

Measurement Score-Based Diffusion Model

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¹ University of Wisconsin — Madison

² Washington University in St. Louis



Outline of the talk

- **Motivation**
- **Proposed Methods**
- **Experiments**

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- **Motivation**
- Proposed Methods
- Experiments

Motivation

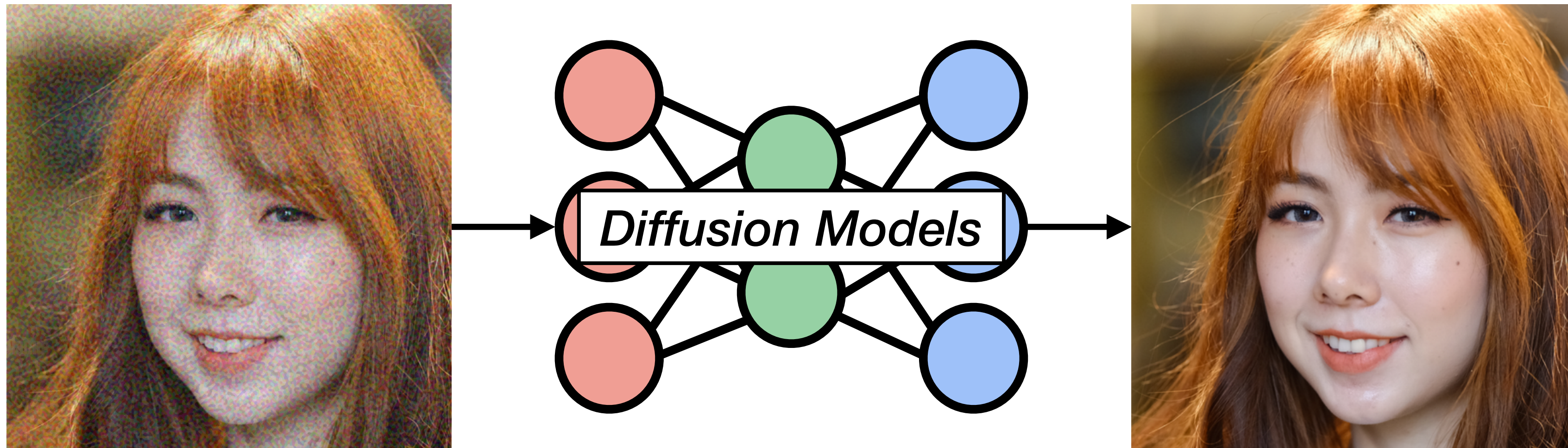
Method

Experiment



Training generative models **without clean data**

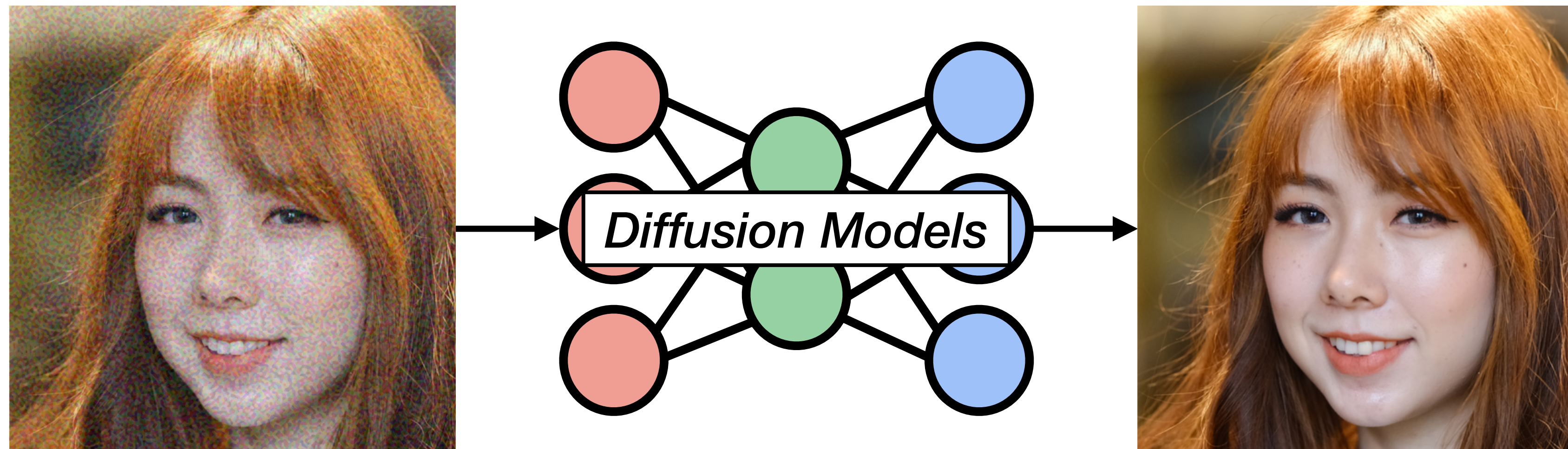
Motivation: diffusion model training / sampling



Train to denoise wide range of noise level.



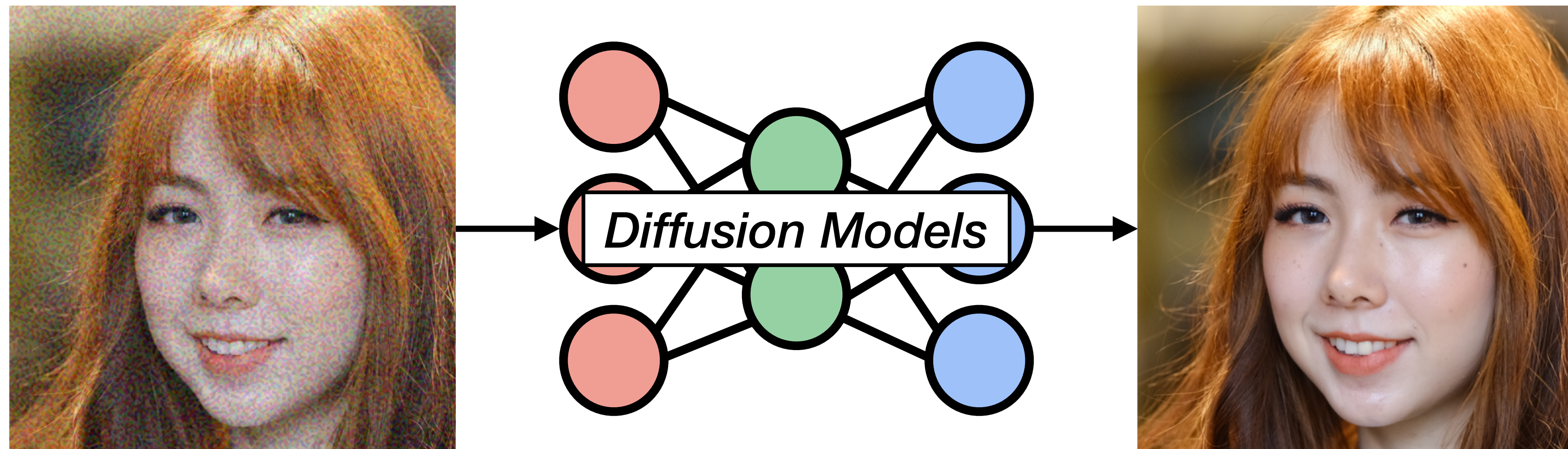
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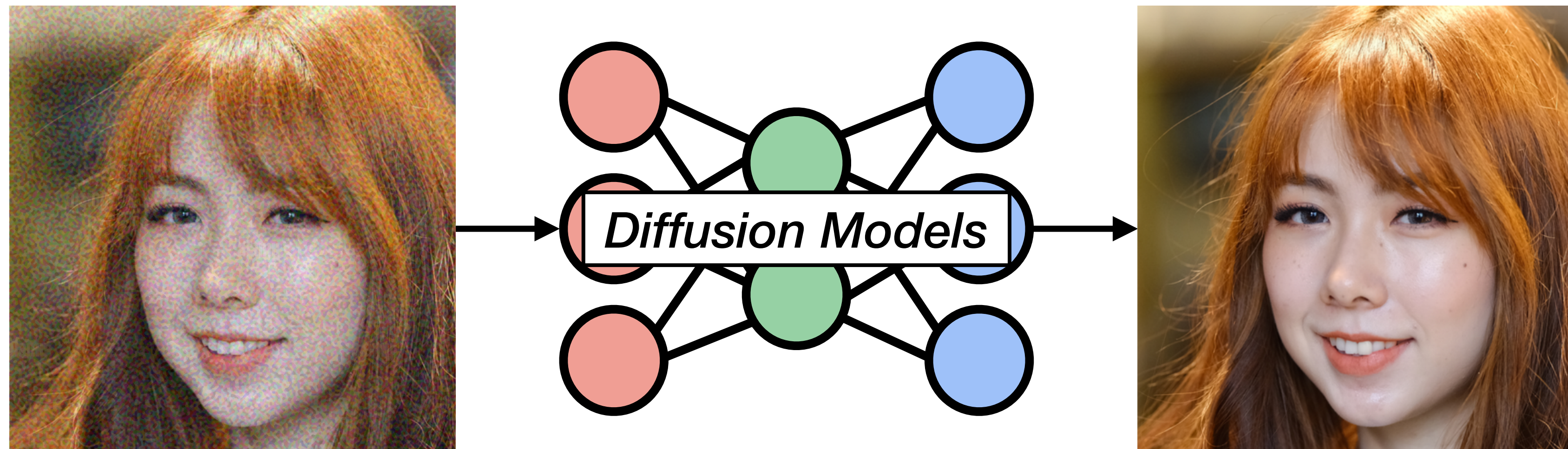
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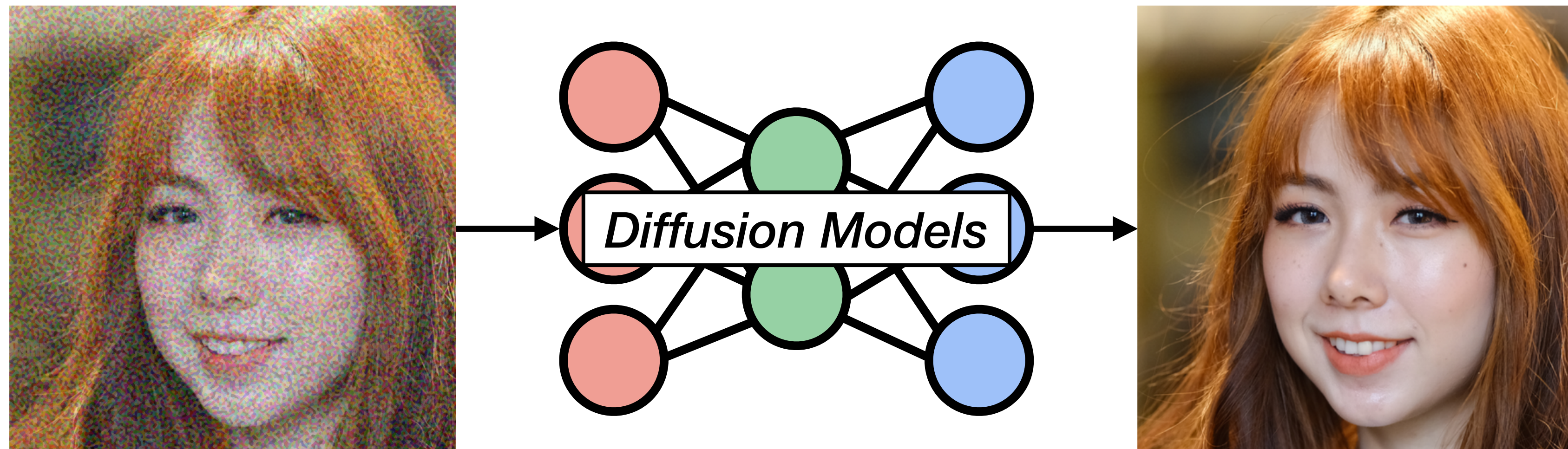
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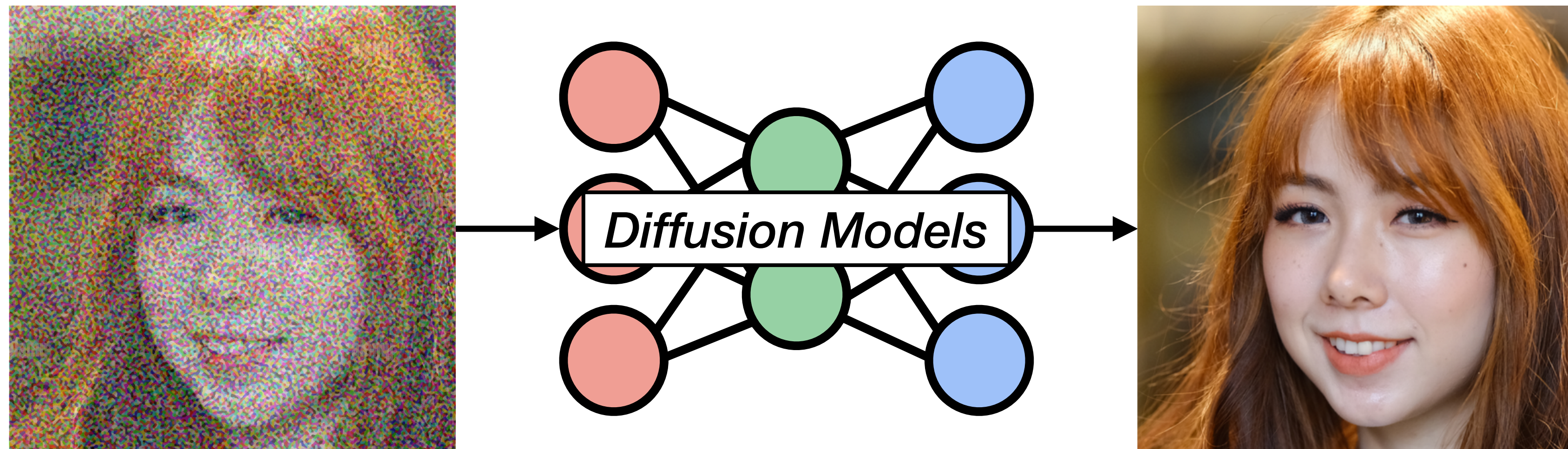
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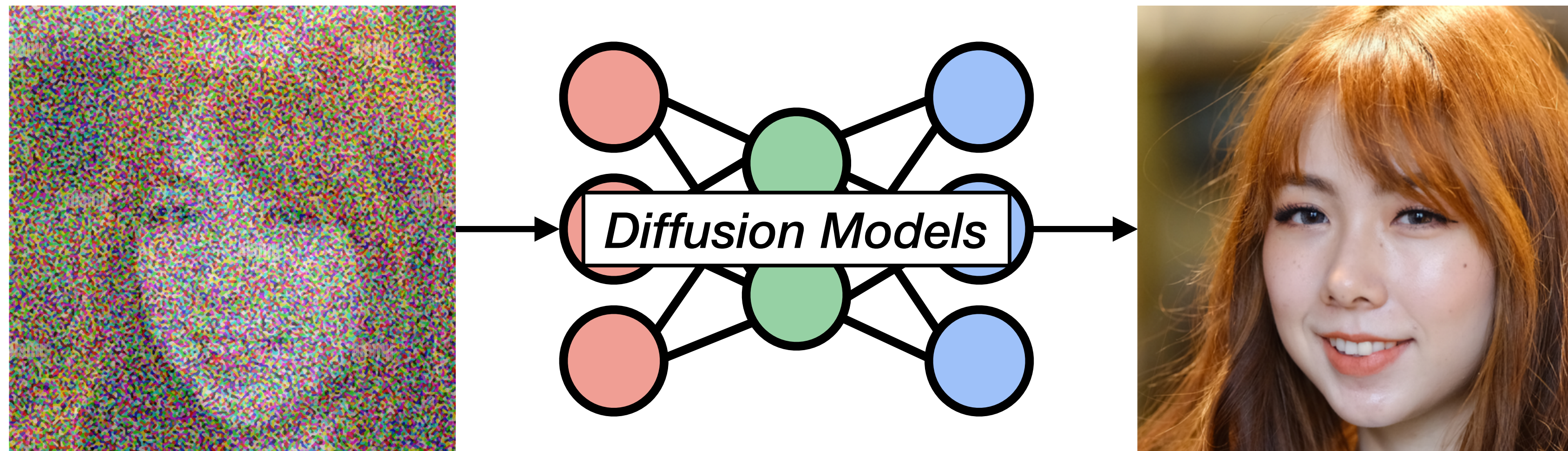
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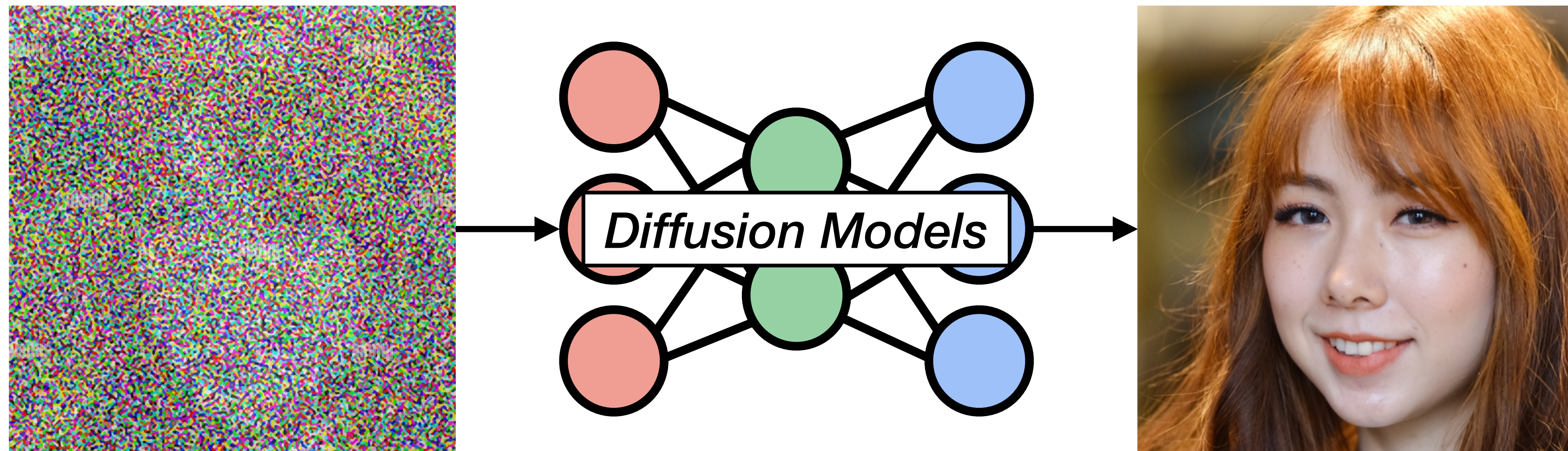
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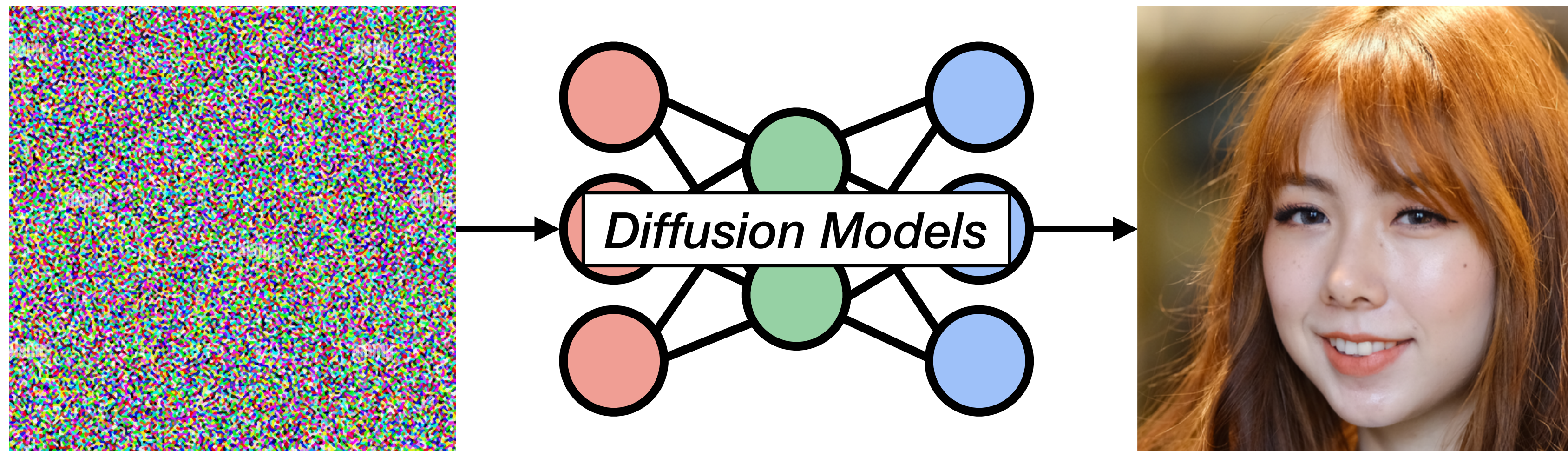
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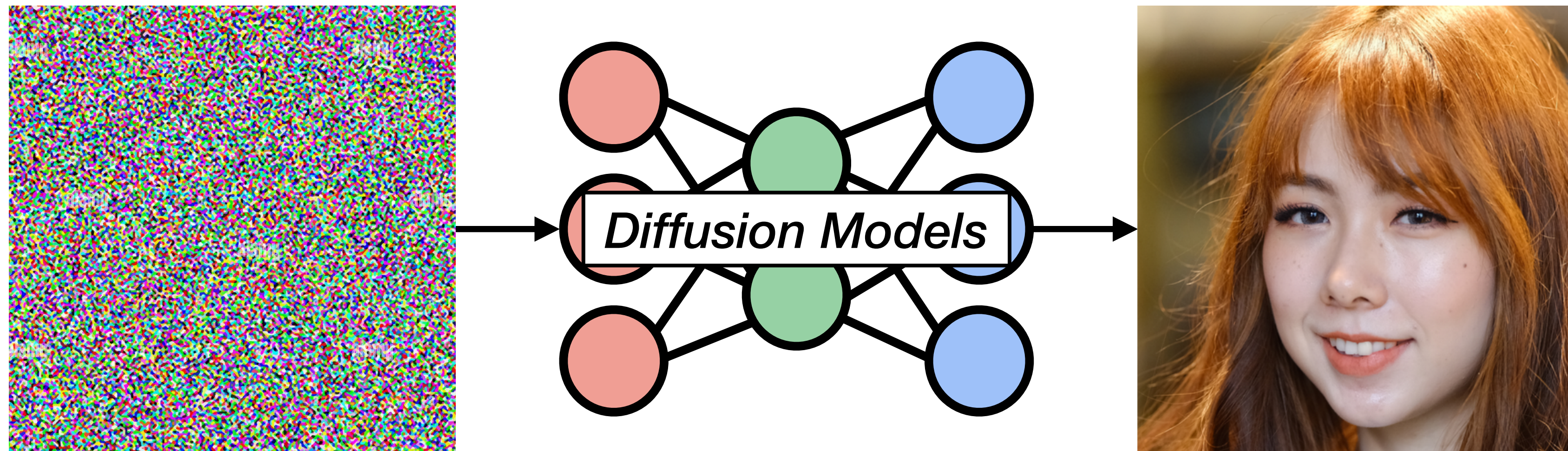
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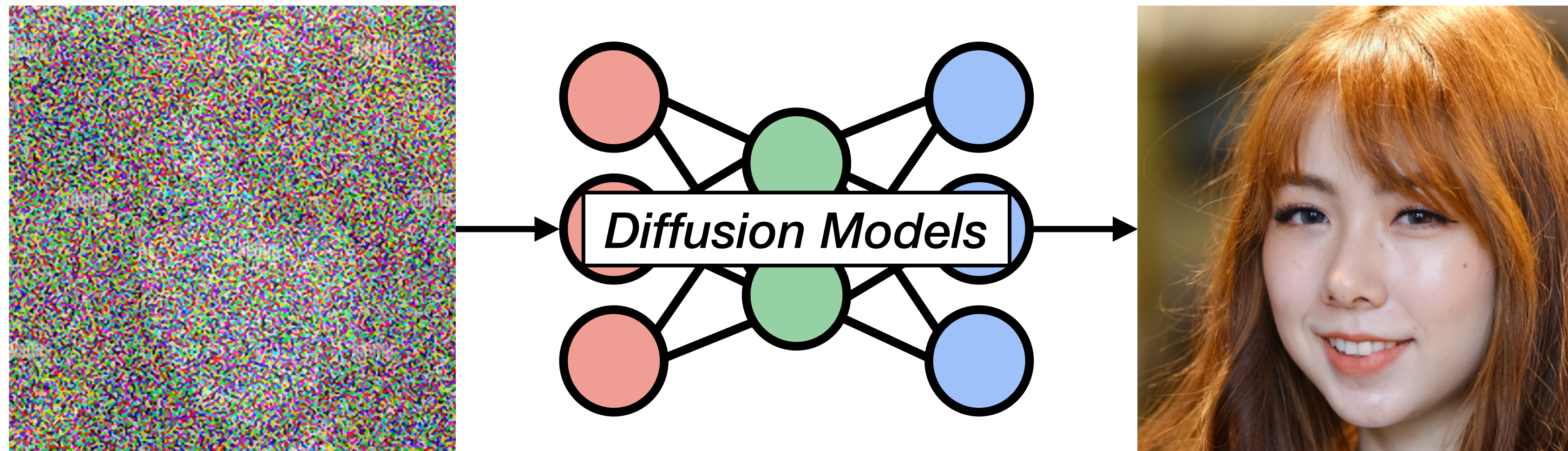
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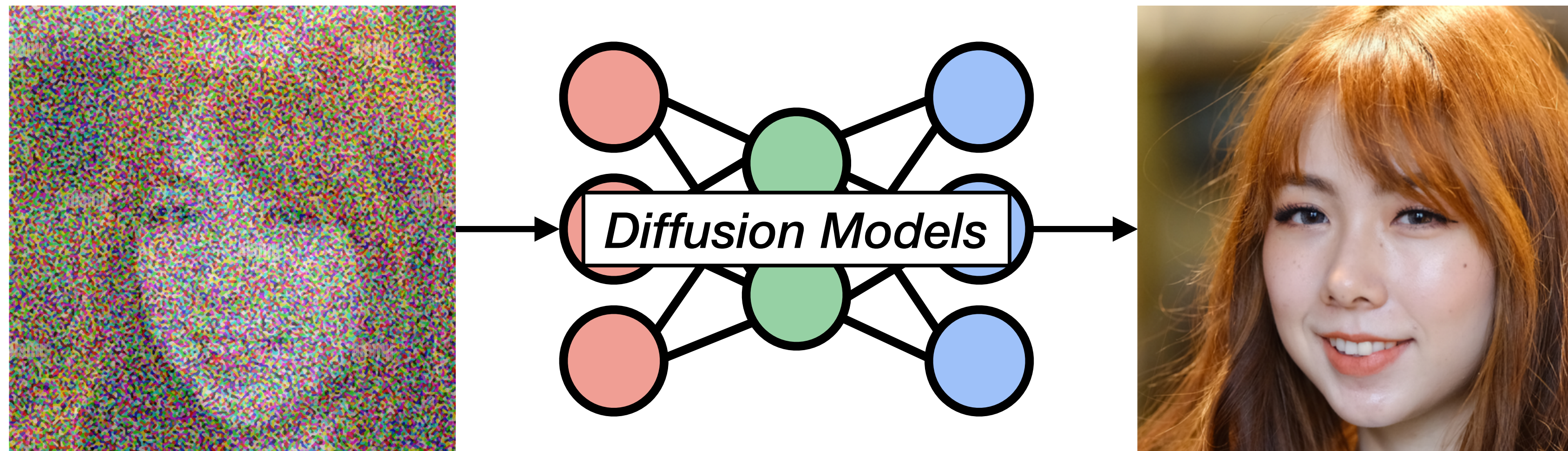
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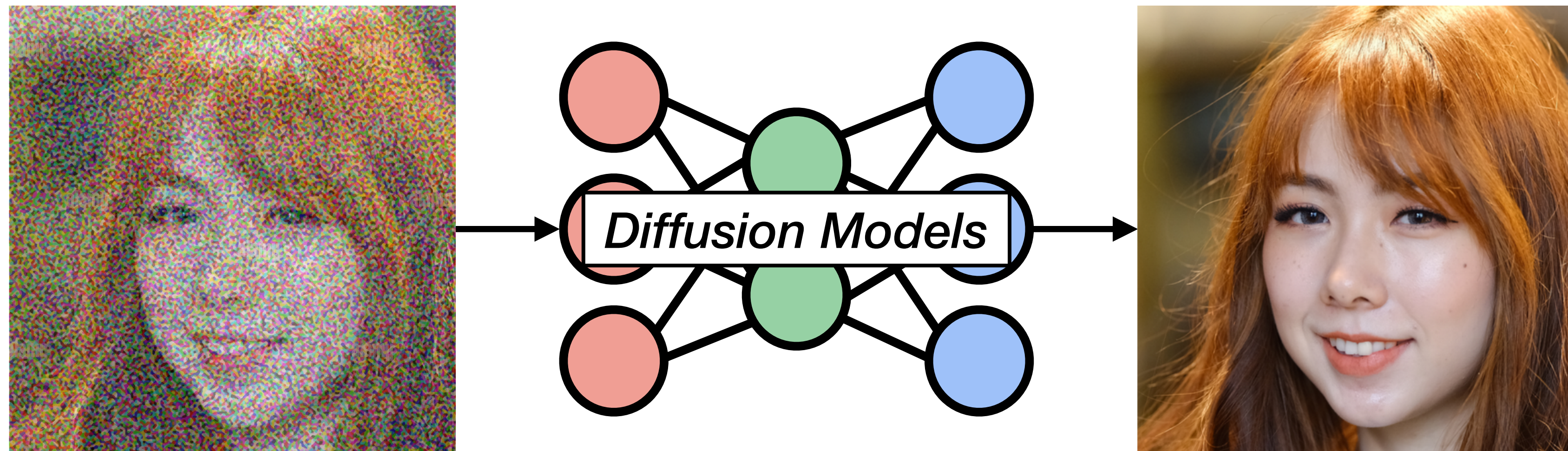
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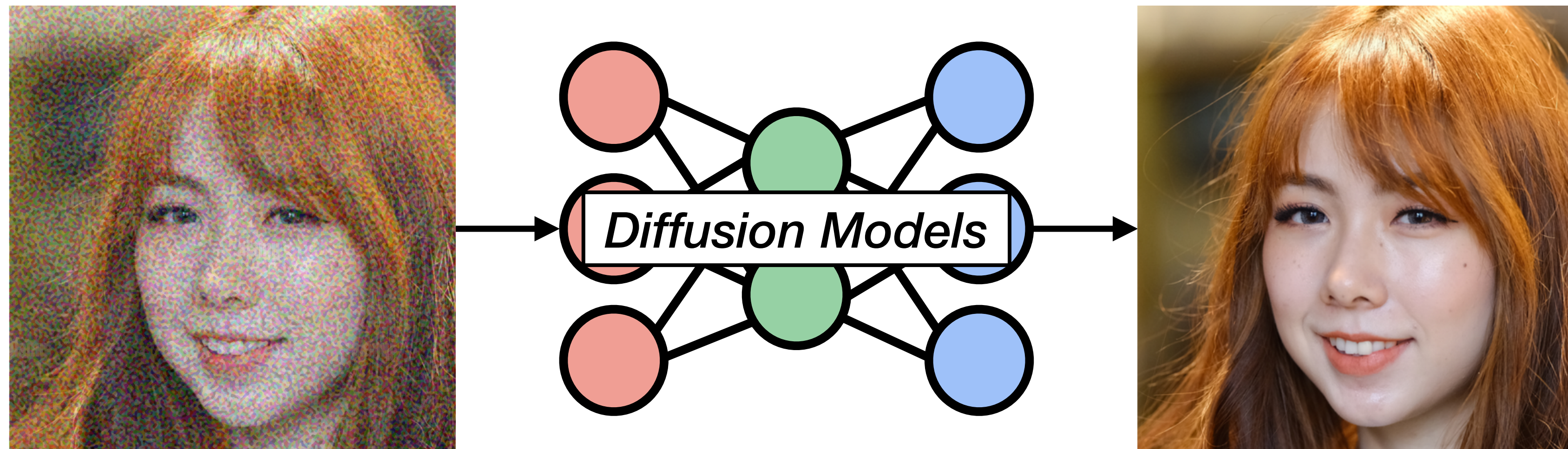
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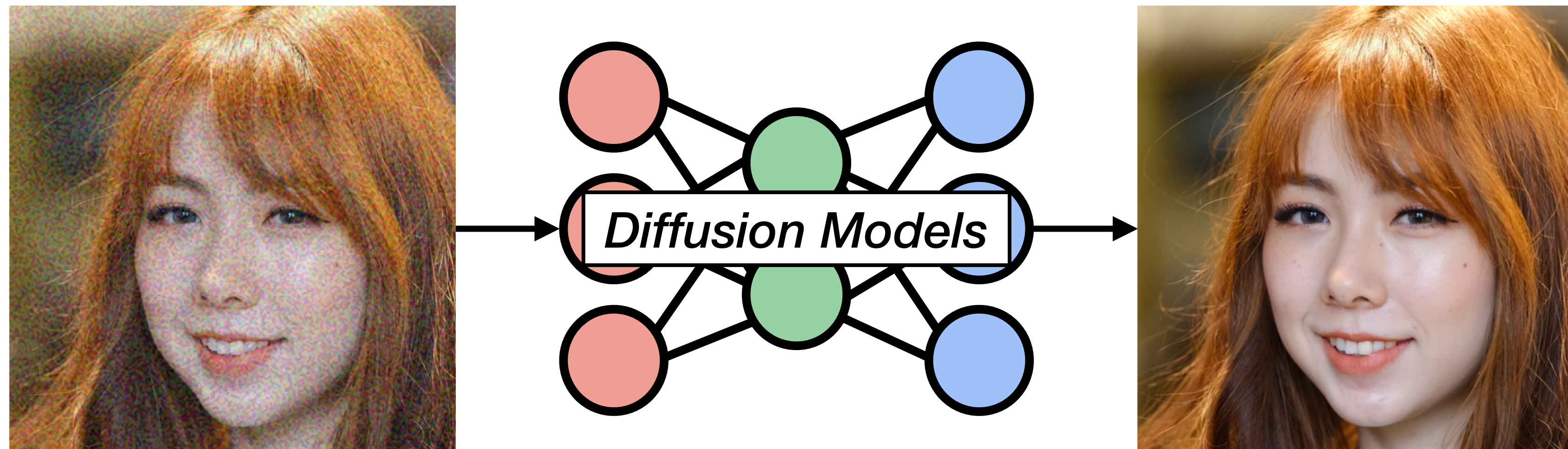
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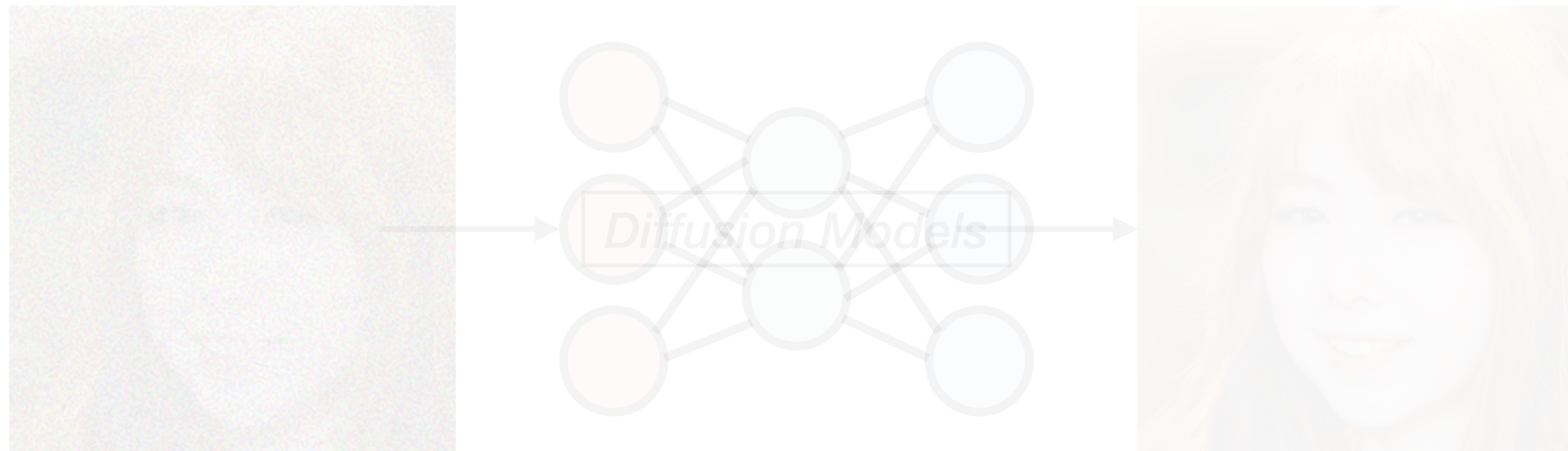
Motivation: diffusion model training / sampling

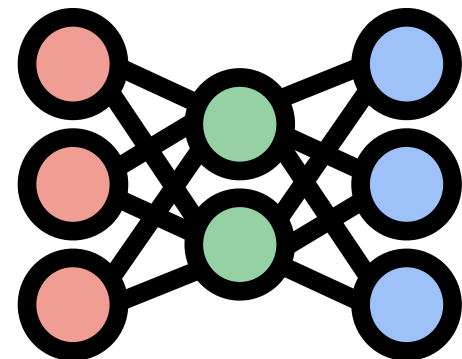


Train to denoise wide range of noise level.



Motivation: diffusion model training / sampling



Once  trained, we can generate images

Motivation



Method



Experiment



Once trained, diffusion model can generate



Motivation



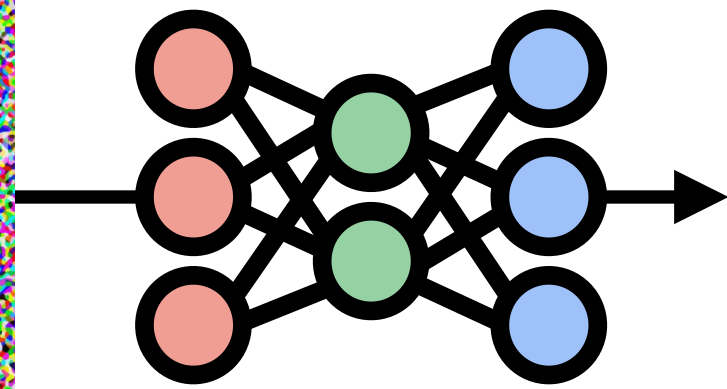
Method



Experiment

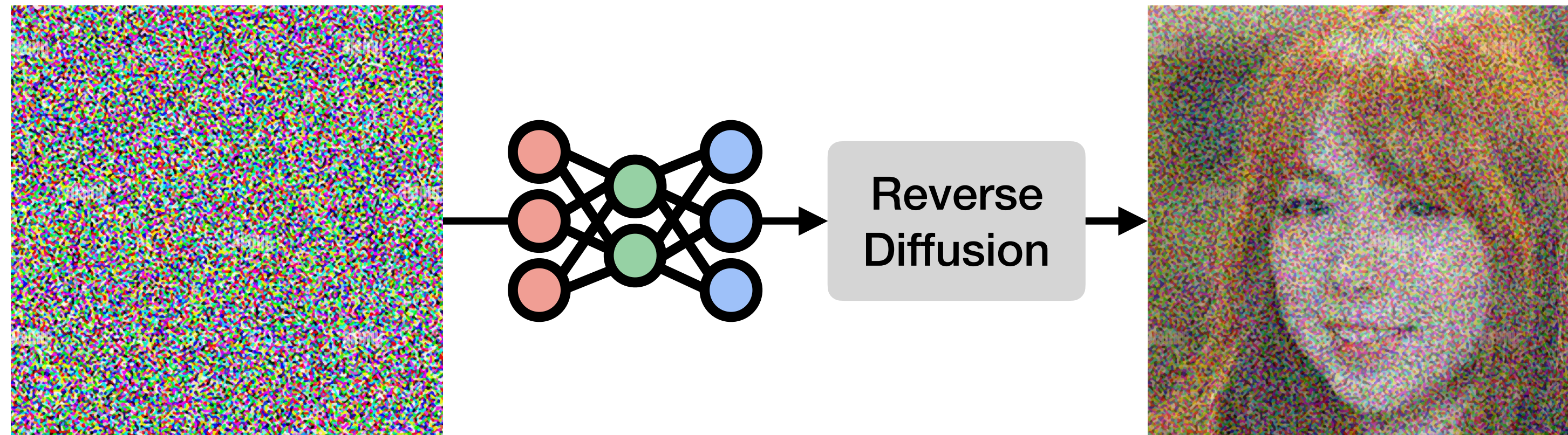


Once trained, diffusion model can generate





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Once trained, diffusion model can generate



Motivation



Method

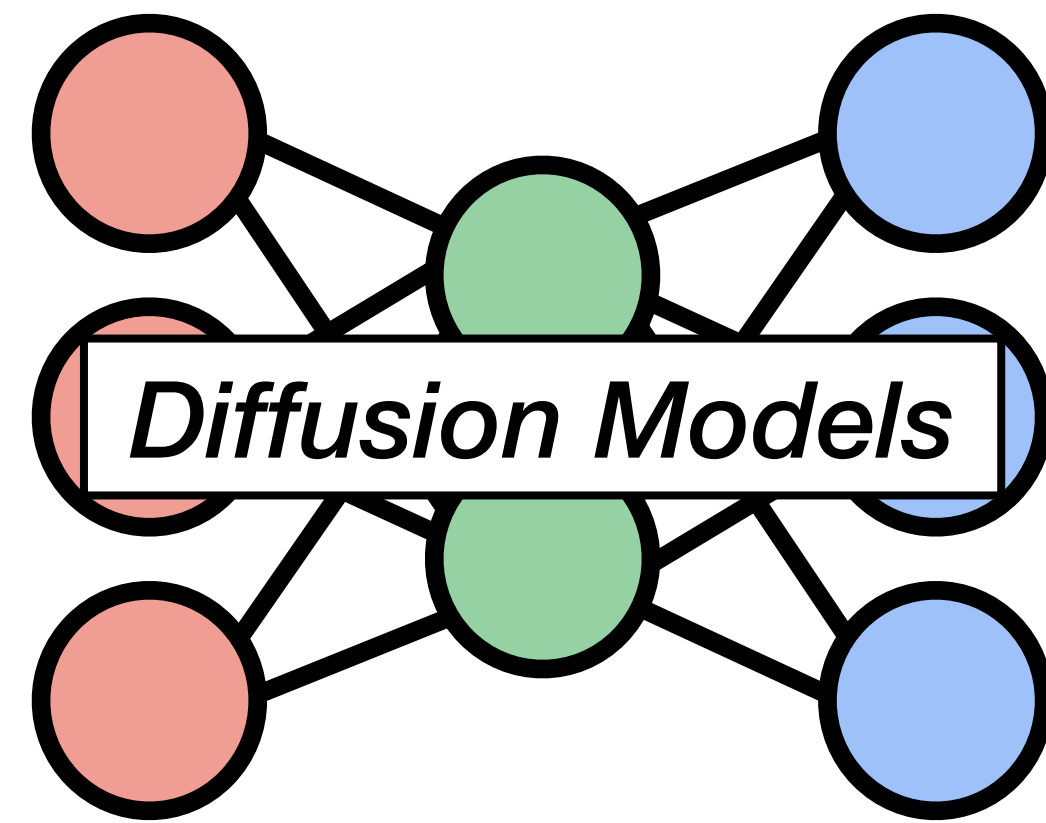


Experiment



Practical challenge: Lack of clean data to train

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needs

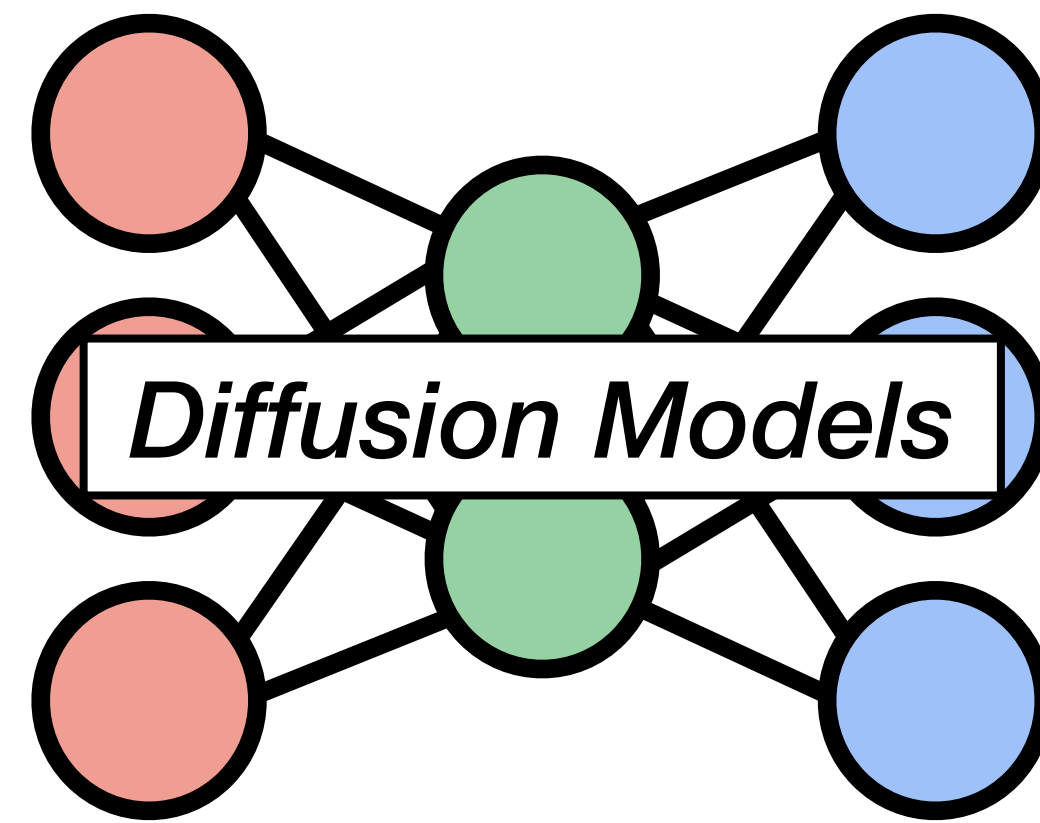


Bunch of clean images

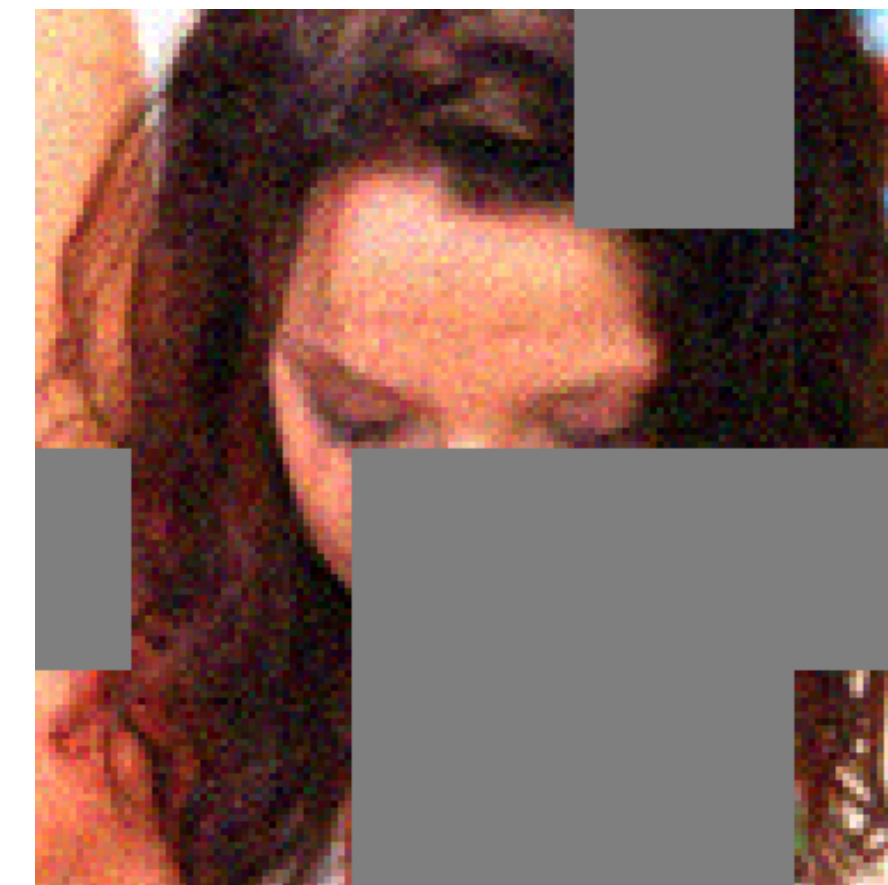
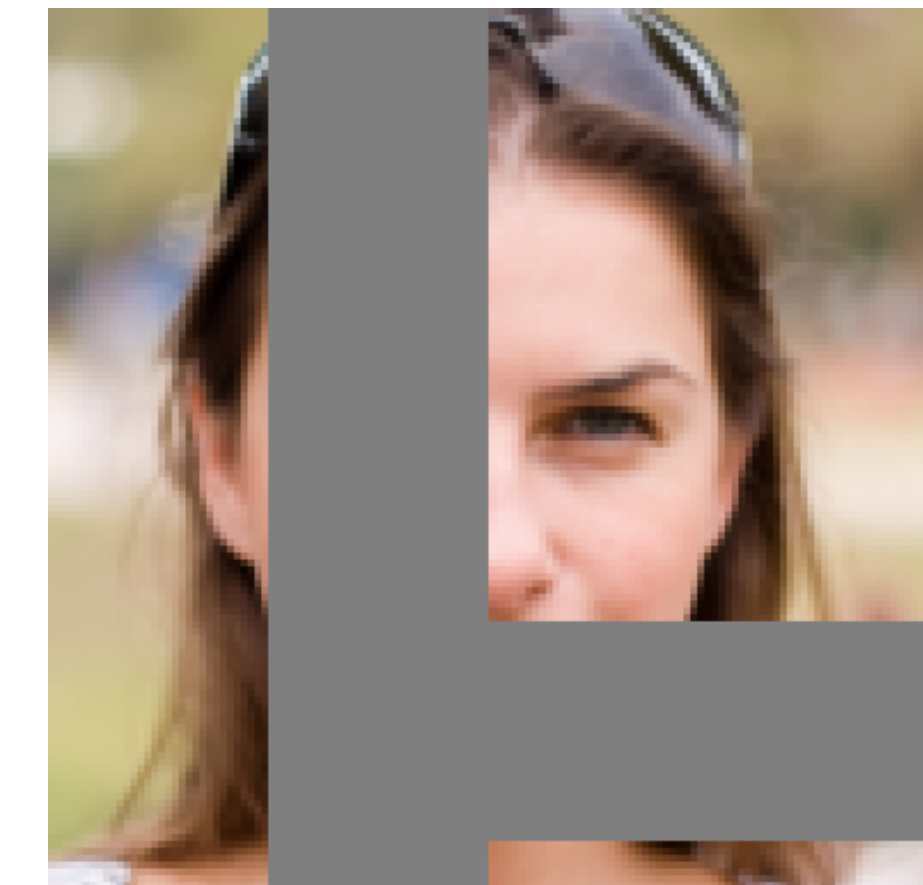


Practical challenge: Lack of clean data to train

Can we train



with



Bunch of subsampled images

Motivation

Method

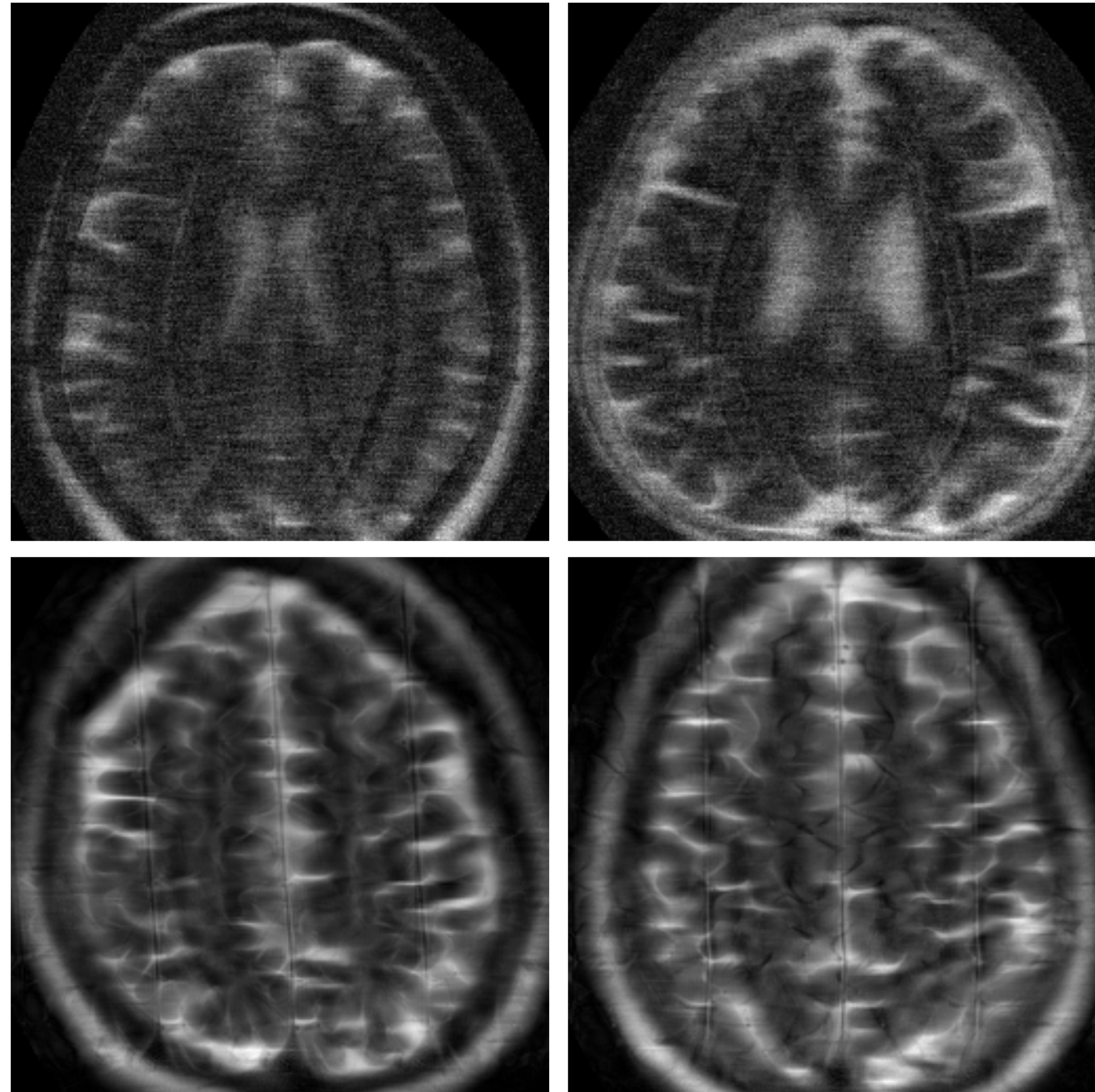
Experiment



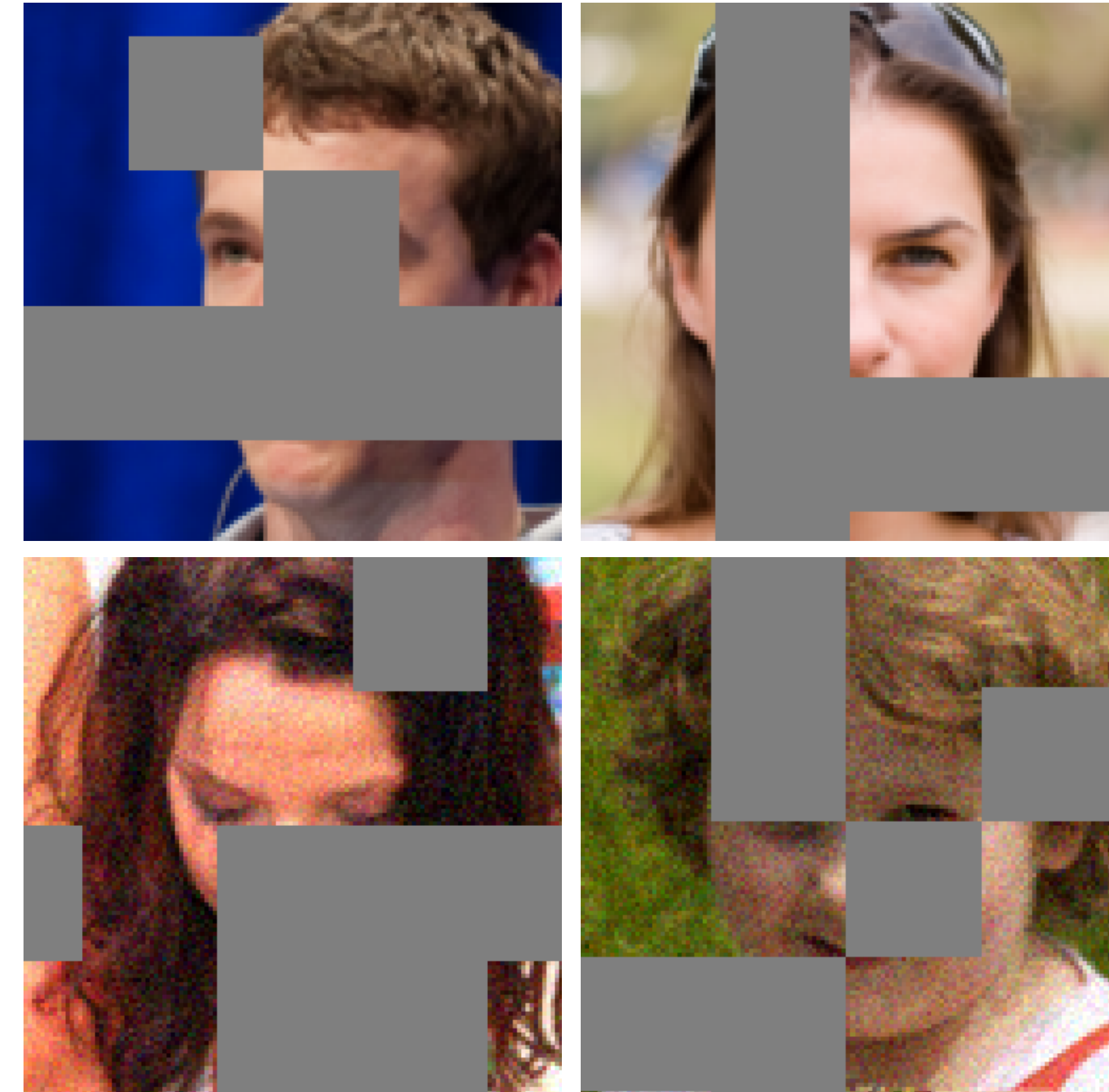
Problem setup: how training data looks like



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MRI training data



RGB training data

Outline of the talk

- ◉ Motivation
- ◉ **Proposed Methods**
- ◉ Experiments

Motivation



Method

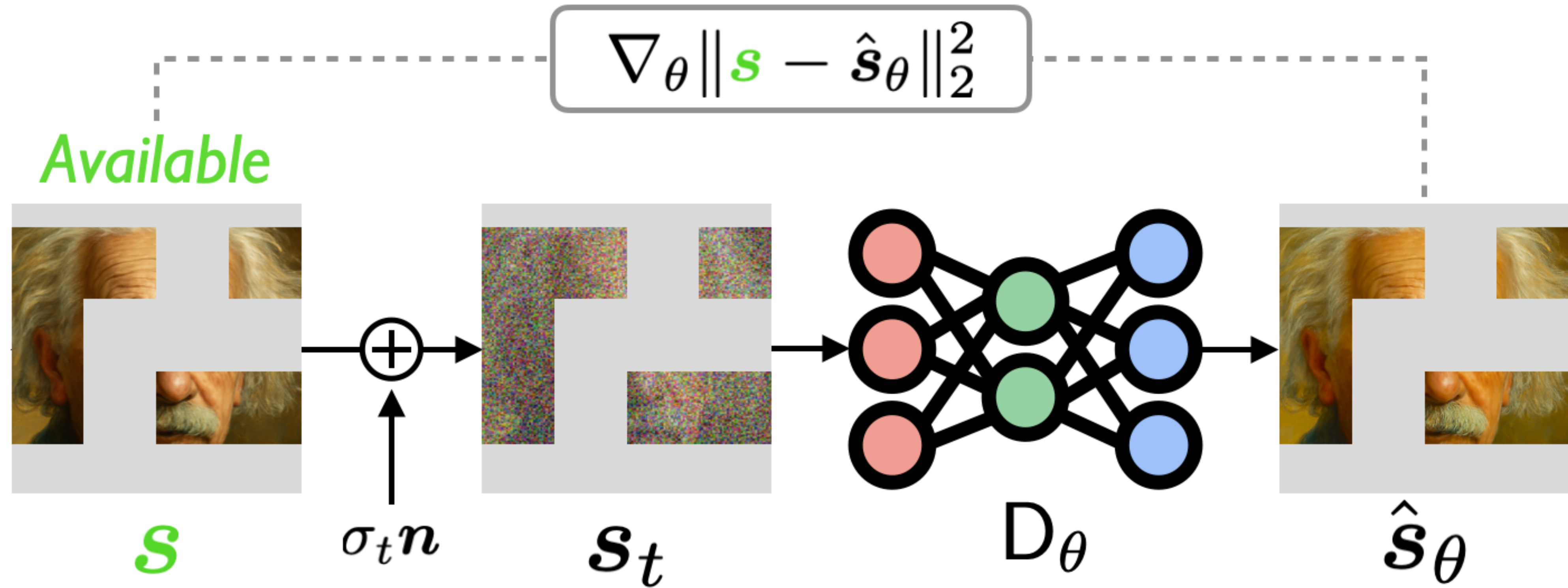


Experiment



Proposed **training** framework

Proposed training framework



Proposed **sampling** framework

Motivation



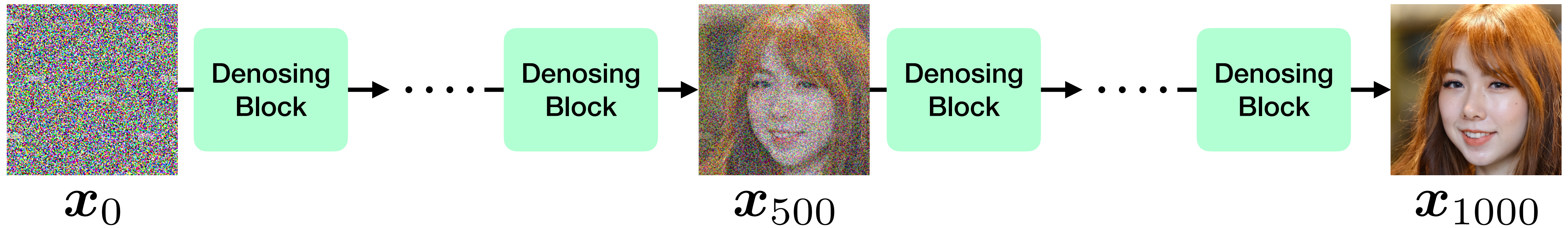
Method



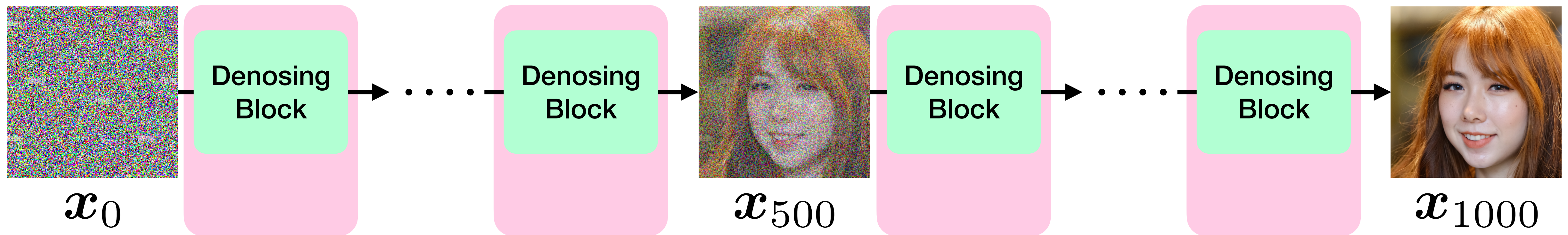
Experiment



Proposed sampling framework



Proposed sampling framework



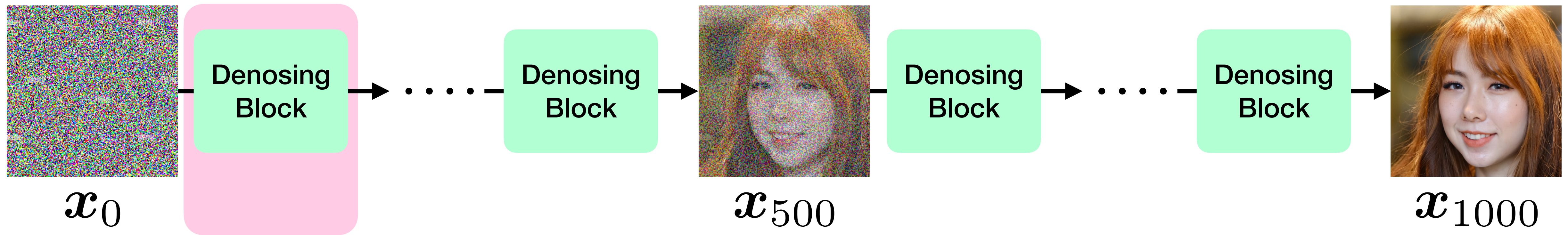
Let's see **how our denoising block works**

Toy example setup



RGB training data

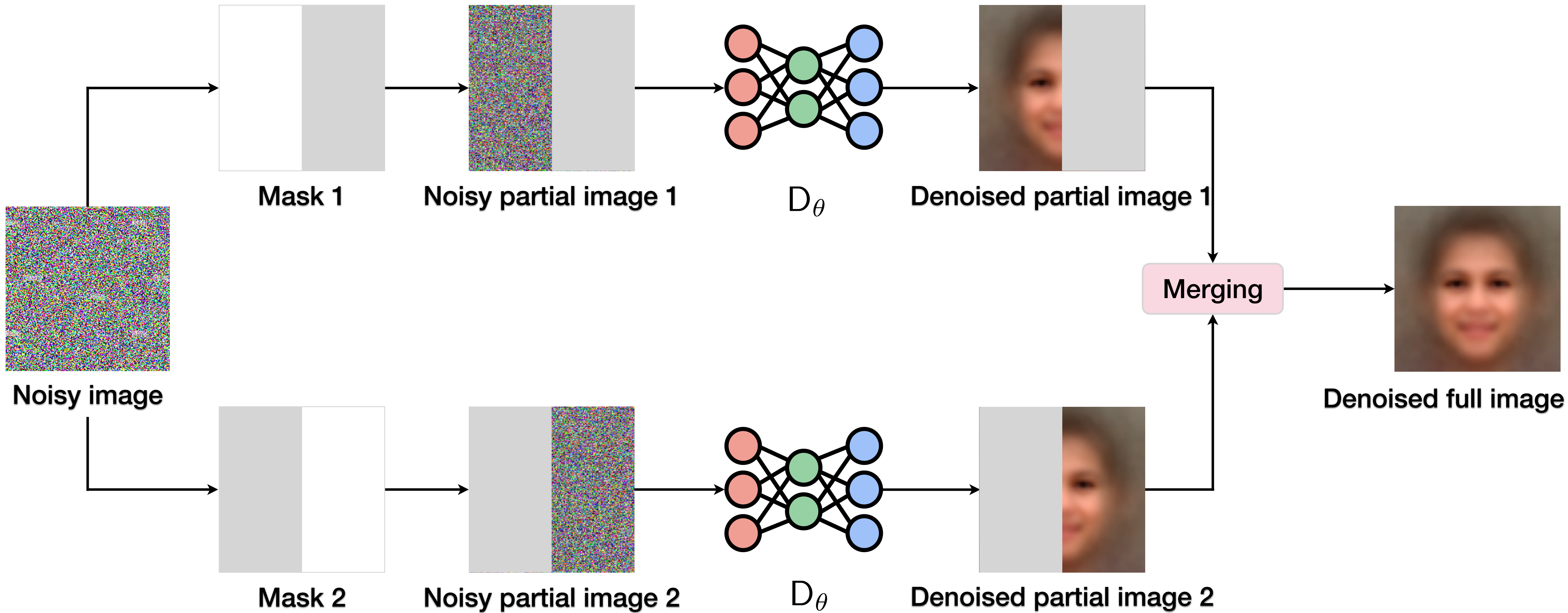
Proposed sampling framework



Let's see how our denoising block works at this stage.

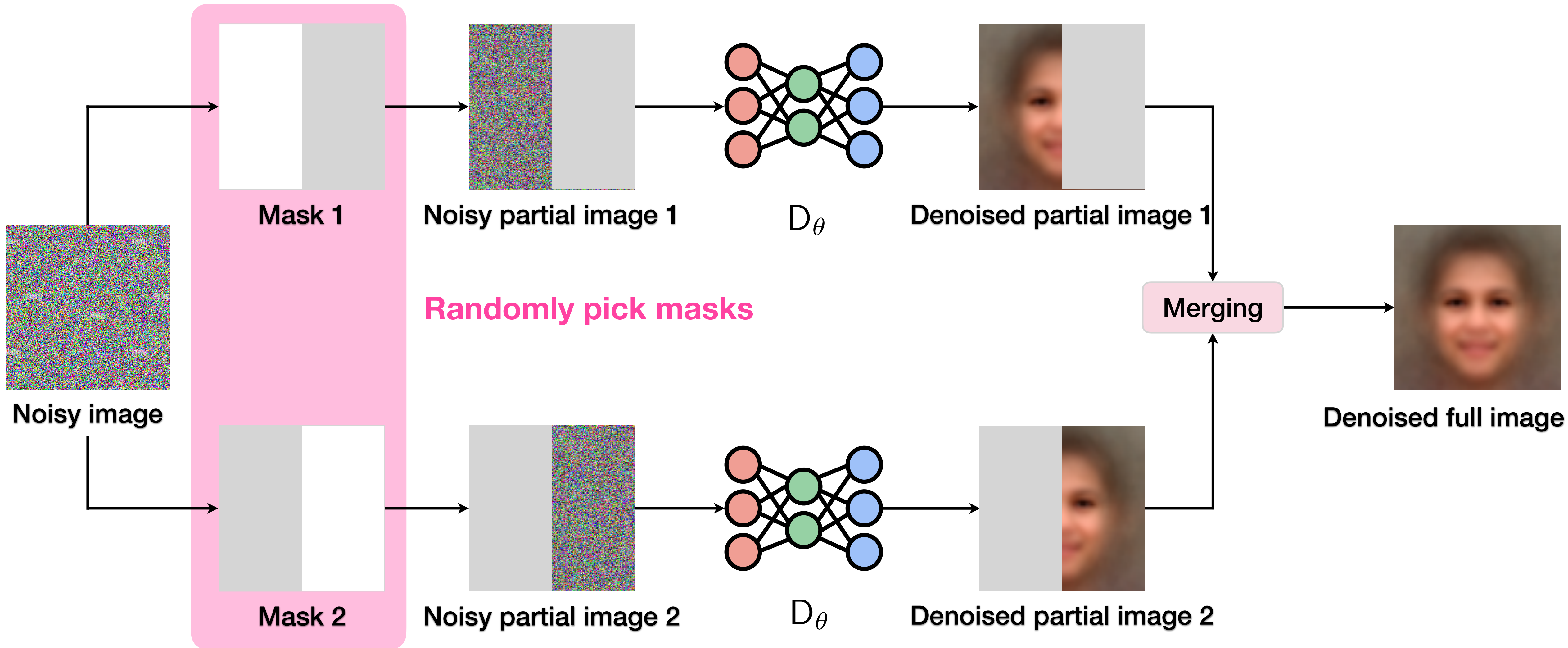


Generation: Partially denoise and merge



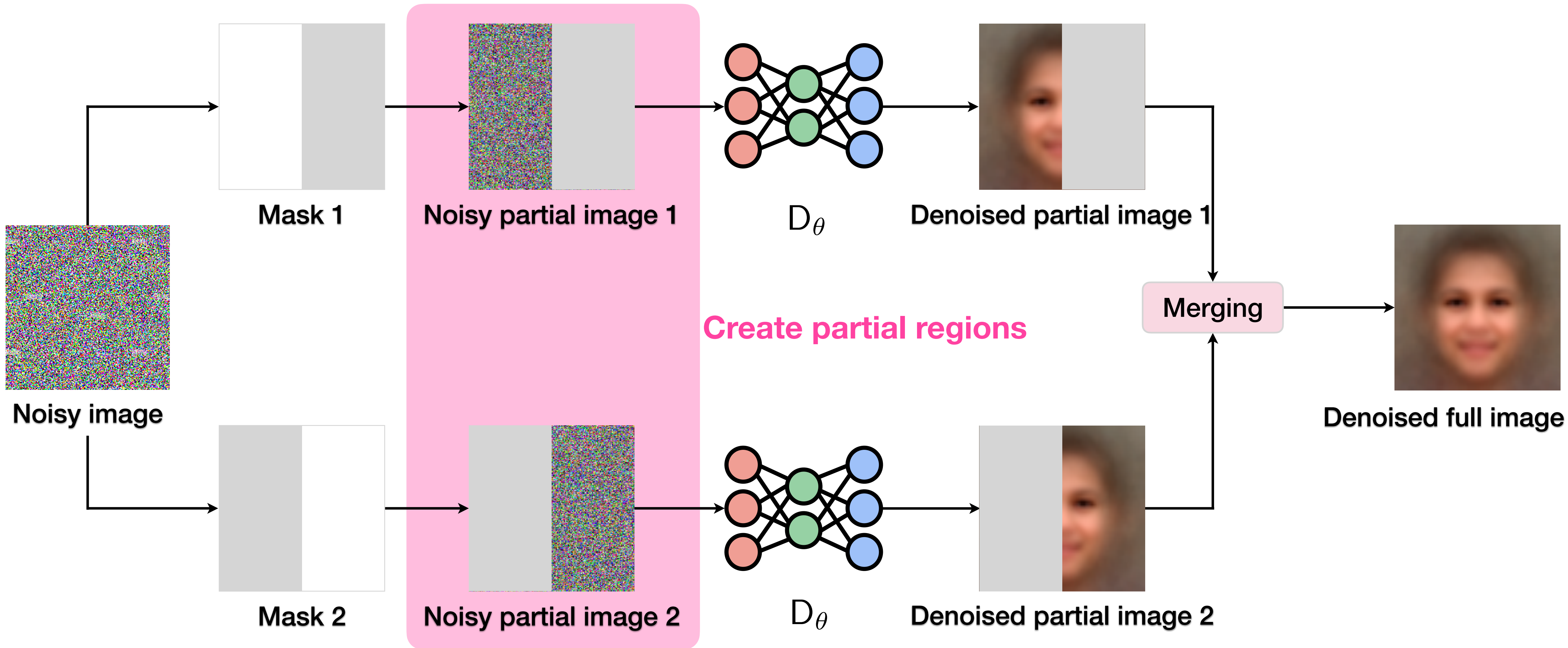


Generation: Partially denoise and merge



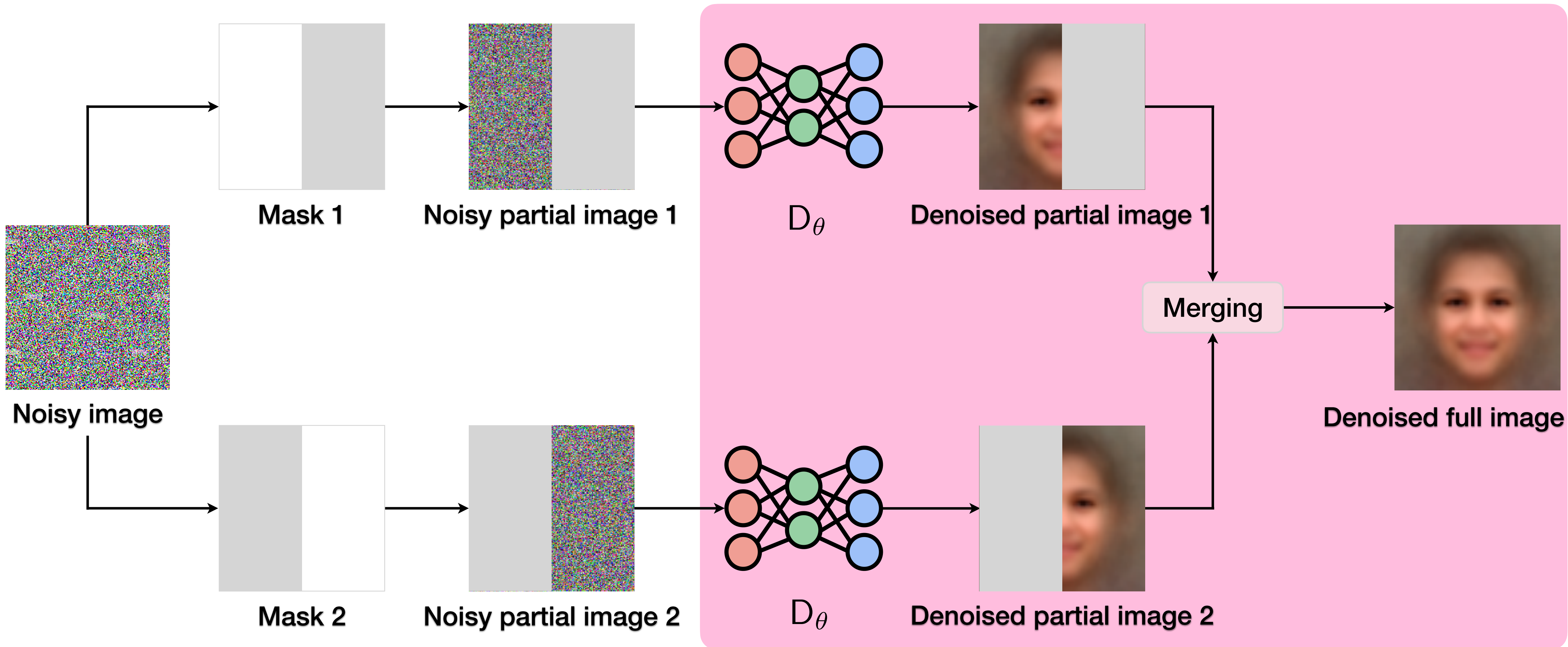


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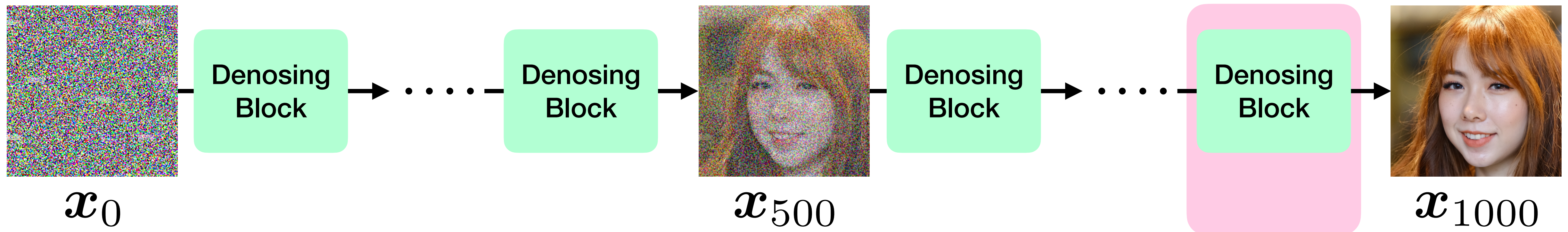




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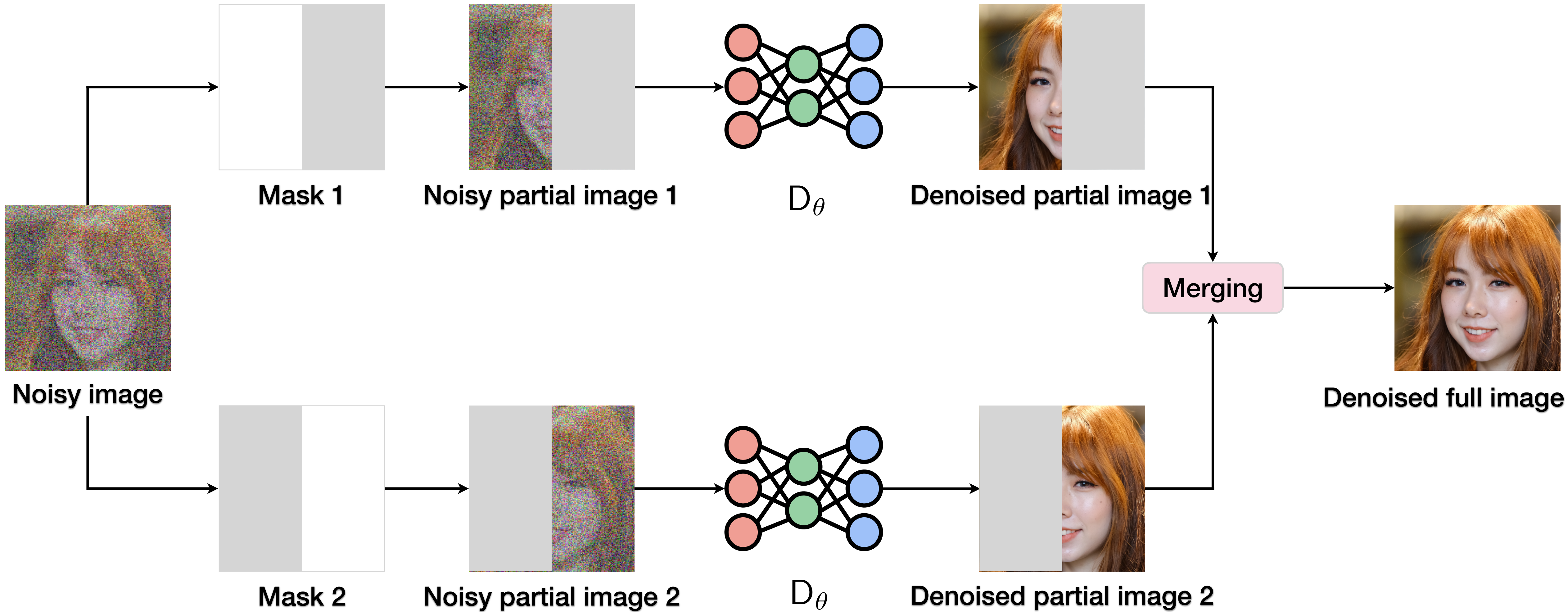
Proposed sampling framework



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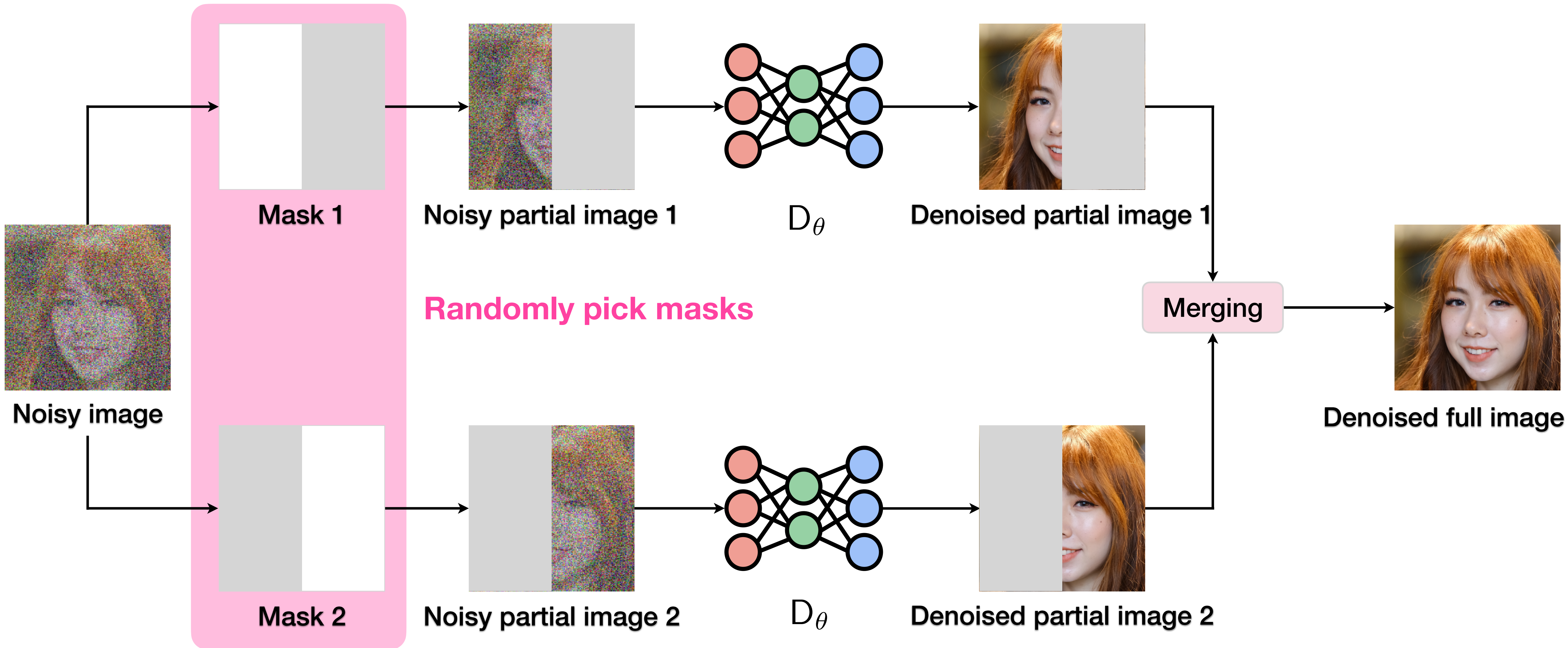


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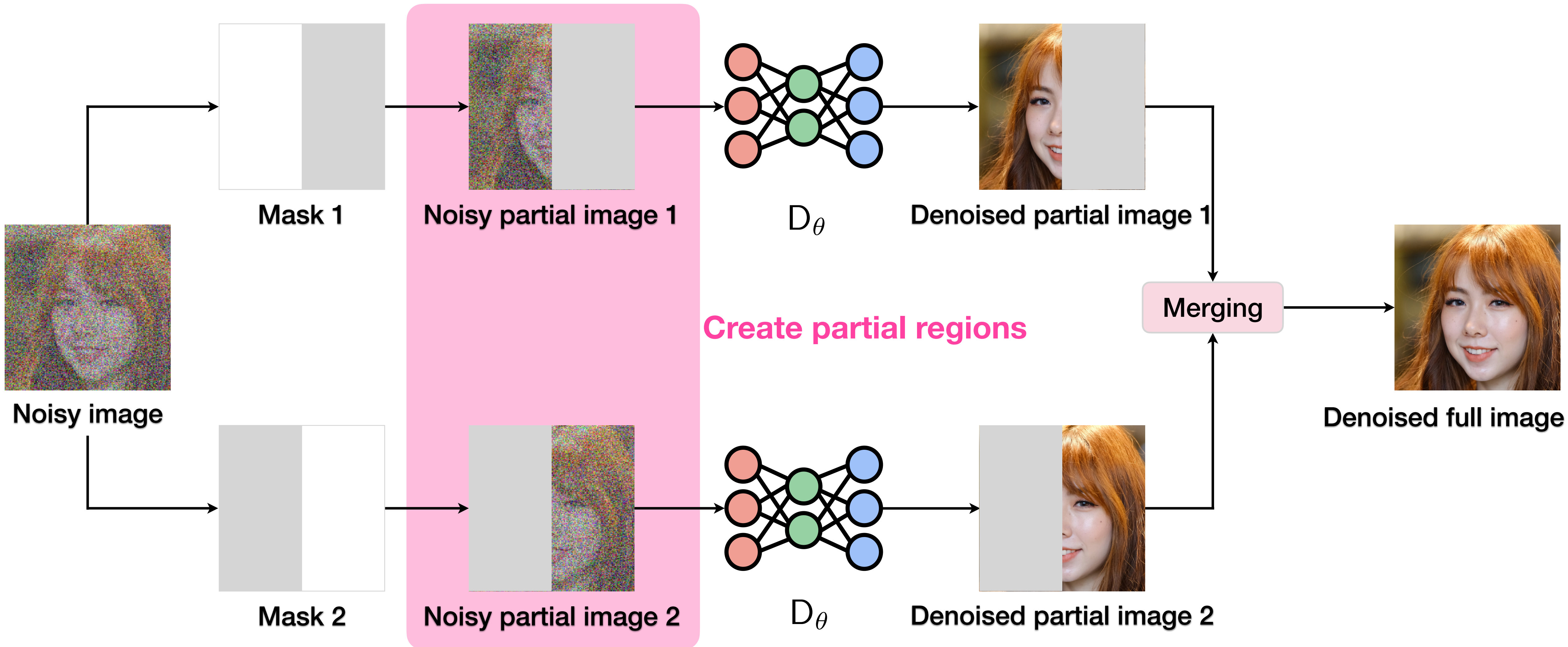


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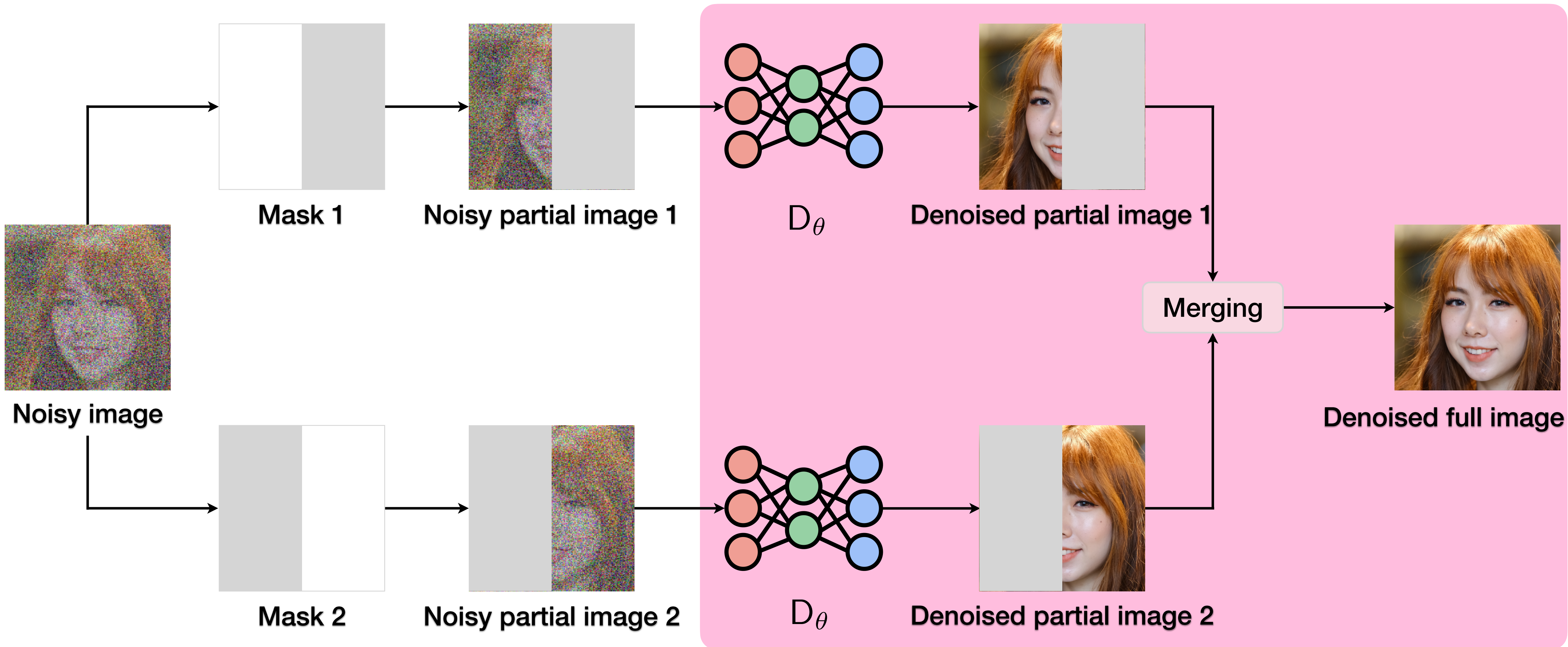


Generation: Partially denoise and merge

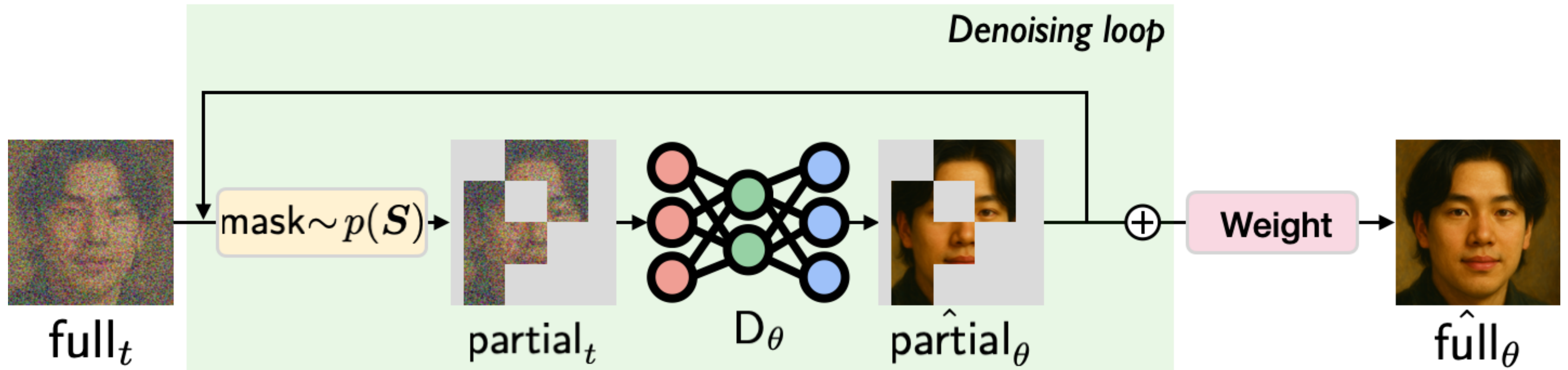




Generation: Partially denoise and merge



Proposed sampling framework





Experiment 1: image generation

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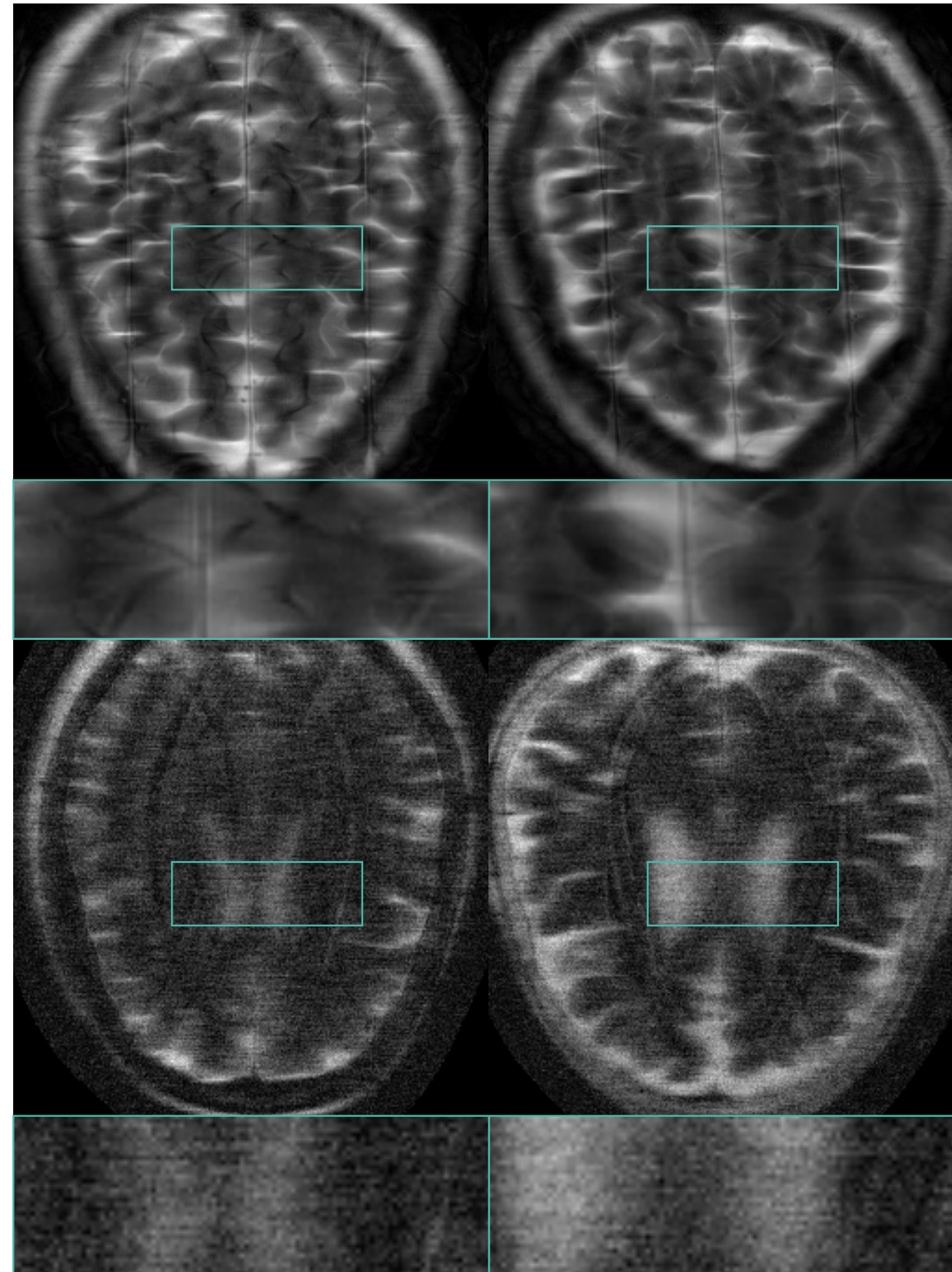
Training set: 40%



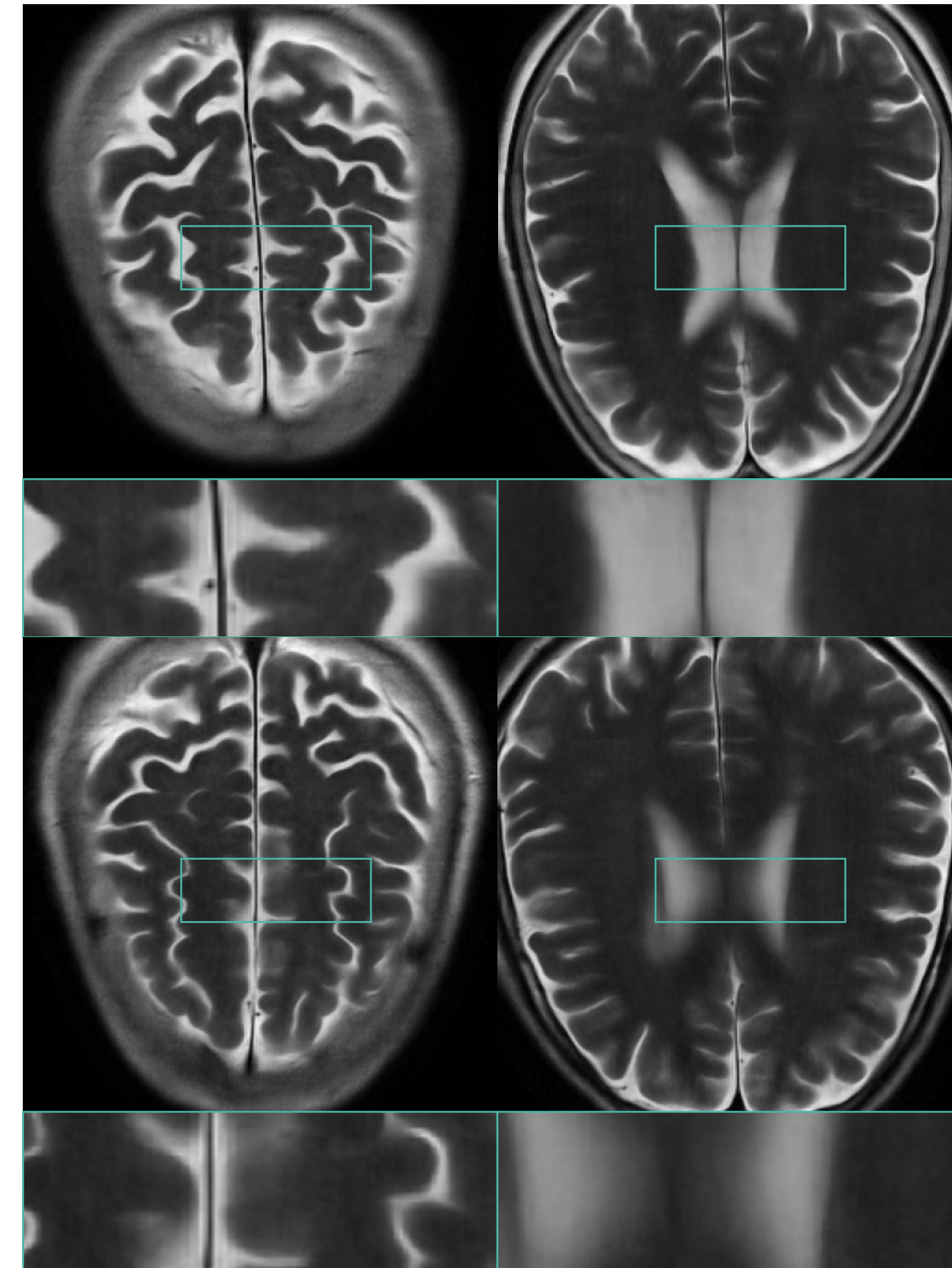
Generated samples



Experiment 1: image generation



Training set: Acc. 4



Generated samples

Motivation



Method

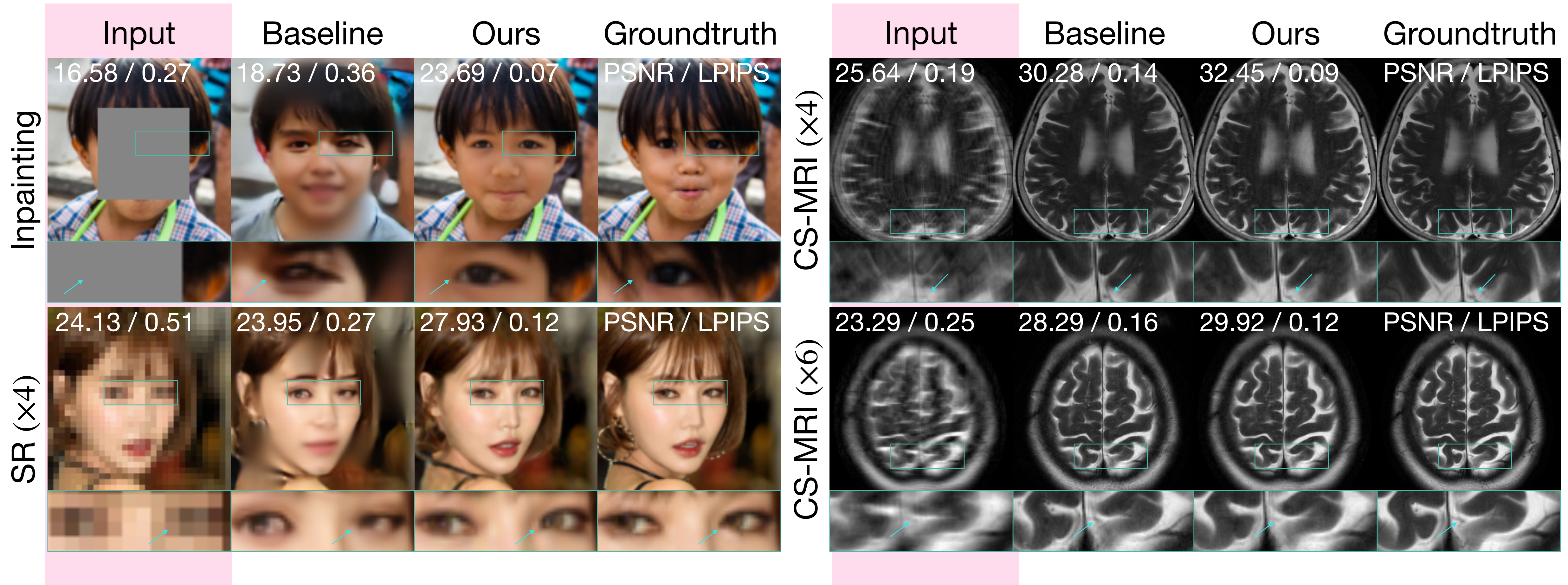


Experiment



Experiment 2: image reconstruction

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Experiment 2: image reconstruction

