

Deformable Style Transfer

ECCV 2020 Poster

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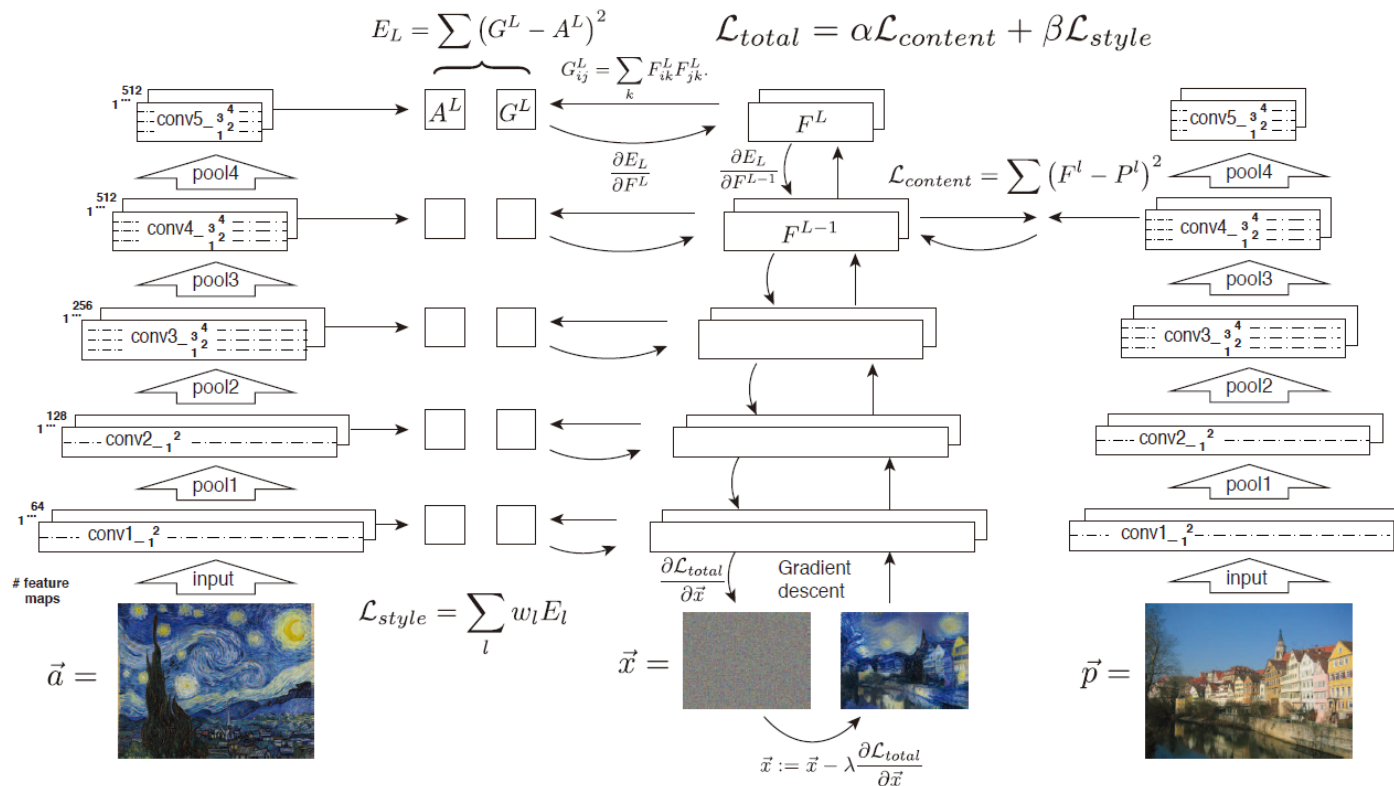
Presented by Liang Hao
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Outline

- Authors
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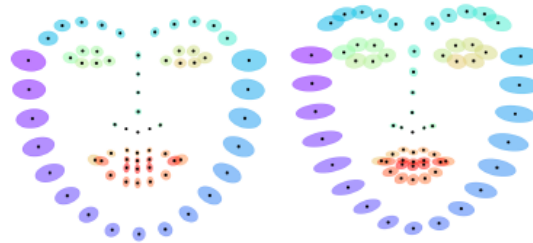
Background

- Neural Style Transfer (CVPR 2016)

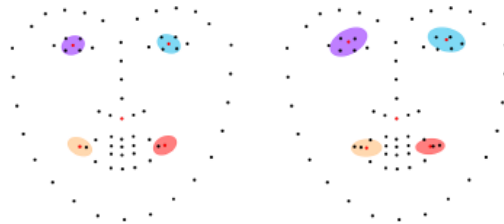


Background

- The Face of Art: Landmark Detection and Geometric Style in Portraits (SIGGRAPH 2019)



(a) 68 landmark points

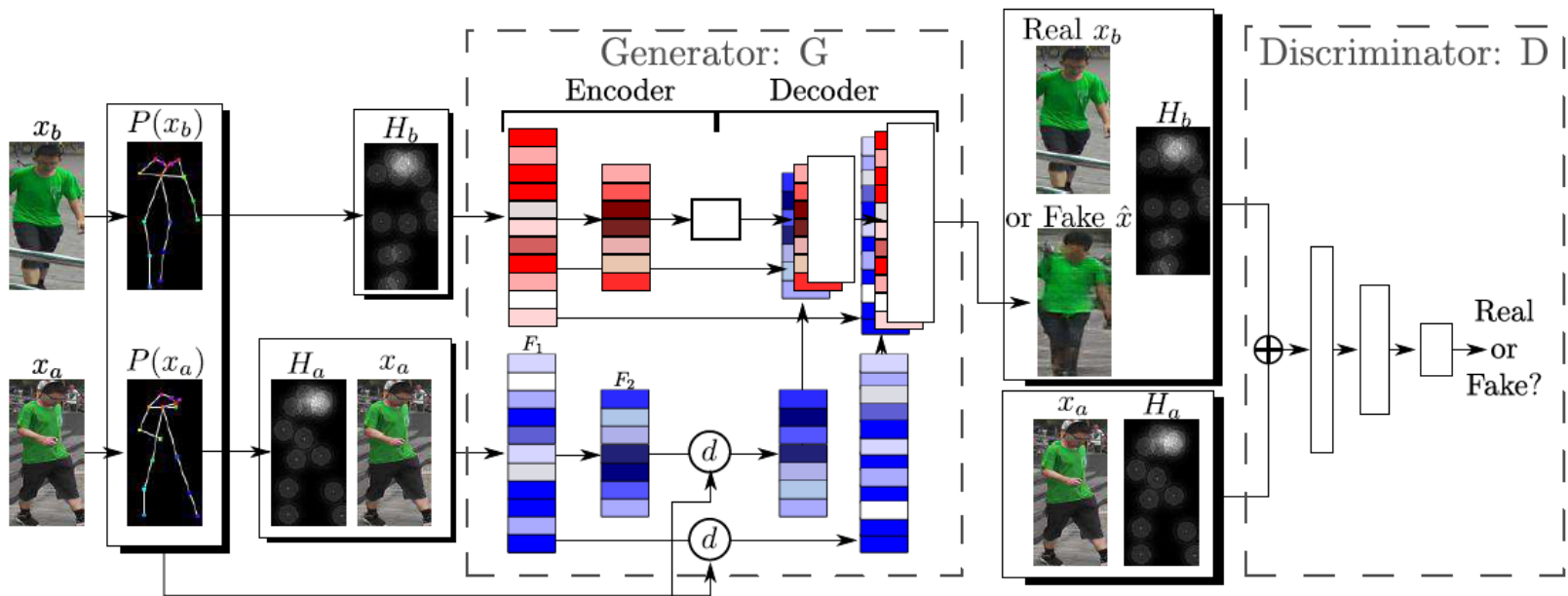


(b) 5 landmark points (red points)

Fig. 4. Comparison between natural faces (left) and artistic faces (right) in terms of the landmark point distributions. Mean position and the ellipse of one standard deviation are shown. The variability in artistic faces is larger.

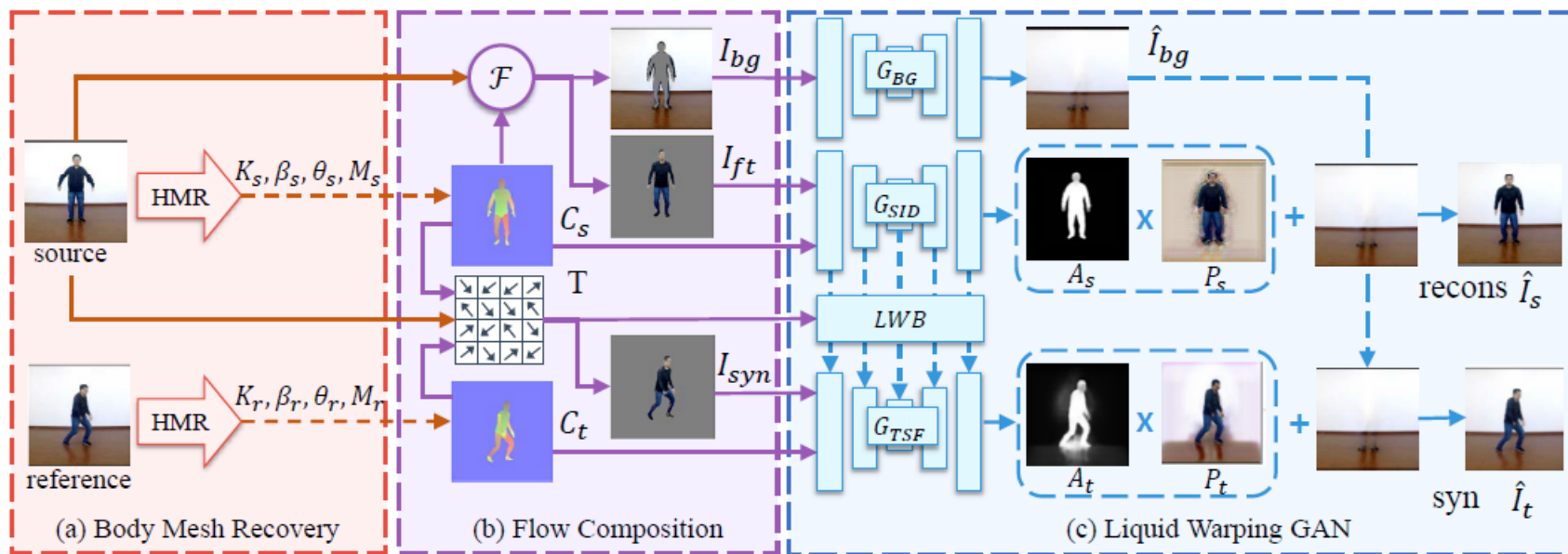
Background

- Deformable GANs for Pose-based Human Image Generation (CVPR 2018)



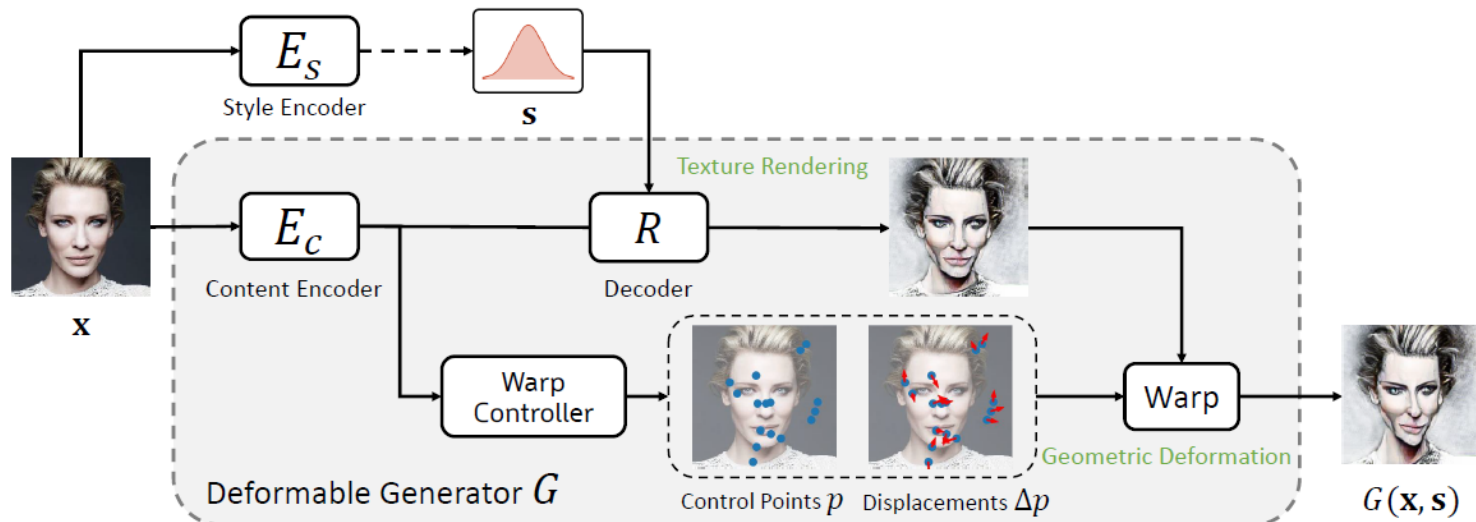
Background

- Liquid Warping GAN: A Unified Framework for Human Motion Imitation, Appearance Transfer and Novel View Synthesis (ICCV 2019)



Background

- WarpGAN: Automatic Caricature Generation (CVPR 2019)
- Thin plate spline interpolation
- $f_{\theta}(x) = \sum_{i=1}^k \omega_i \sigma(\|x - c_i\|) + v^T x + b$

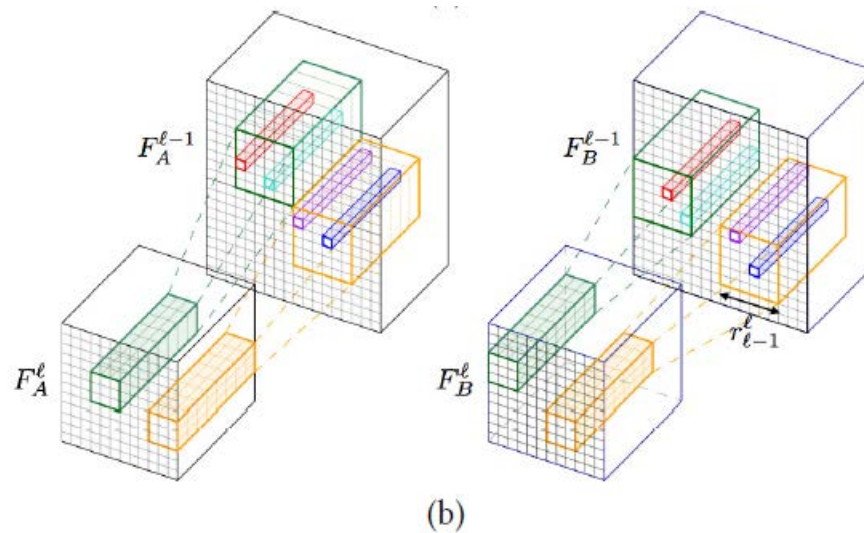


Problem

- These methods require a collection of images in the chosen style, and work only in a specific domain.
- How to find keypoint pairs in the case of one shot.

Background

- Neural Best-Buddies: Sparse Cross-Domain Correspondence (TOG)



Proposed Model

- Finding and Cleaning Keypoints
 - Remove the clustering step, find better spatially-distributed set of pairs.
 - Finding a similarity transformation that minimizes the squared distance between the two point clusters.
 - Remove keypoints pairs that cross each other.

Proposed Model

- Differentiable Image Warping
 - Thin plate spline interpolation
 - $f_{\theta}(q) = \sum_{i=1}^k \omega_i \phi(\|q - p_i - \theta_i\|) + v^T q + b$

Experiment

- Training Loss

- $L_{style} = L_S(I_S, X) + I_S(I_S, Warp(X, \theta))$

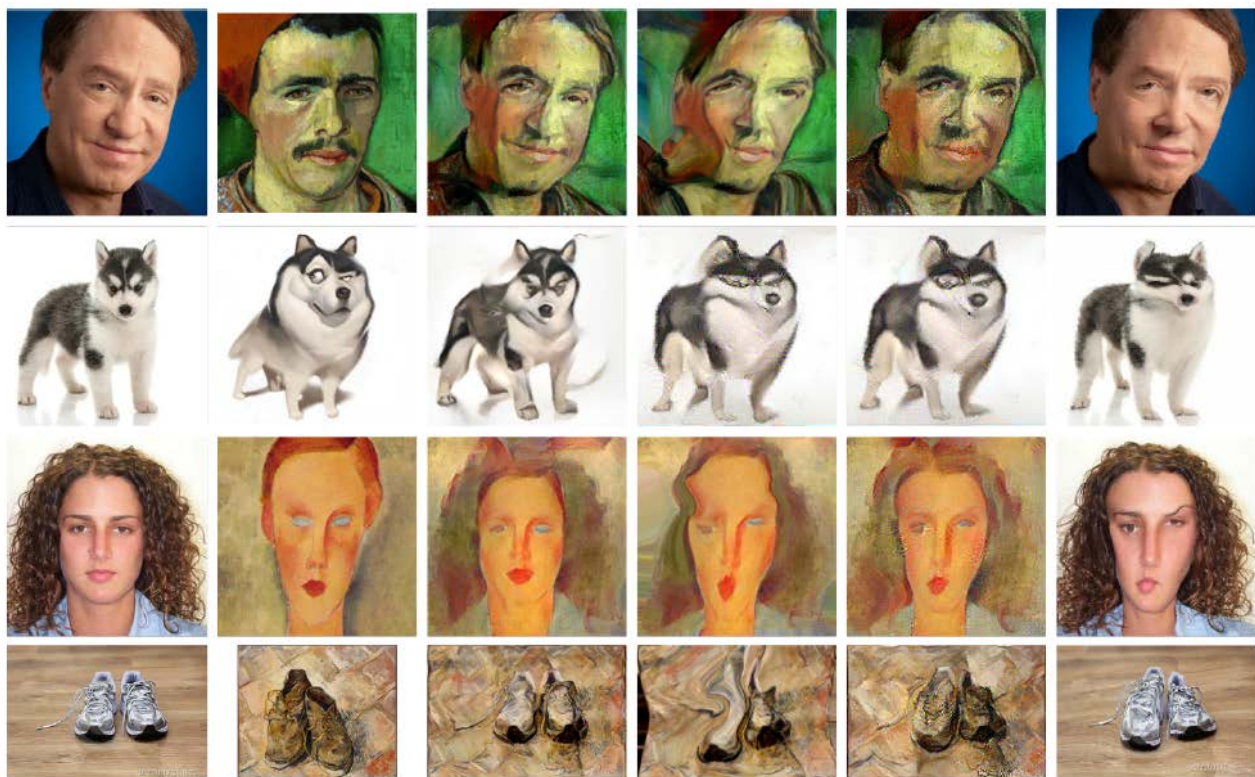
- $L_{content}$

- $L_{warp}(P, P', \theta) = \frac{1}{k} \sum_{i=1}^k \|p'_i - (p_i + \theta_i)\|$

- L_{TV}

Experiment

- Compare with other methods



Content

Style

Gatys

Gatys +
Naive Warp^{*}

DST

Content +
DST Warp[†]

Experiment

- Compare with other methods



Content

Style

STROTSS

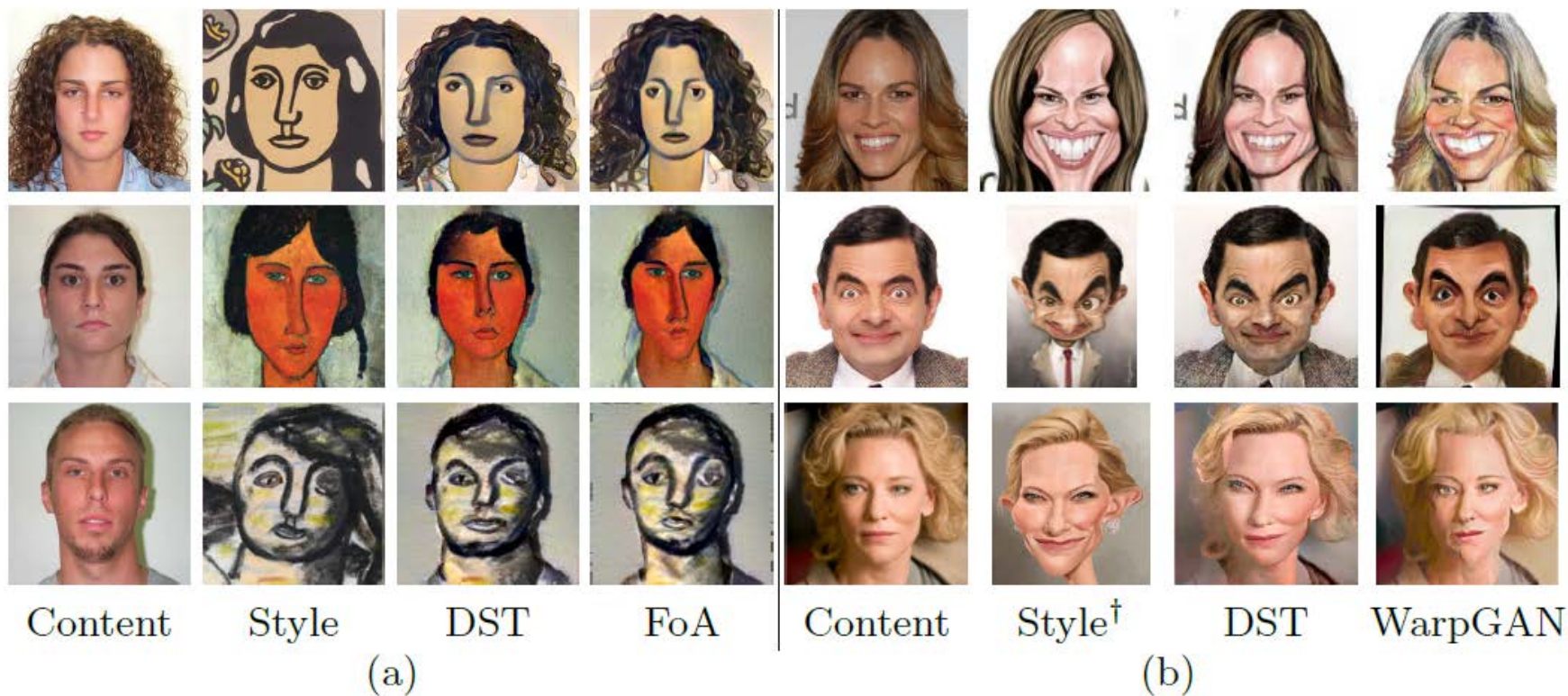
STROTSS +
Naive Warp*

DST

Content +
DST Warp†

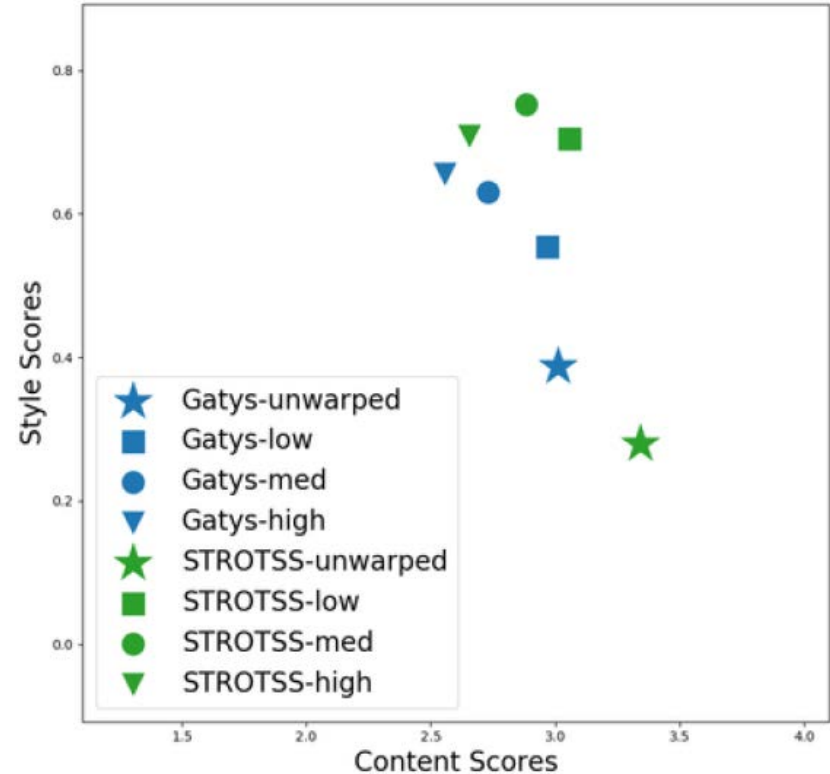
Experiment

- Compare with other methods



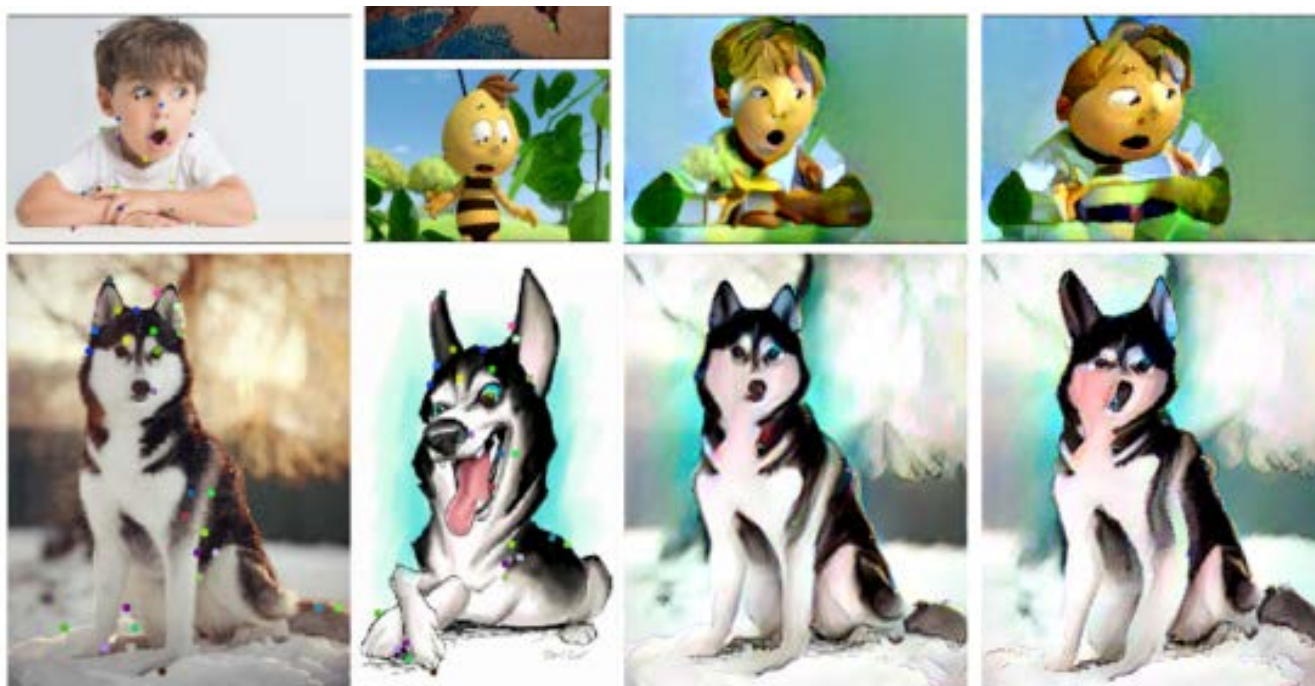
Experiment

- User study
 - 123 subjects
 - 4 x 75 comparisons



Experiment

- Failure case



Content

Style

STROTSS

DST

Conclusion

- Develop a one-shot, domain-agnostic method for capturing and transferring geometric aspects of style.

Thanks!