**Introduction**

Artistic style transfer
- Synthesize an image sharing structure similarity of the content image and reflecting the artistic style.

- Style is not only in one individual style image but also a reflection of an art collection.
- Arbitrary style transfer cannot benefit from other style images sharing similar style.
- Collection style transfer only recognize and transfer the domain dominant style clues and thus lack the flexibility of exploring style manifold.

**Contribution**
- A unified Model that handle arbitrary style transfer and collection style transfer.
- "style codes" is modeled as the dynamic parameters within Dynamic ResBlocks.
- Style consistency & Content structural similarity.

**Datasets & Metrics**
- Dataset: Place365 dataset and Wikiart dataset.
- Metrics: Deception score, Human study and Memory consumption.
- Project: [https://github.com/xuwenju123/DRB-GAN](https://github.com/xuwenju123/DRB-GAN)

**Key References**


**DRB-GAN**

- **Style Encoding Network**
  - CNN Encoder
  - Dynamic ResBlock
  - SW-LIN Decoder
  - Generated Image
- **Style Transfer Network**
  - Style encoding network
  - Learnable CNN & Pertrained VGG
  - "style code" in dynamic ResBlocks:
    - $\{u_g, v_g\} = \{H_u(x), H_v(x)\}$
  - "collection style code" as a weighted mean of the "style codes":
    - $\{u_c, v_c\} = \left(\frac{1}{N} \sum_{i=1}^{N} u_i, \frac{1}{N} \sum_{i=1}^{N} v_i\right)$
  - Preserve local feature.
  - Remove artifacts.

- **Discriminative Network**
  - Discriminative on image and target style collection
  - $\mathcal{L}_{\text{disc}} = \mathcal{L}_{\text{cycle}} + \mathcal{L}_{\text{perceptual}} + \mathcal{L}_{\text{style}}$
  - Better style consistency

**Comparison Experiments with State-of-the-art Approaches**

- **Arbitrary Style Transfer**
  - Table 1: Qualitative comparison of different methods. HD-stable for real-time style transfer. HD: high-definition.
  - Method: Adain, AST, CSD, CST, MetaNet, GAN, Ours
  - Human study (HD) scores: 97.1%, 92.8%, 92.8%, 80.4%, 80.4%, 80.4%, 80.4%

- **Collection Style Transfer**
  - Table 1: Quantitative comparison of different methods. HD-stable for real-time style transfer. HD: high-definition.
  - Setting: Arbitrary Style Transfer (AST), Collection style (CST), MetaNet
  - Human study (HD) scores: 94.3%, 92.8%, 92.8%, 80.4%, 80.4%, 80.4%

**Visualization and Robustness Analysis**

- **Visualization Comparison with State-of-the-art Approaches**
  - Visualizaiton: Control, Style, CSD, AST, Gans, CycleGAN, Adain, MetaNet, CFT, Ours

- **Visualization on Ablation Study**
  - Ablation Study: Control, Style, CSD, AST, Gans, CycleGAN, Adain, MetaNet, CFT, Ours

- **Robustness Analysis**
  - Unseen style
  - HD resolution
  - Interpolation

- **Different resolutions**
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