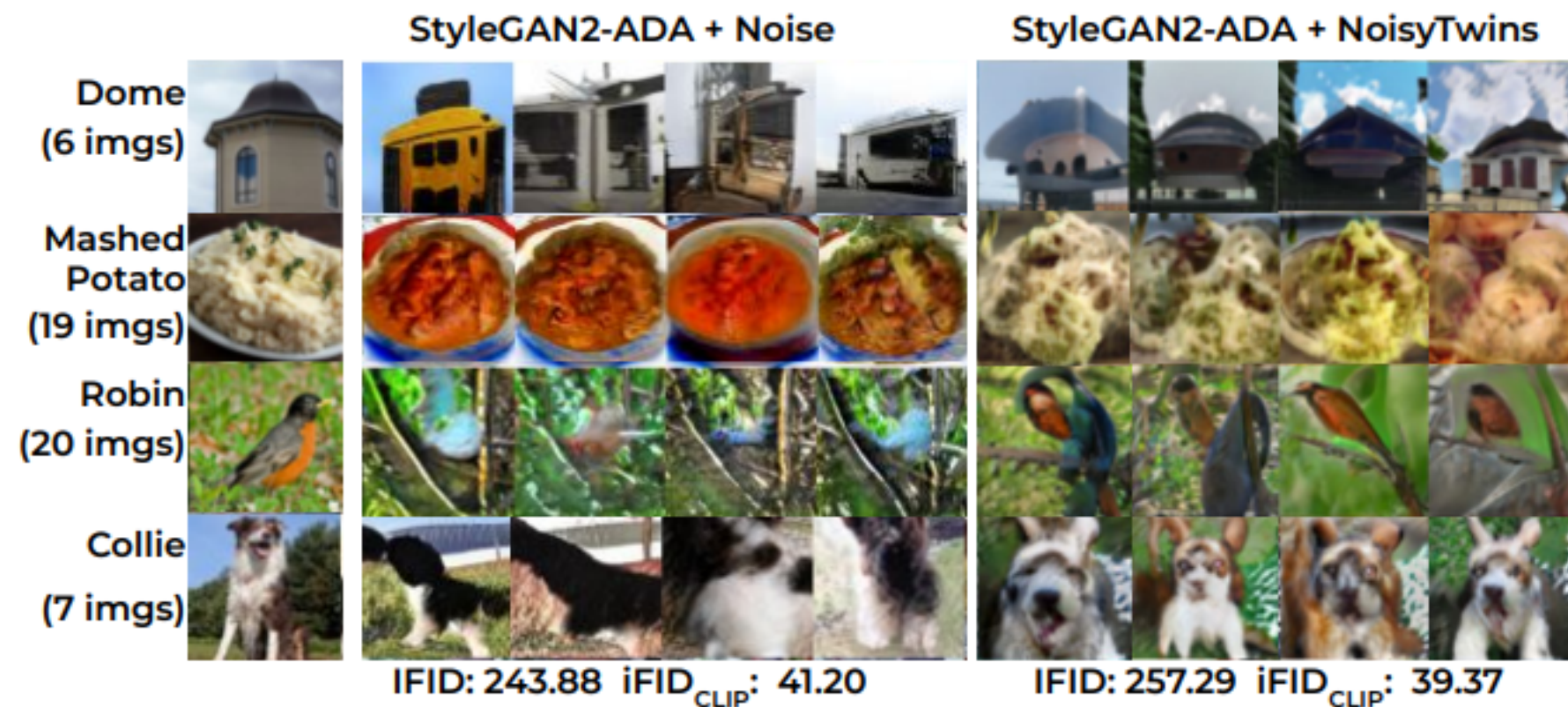


StyleGAN for Class-Consistent and Diverse Image Synthesis

What is the Problem?

- Generative models, particularly GANs, face challenges in producing high-quality images and managing training stability. These issues often arise due to limited data availability and the complexity of capturing diverse image features.



What Has Been Done Earlier?

- Researchers have explored various approaches:
 - Data Augmentation: Enhancing training datasets with techniques to improve model robustness.
 - Adaptive Training Techniques: Implementing strategies to stabilize GAN training, such as two time-scale update rules.
 - Style Transfer Mechanisms: Utilizing adaptive instance normalization for better style manipulation in generated images.
 - Contrastive Learning: Applying contrastive methods to enhance the discriminator's performance, which leads to more accurate image generation.

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What are the Remaining Challenges?

- **Data Scarcity:** Many GAN applications suffer from a lack of diverse training samples, which limits their ability to generalize.
- **Model Complexity:** As models grow in complexity, they become harder to train effectively, often leading to mode collapse or instability.
- **Interpretability:** Understanding how GANs manipulate latent spaces is crucial for better control over generated outputs.

What Novel Solution is Proposed?

- The authors introduce a Dynamic Discriminator approach, which adapts during training to respond to the generator's updates. This method helps:
 - **Improve Stability:** By adjusting its capacity and focus based on the generator's performance, the dynamic discriminator reduces the likelihood of mode collapse.
 - **Enhance Quality:** This solution allows for the generation of higher-quality images with more diversity, even in limited data scenarios.
 - **Facilitate Interpretability:** By exploring the latent space more effectively, users gain better insights into how attributes are manipulated, leading to more targeted image generation.

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