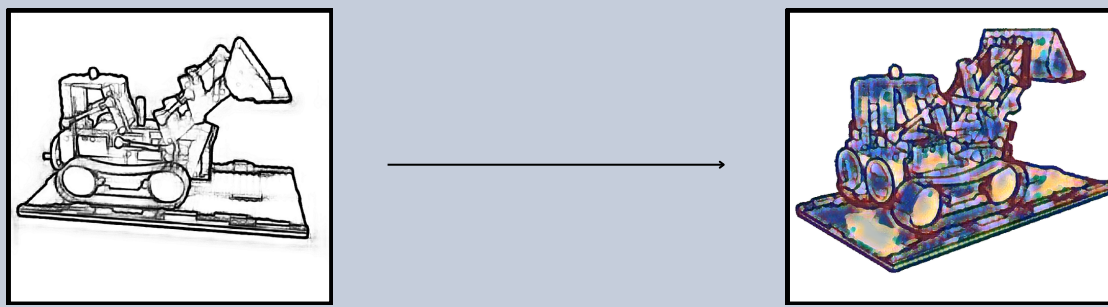# From Pencil Lines to 3D Realms: Sketch Stylization with NeRF

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## Motivation:

- Current NeRF techniques tend to require a **large amount** of **highly detailed** images to capture the complete 3D representation of an object. These are not always easily available.



- We propose 2 approaches:
  - Novel 3D view generation from 2D sketches by incorporating style elements before rendering NeRF outputs (includes few shot approaches)
  - Stylize sketched images while rendering NeRF outputs using CLIP NeRF with edge loss.

## Related Works:

- **SNeRF:** style transfer on the rendered image from NeRF.
  - Requires many photo-realistic images.



- **CLIP-NeRF:** multi-modal 3D object manipulation, for NeRF (text + images).
  - Modified CLIP-NeRF to receive 2D sketches.
  - Added edge loss + foreground masking.

- **NEF:** reconstruct 3D parametric curves from multi-view edge maps.
  - We employ their W-MSE loss and sparsity loss to train our NeRF model on 2D sketches.

- **InfoNeRF:** few shot NeRF method that can utilize as few as 4 perspective images.
  - InfoNeRF was tested on stylized sketch inputs (detailed and sparse) to achieve few shot sketch to stylized 3D.
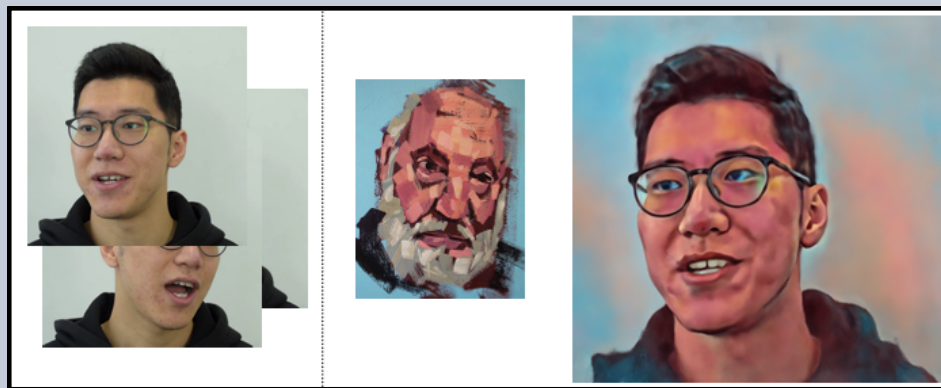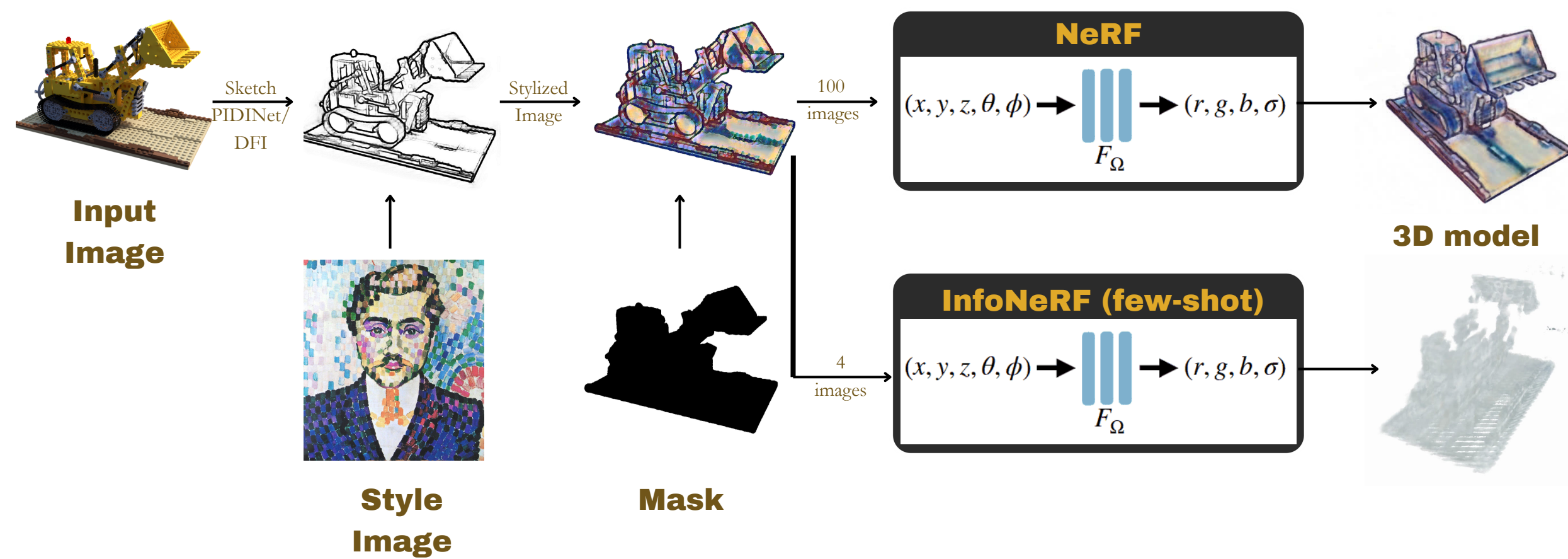
## Conclusion and Future Work

- We present a unique solution called "sketch 2D → stylized 3D" wherein the aspect of style/color is incorporated into 2D sketches.
- We aim to produce higher-quality outputs with fewer volumes of data in quicker periods using more optimized, better-performing few-shot models.
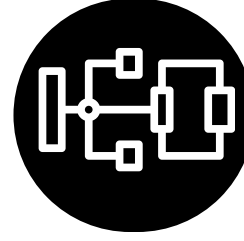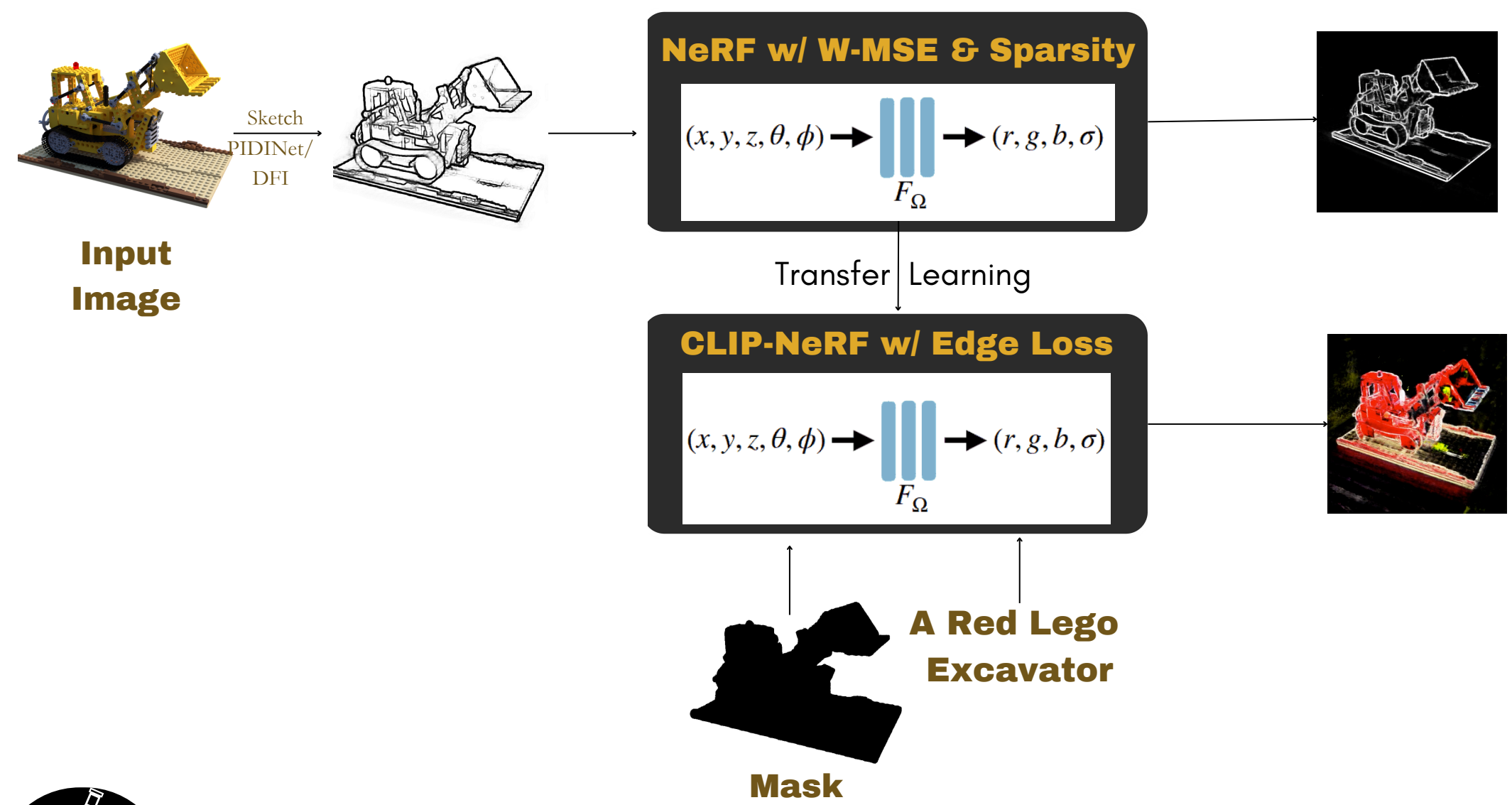
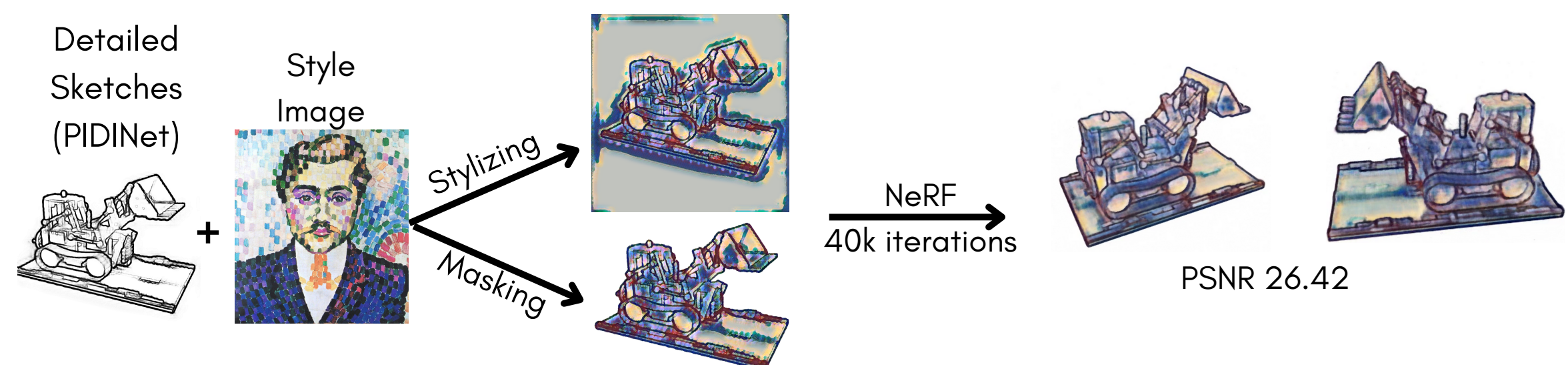## Proposed Methods:

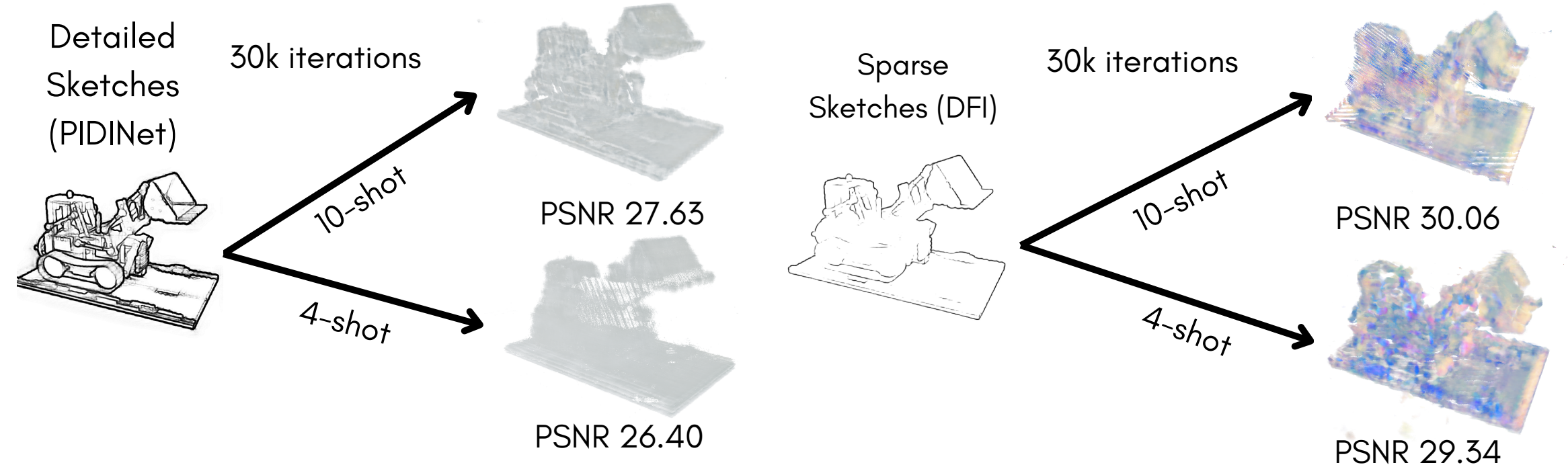### Approach 1: Sketch → Style → 3D



### Approach 2: Sketch → Stylized 3D
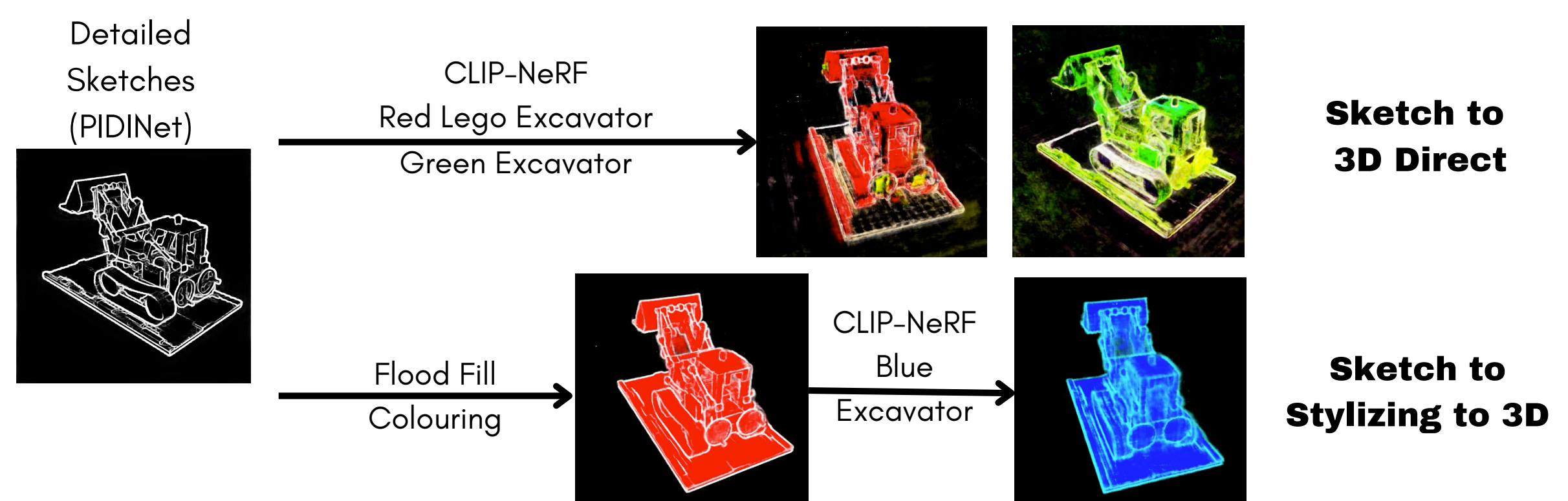


## Experimental Results

### 2D Style to Regular NeRF Results:



### 2D Style to 3D InfoNeRF (few-shot) Results:



### Sketch to CLIP-NeRF Results:



## References

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