Generative Adversarial Networks (GANs) are a way to make a generative model by having two neural networks compete with each other.

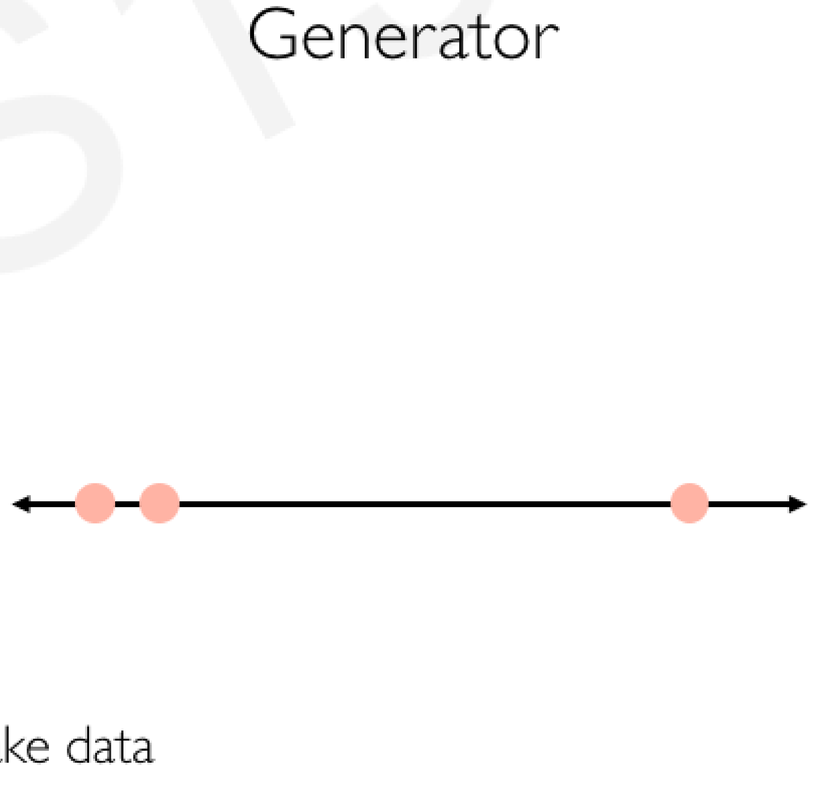
The **discriminator** tries to identify real data from fakes created by the generator.

The **generator** turns noise into an imitation of the data to try to trick the discriminator.



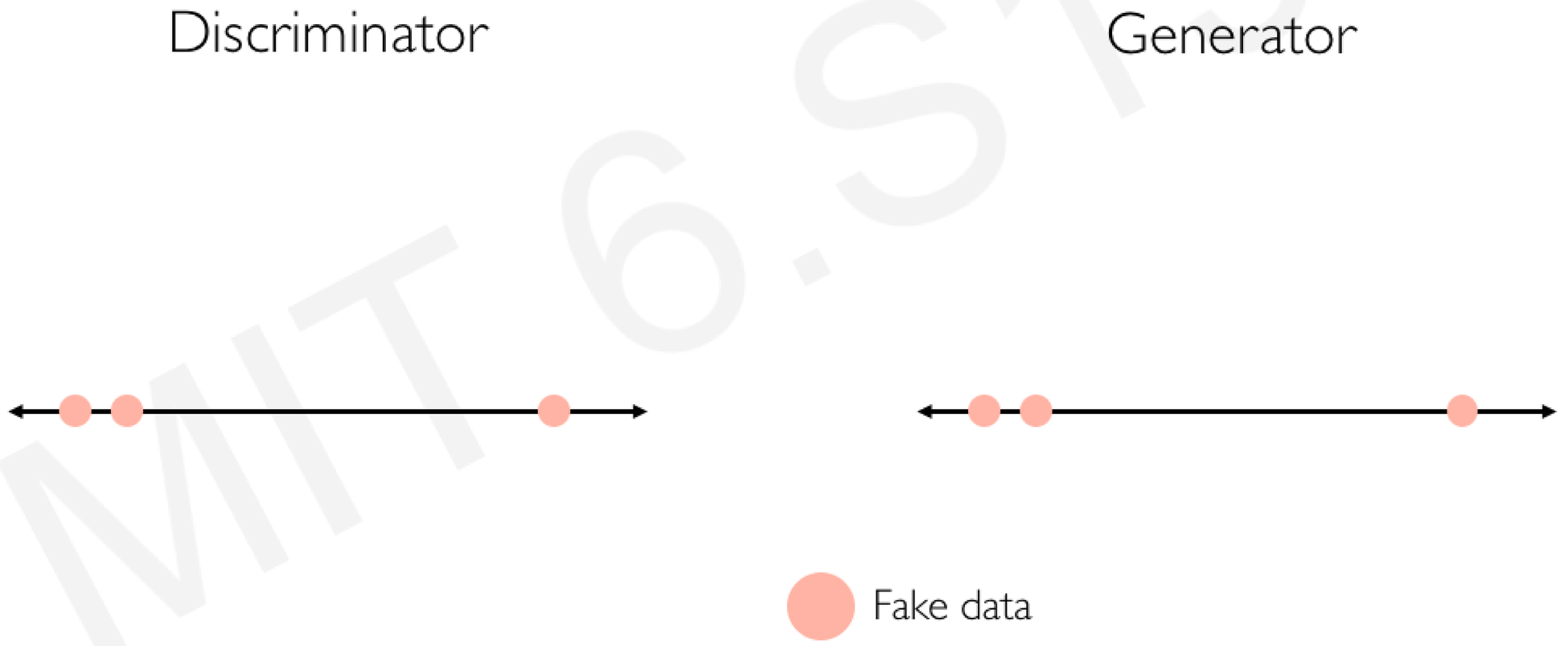
Intuition behind GANs

Generator starts from noise to try to create an imitation of the data.



Intuition behind GANs

Discriminator looks at both real data and fake data created by the generator.



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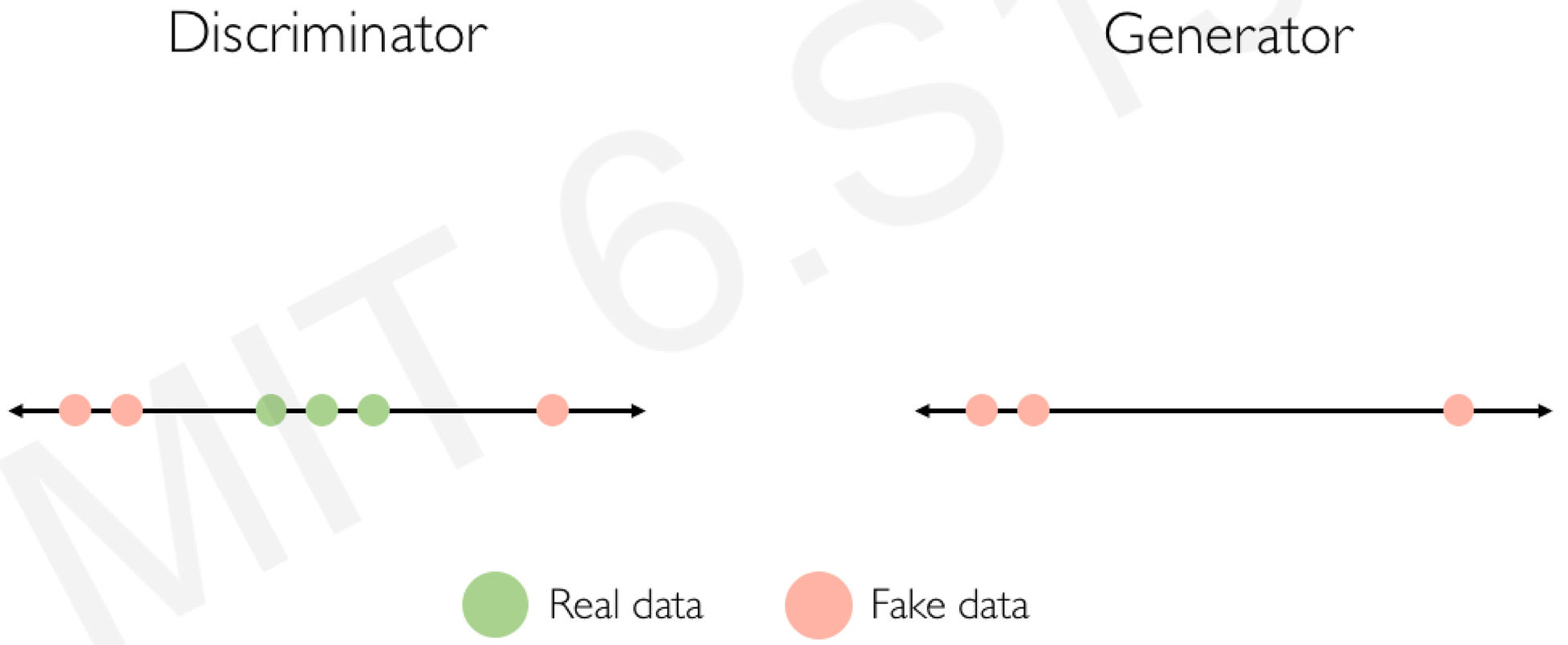
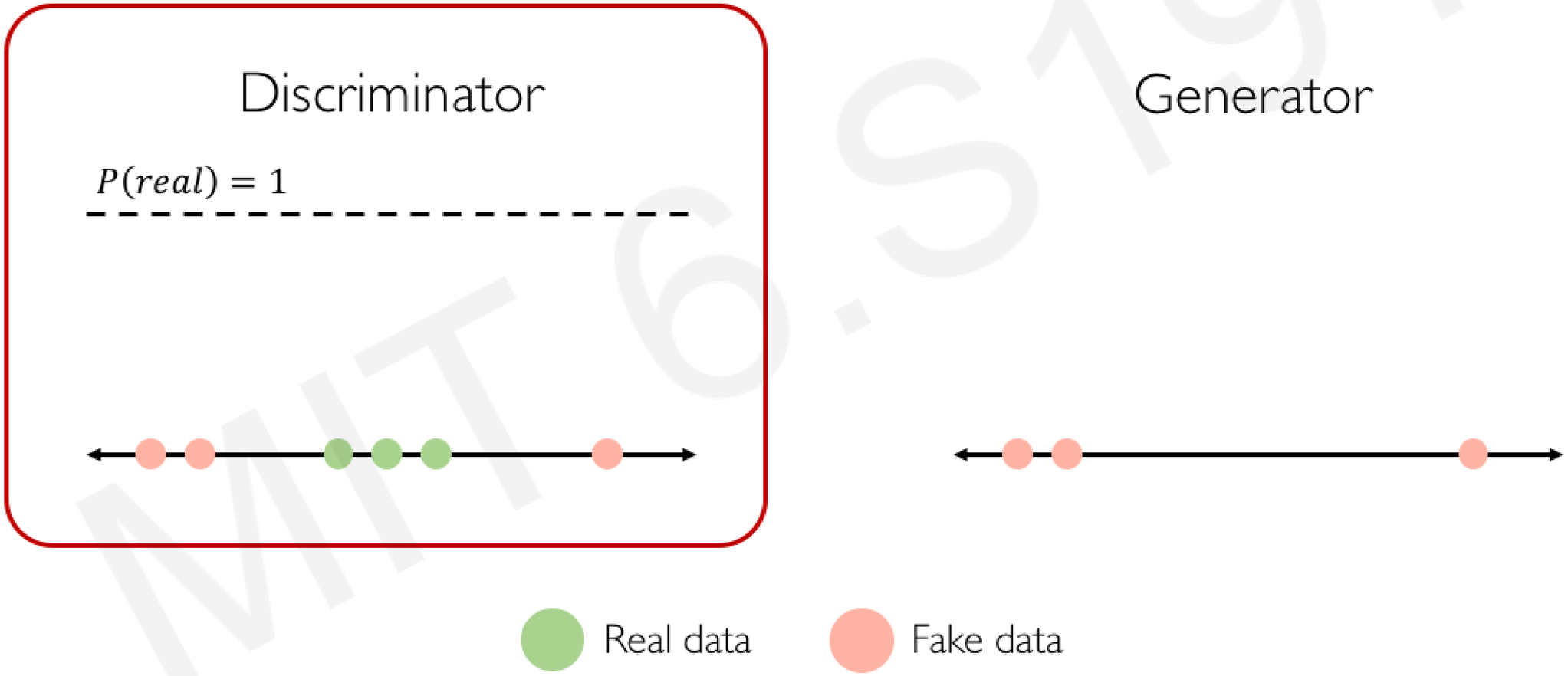


Intuition behind GANs

Discriminator tries to predict what's real and what's fake.



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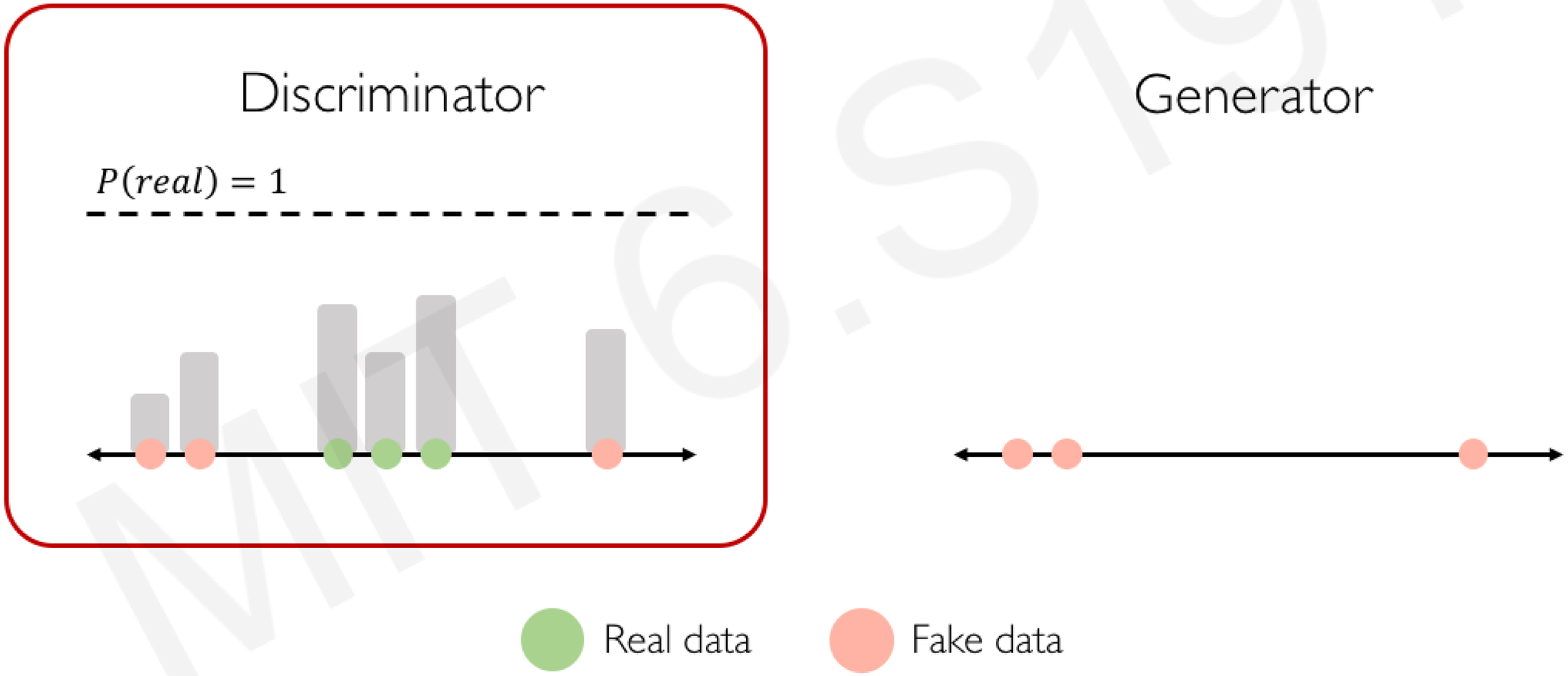

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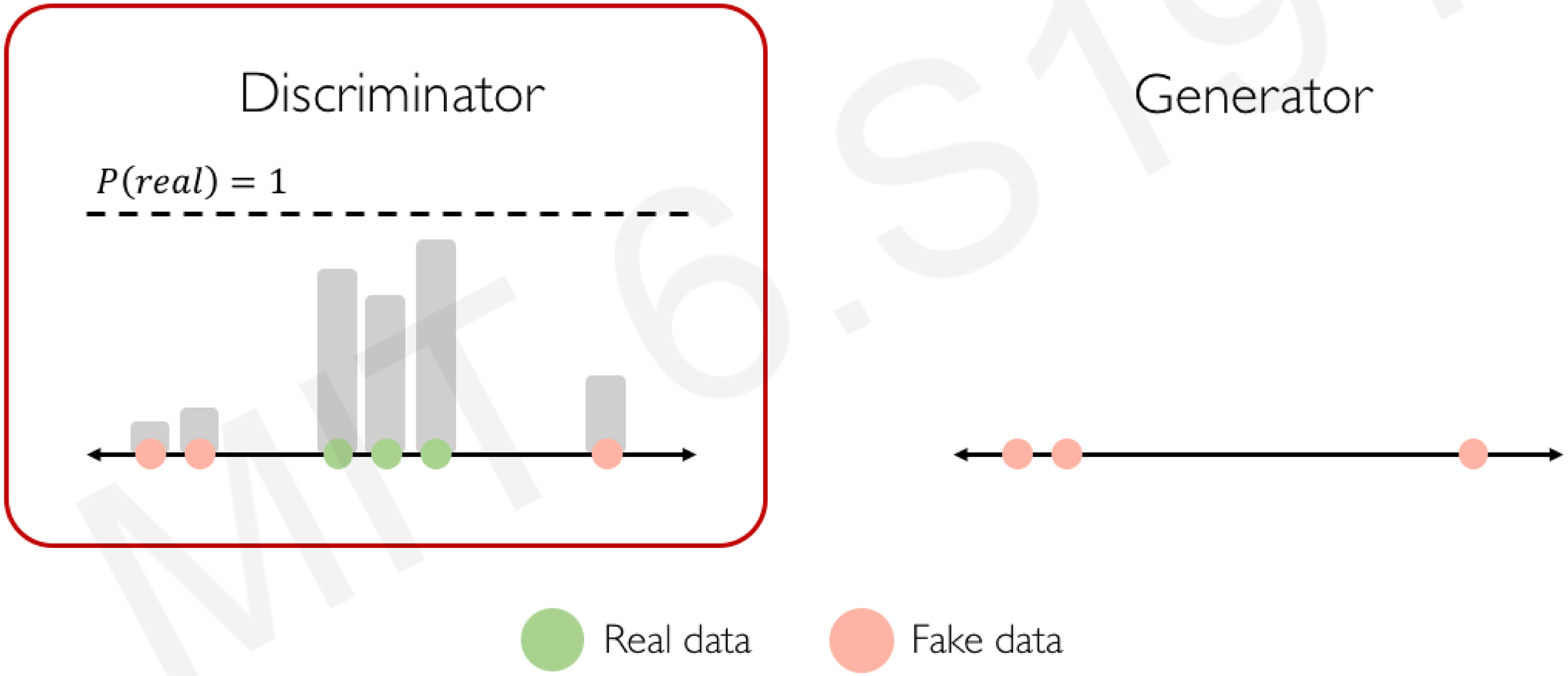

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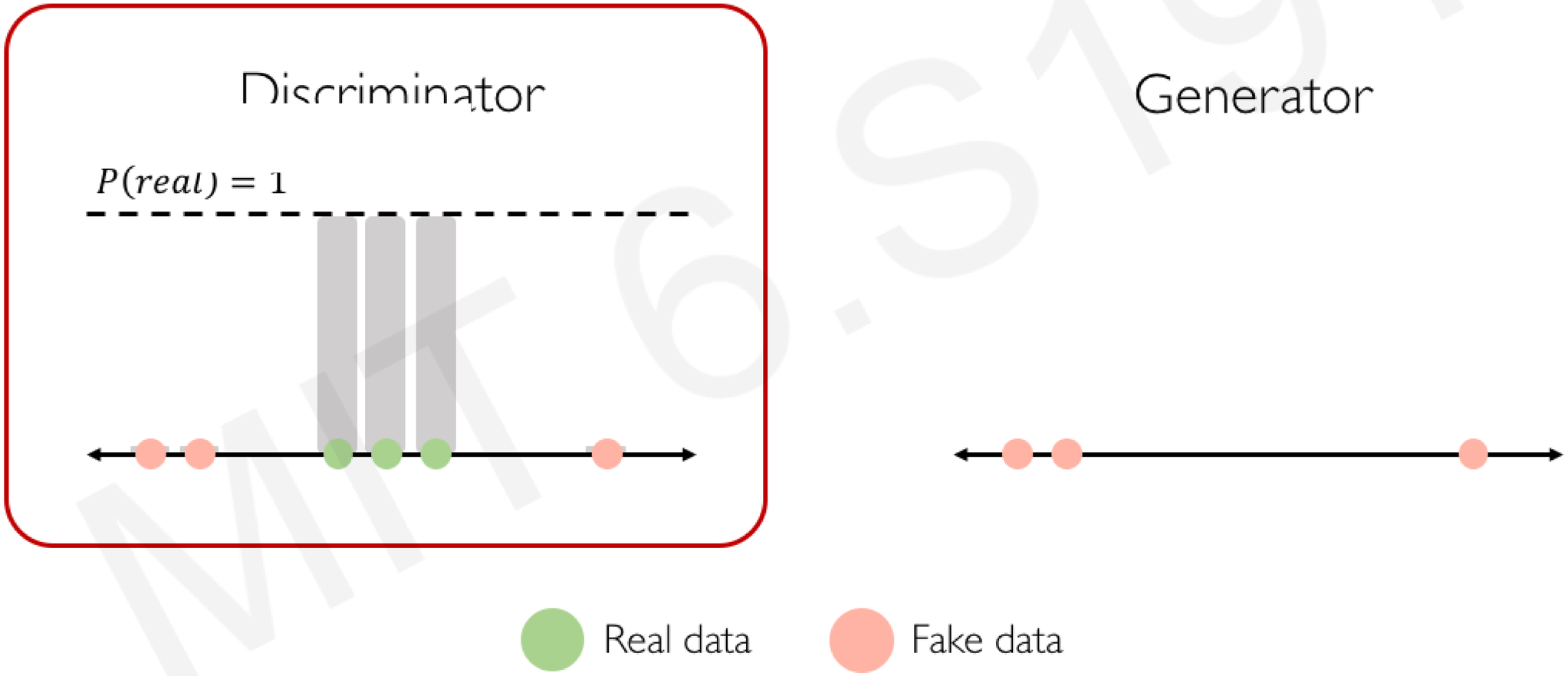
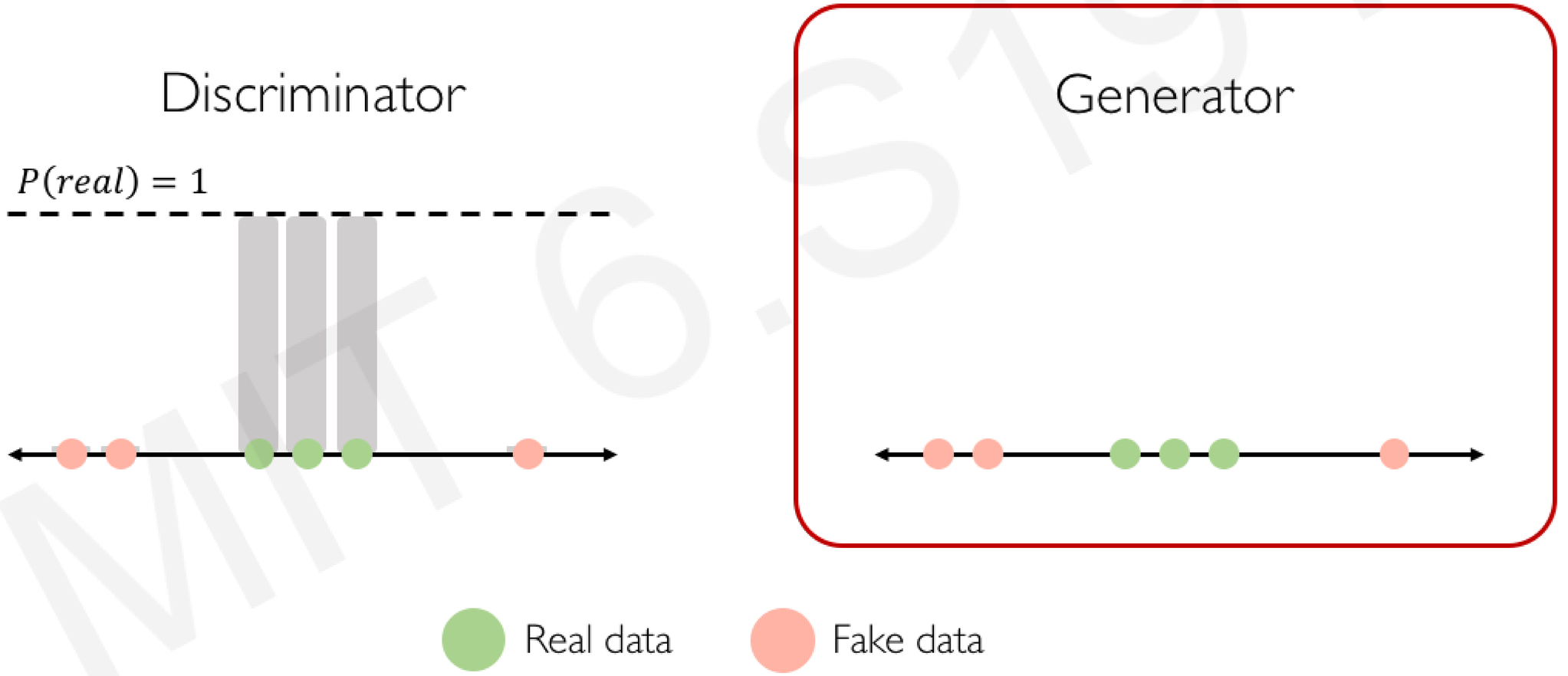


Intuition behind GANs

Generator tries to improve its imitation of the data.



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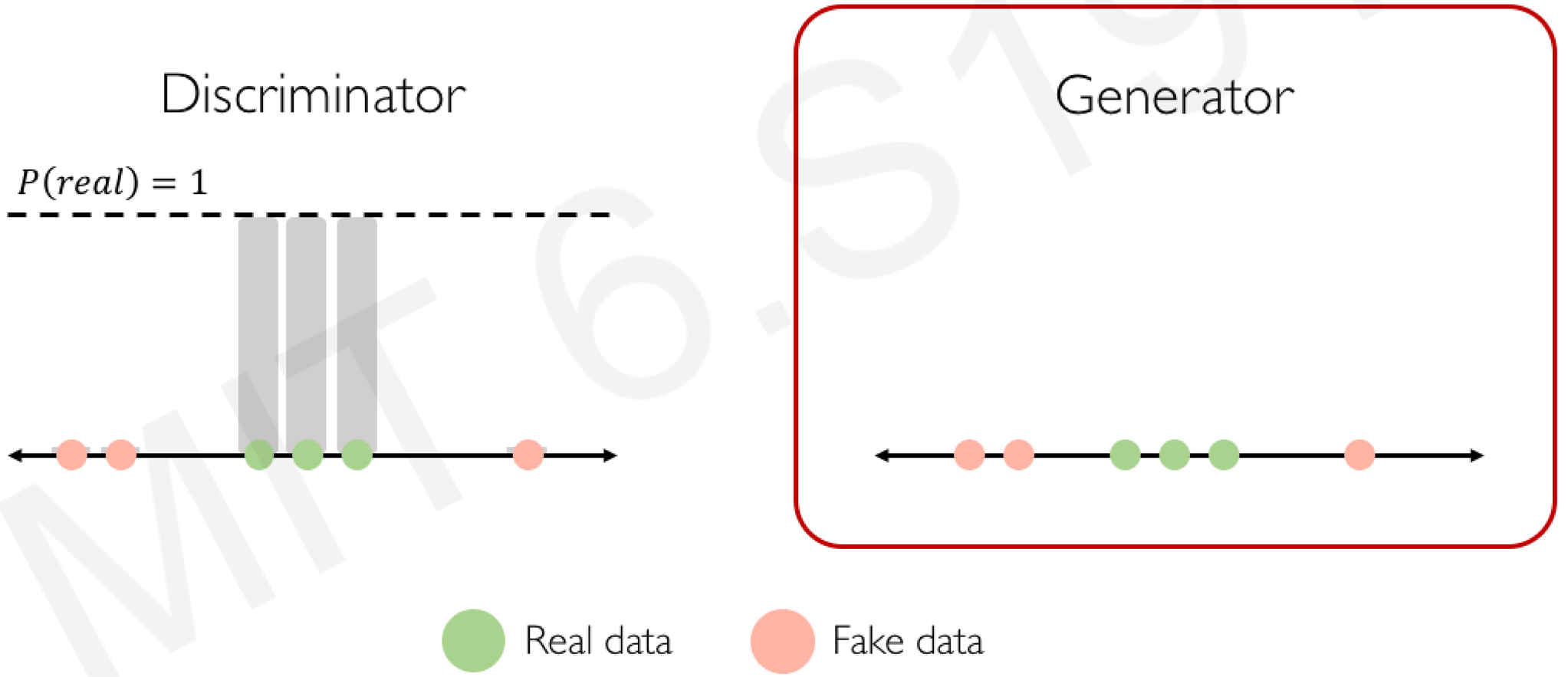

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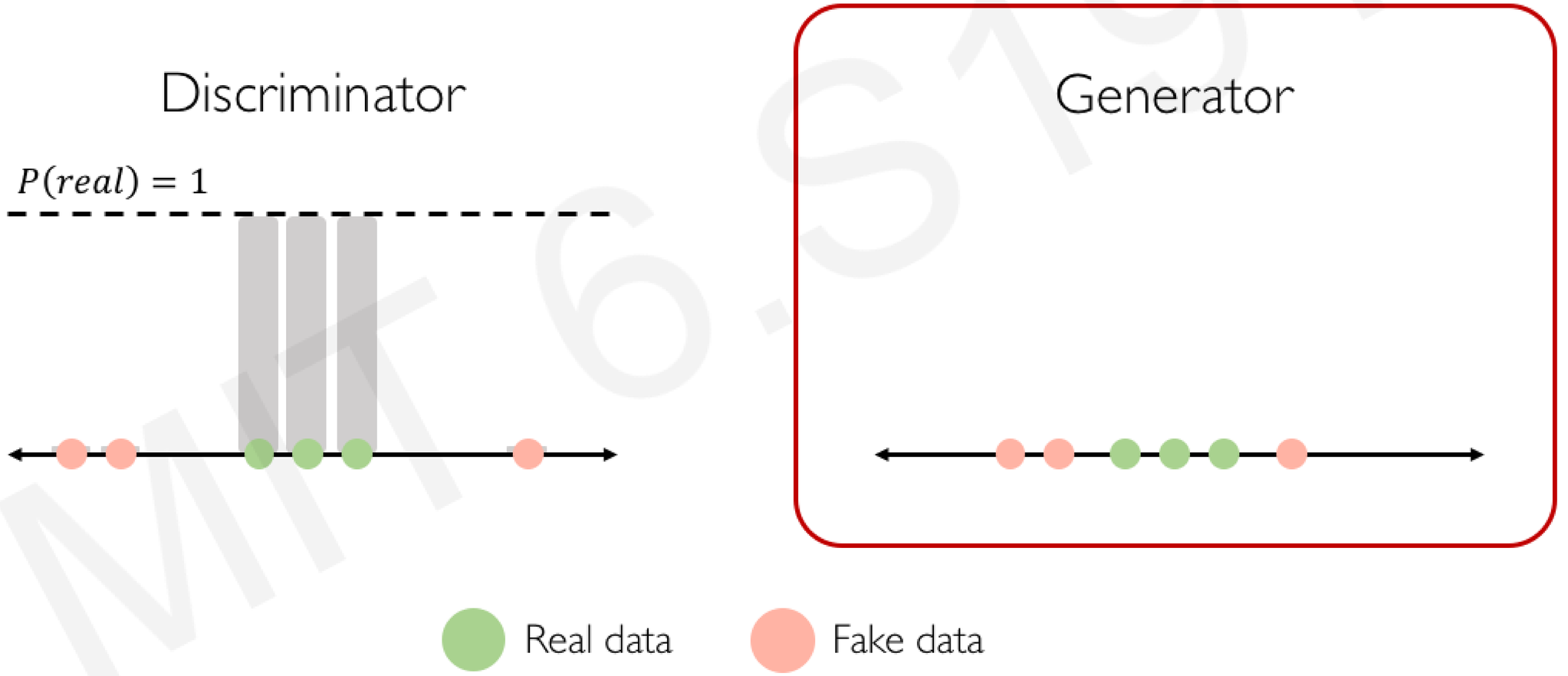

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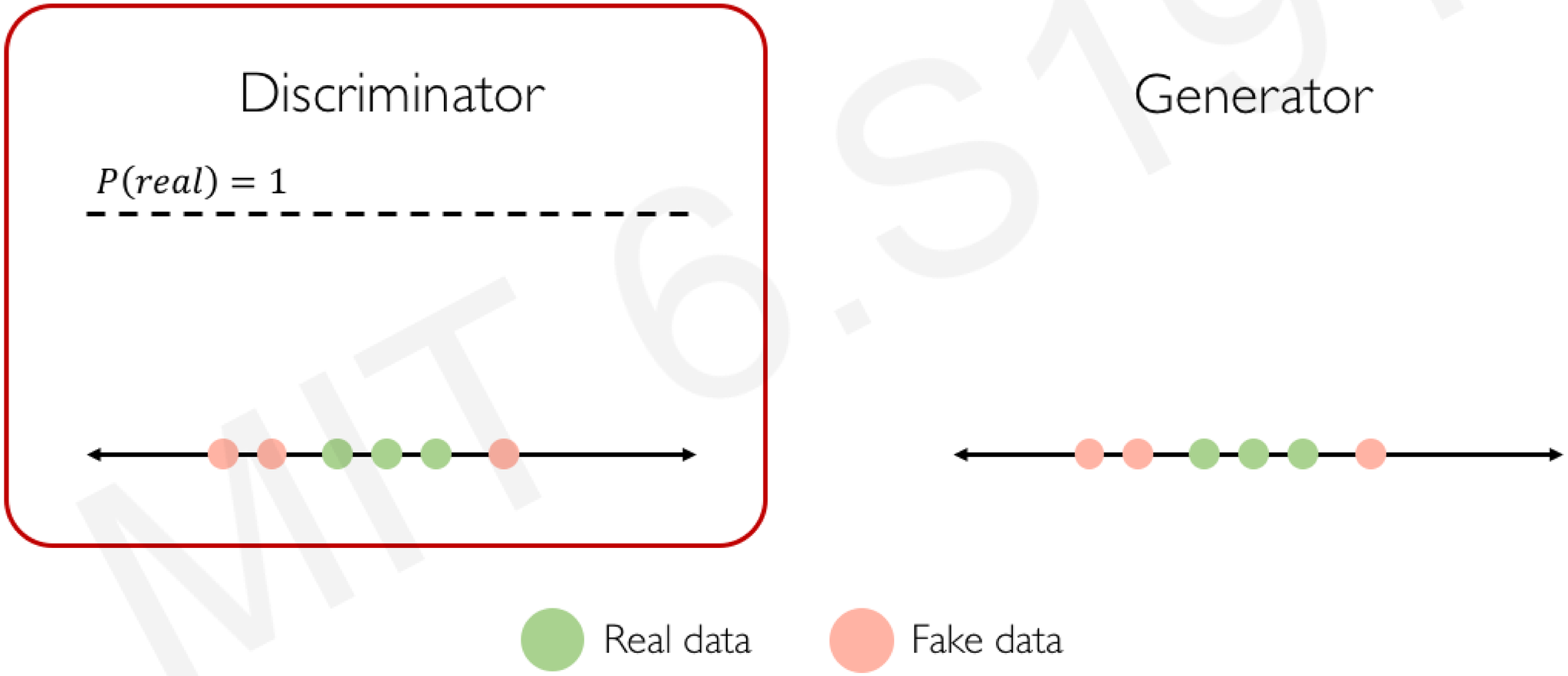

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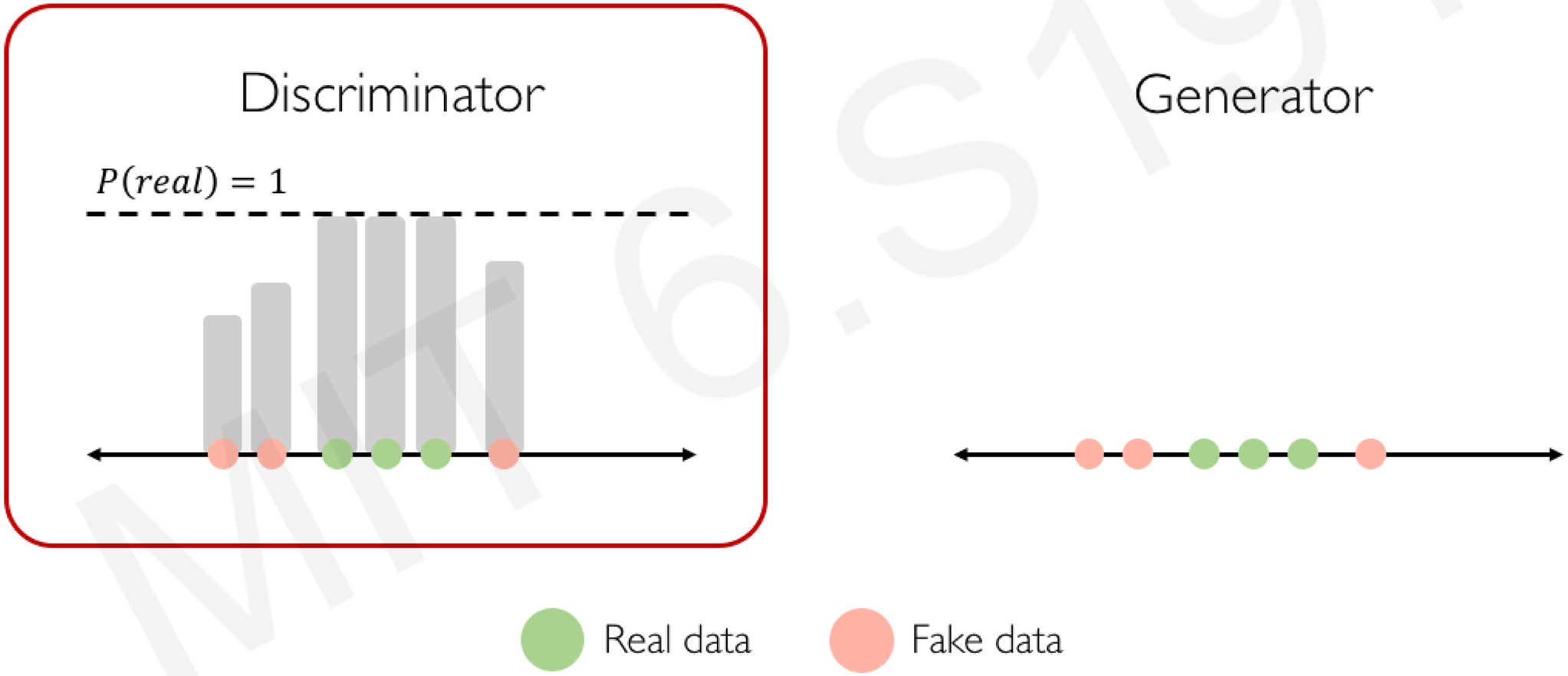

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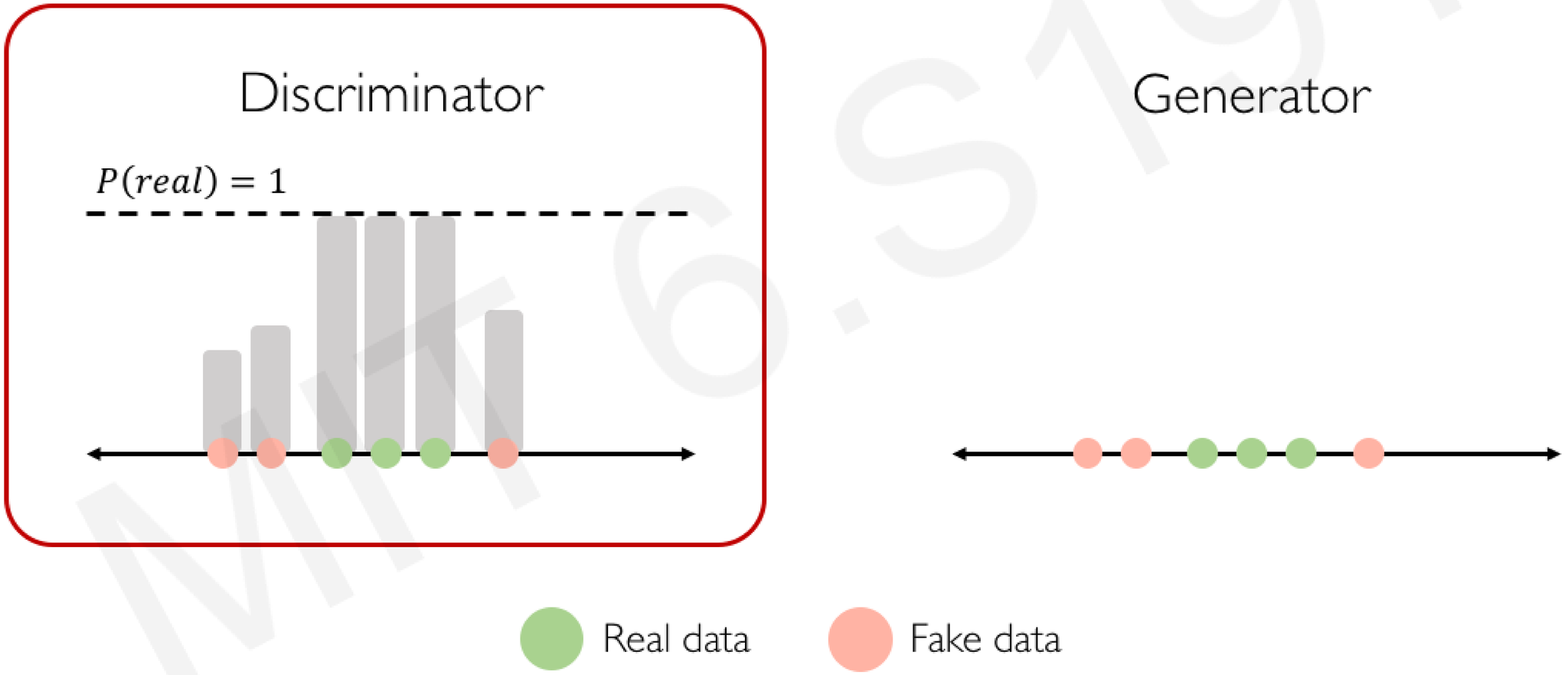

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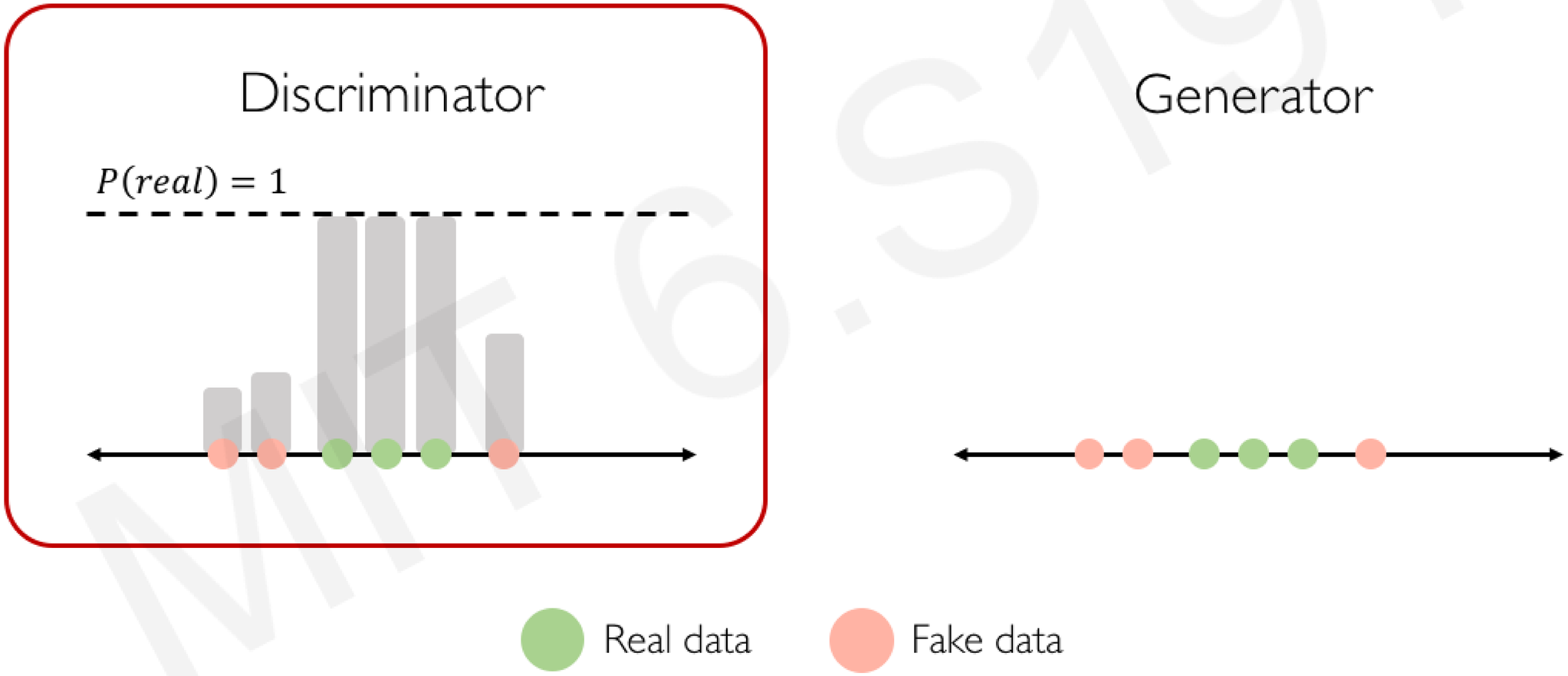

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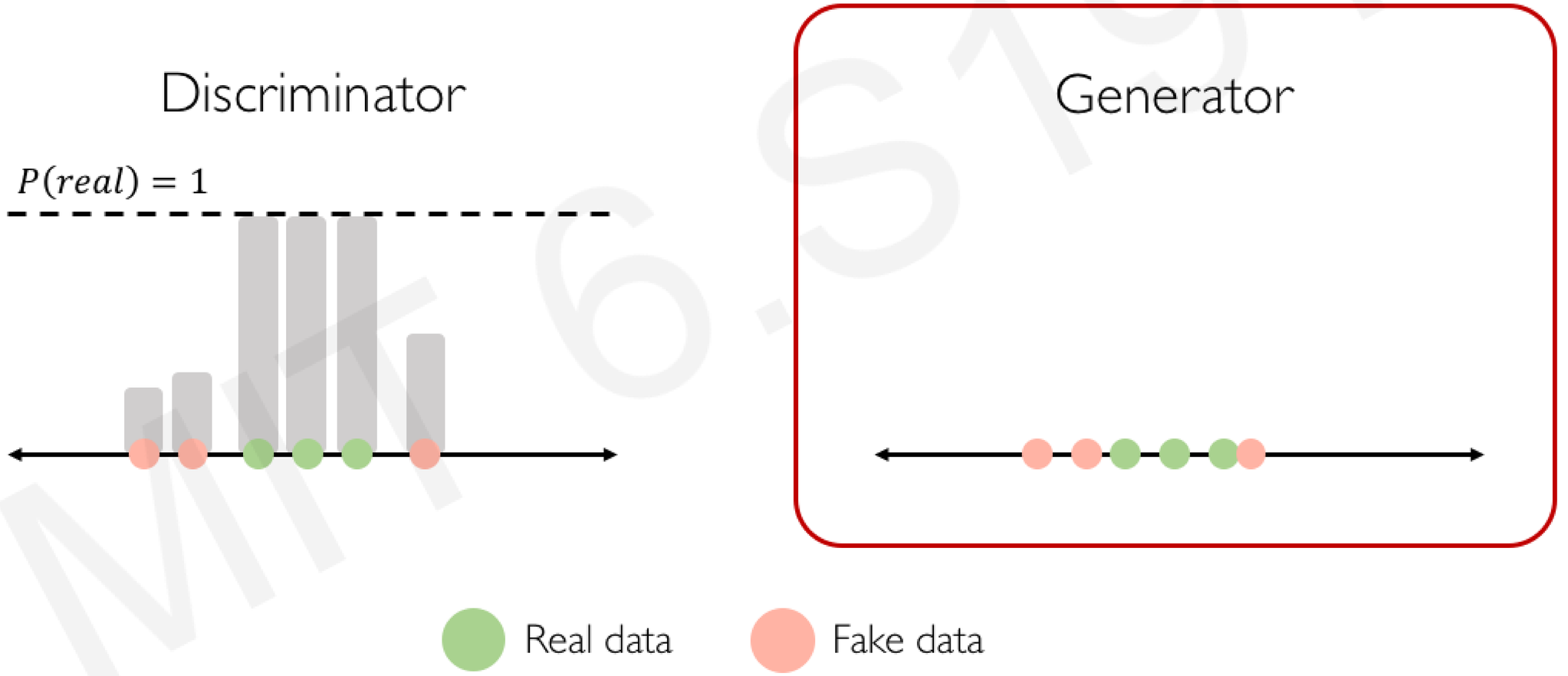

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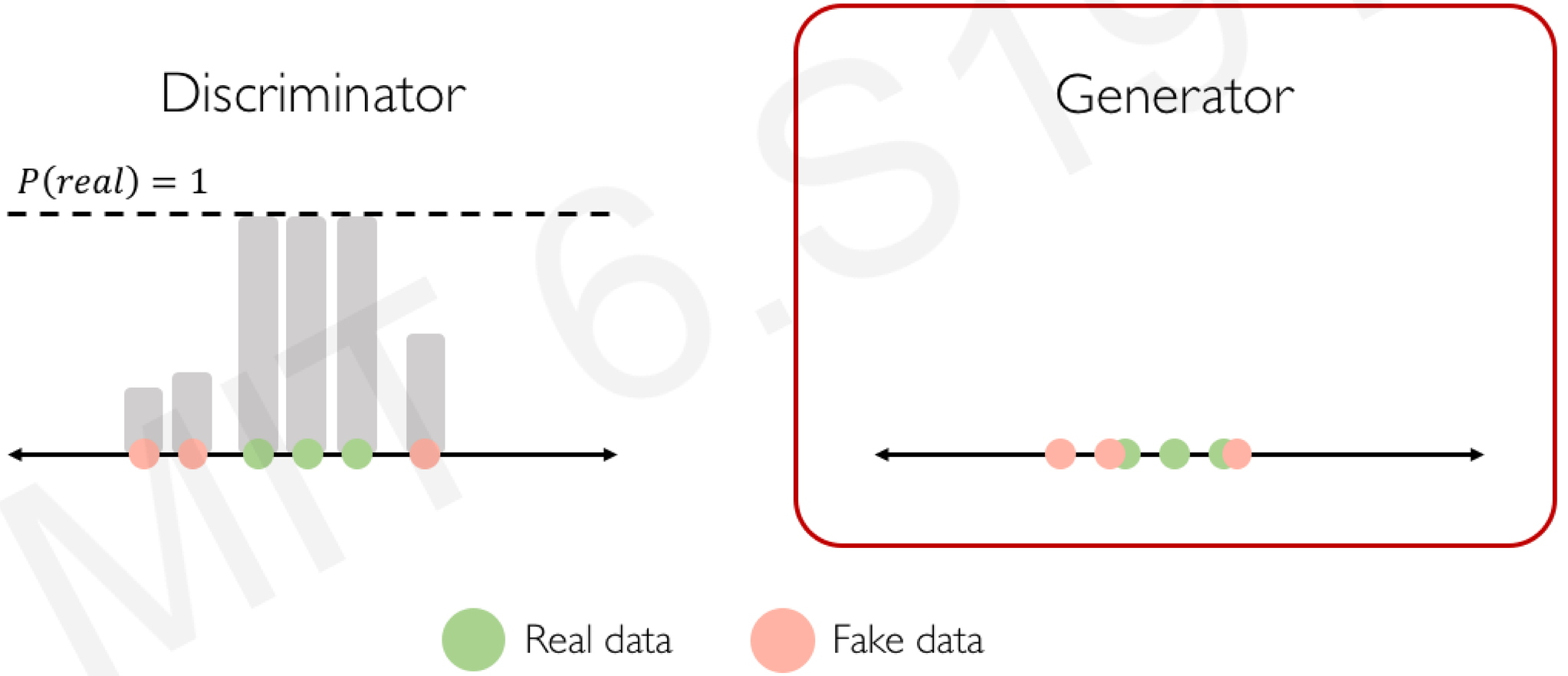

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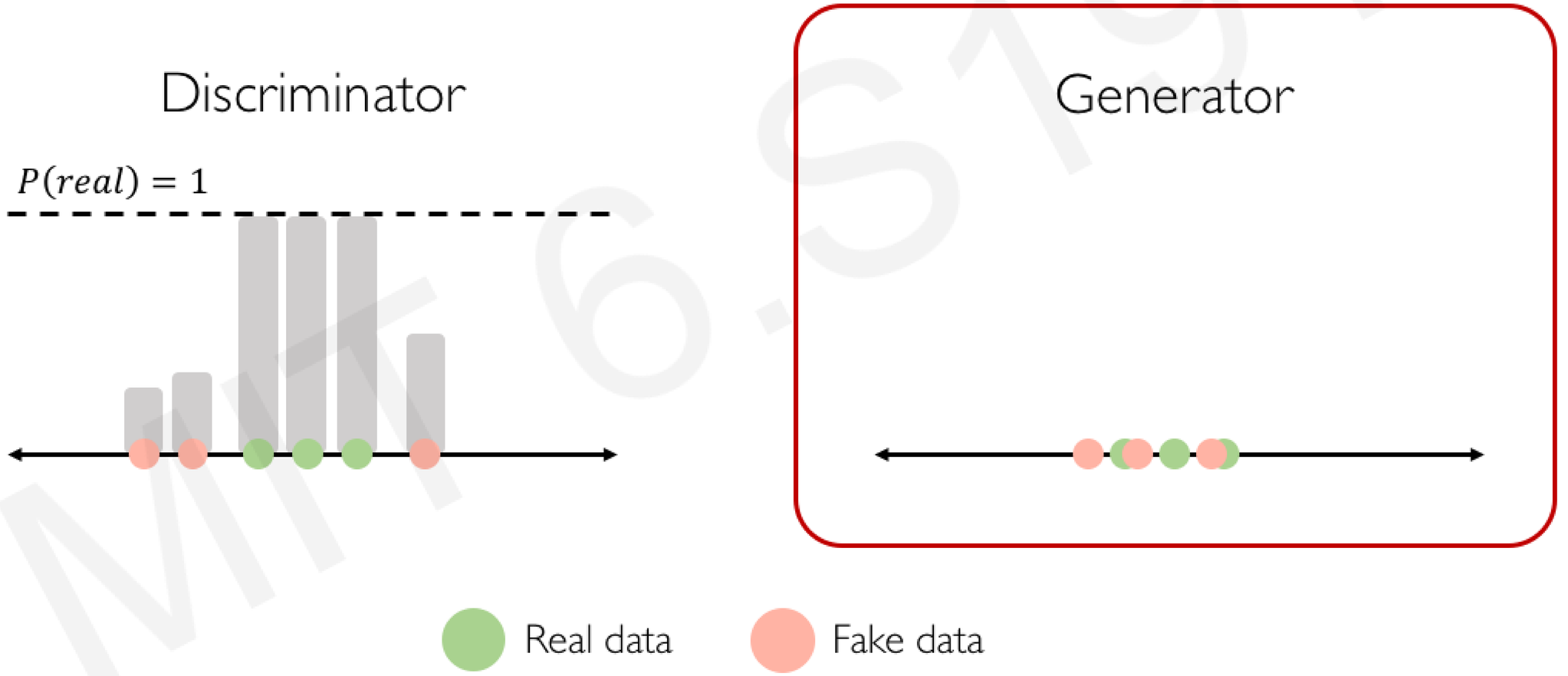
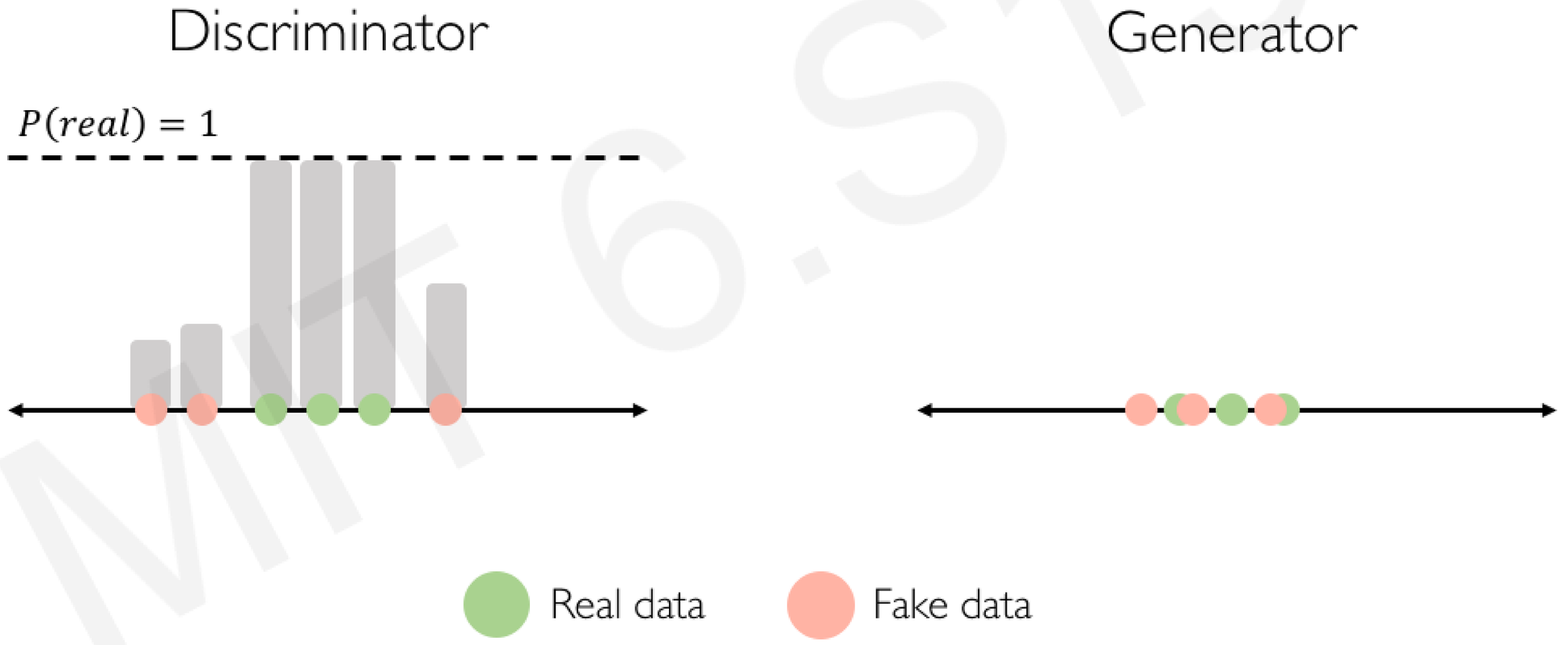


Intuition behind GANs

Discriminator tries to identify real data from fakes created by the generator.
Generator tries to create imitations of data to trick the discriminator.



Generating new data with GANs

After training, use generator network to create **new data** that's never been seen before.