Canonical Makeup Transfer

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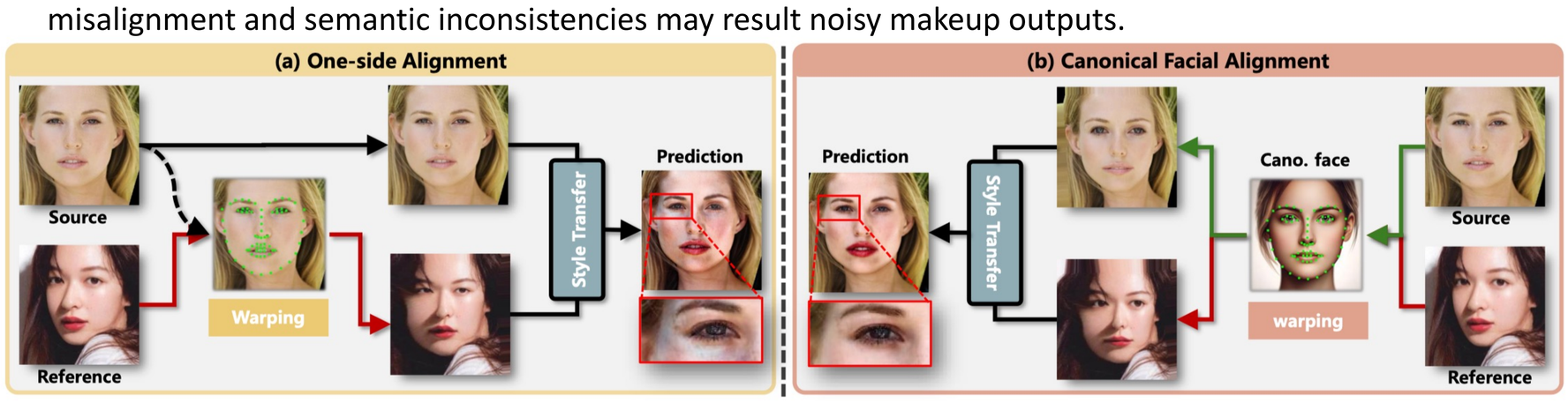
Background

- Comparison between one-side alignment and our canonical facial alignment schemes. Significant misalignment and semantic inconsistencies may result noisy makeup outputs.



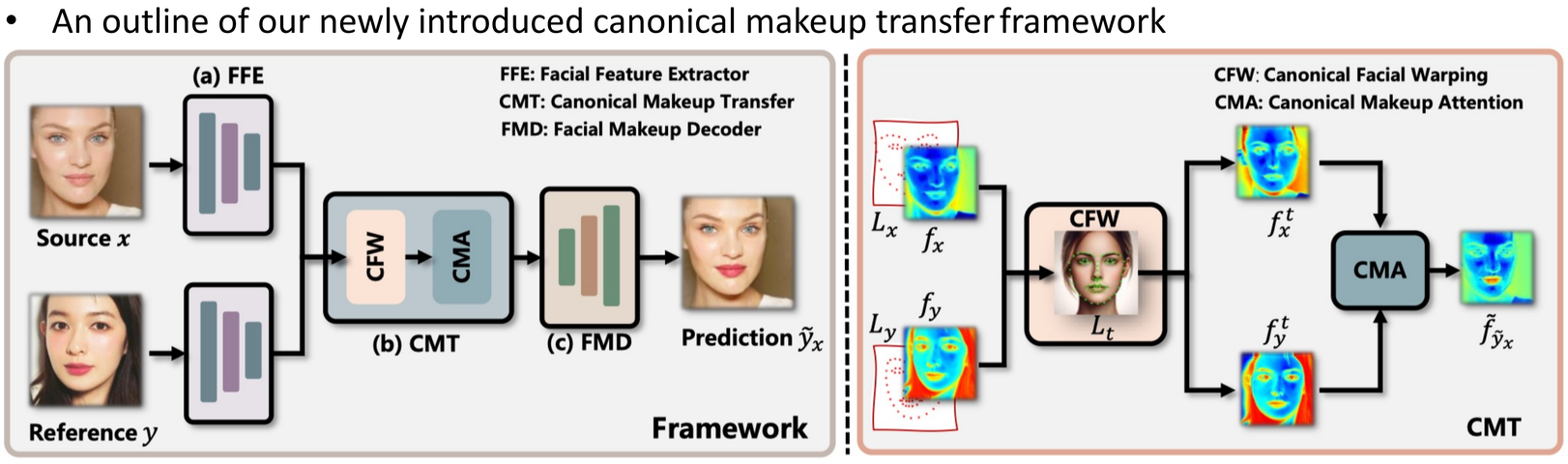
- Early makeup transfer methods (e.g. PSGAN, FAT) use cross-attention for pixel-level correspondence but do not explicitly align semantics of source-reference pairs.
- More recently, EleGANt improves by explicitly aligning features before attention, but in 'one-side alignment' way.

Highlights

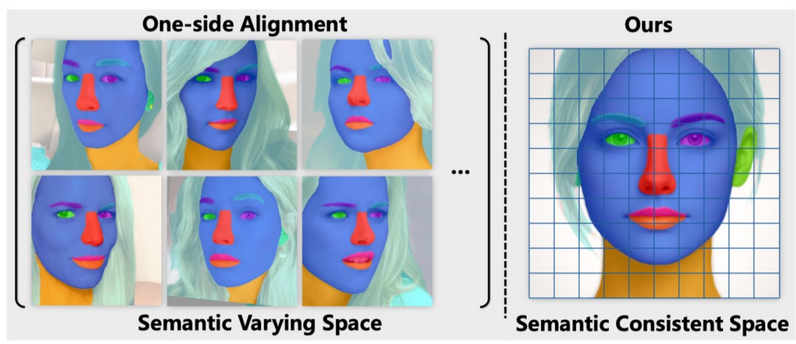
- **Canonical makeup transfer.** We present a canonical makeup transfer approach to shorten the spatial misalignment between source and reference face pairs, resulting in effective semantic-consistent interaction and better information preservation.
- **Benchmarking and quantitative metrics**. We carefully design a fine-grained evaluation benchmark MT-Eval for fair and comprehensive evaluations under different scenarios. Moreover, we present the cyclic reconstruction metrics (in Sec. 4) for objective assessments.
- **SOTA performance**. Extensive experiments and user study demonstrate that our method achieves state-of-the-art performance in transferring makeup quality.

Method

- An outline of our newly introduced canonical makeup transfer framework

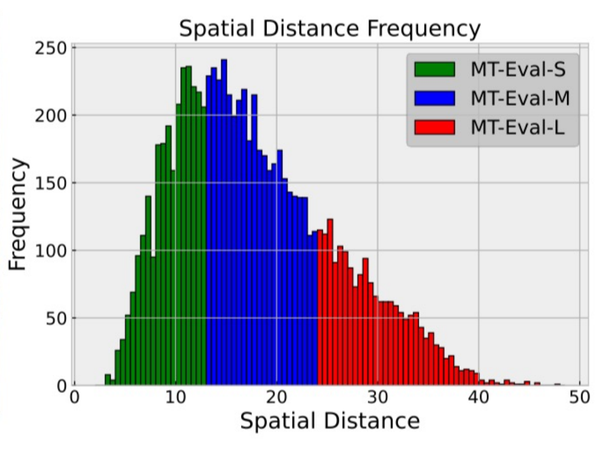


- Illustrations of semantic space for one-side alignment vs. our canonical transfer strategy



Benchmarking and Quantitative Metrics

- Illustrations of some sample images in MT-Eval. We divide the sub-datasets based on the spatial distance



- First perform a cyclic makeup transfer ($\mathcal{G}$: makeup transfer model):

$$x_{cyc}^{p} = \mathcal{G}(\mathcal{G}(x, y^{p}), x),$$

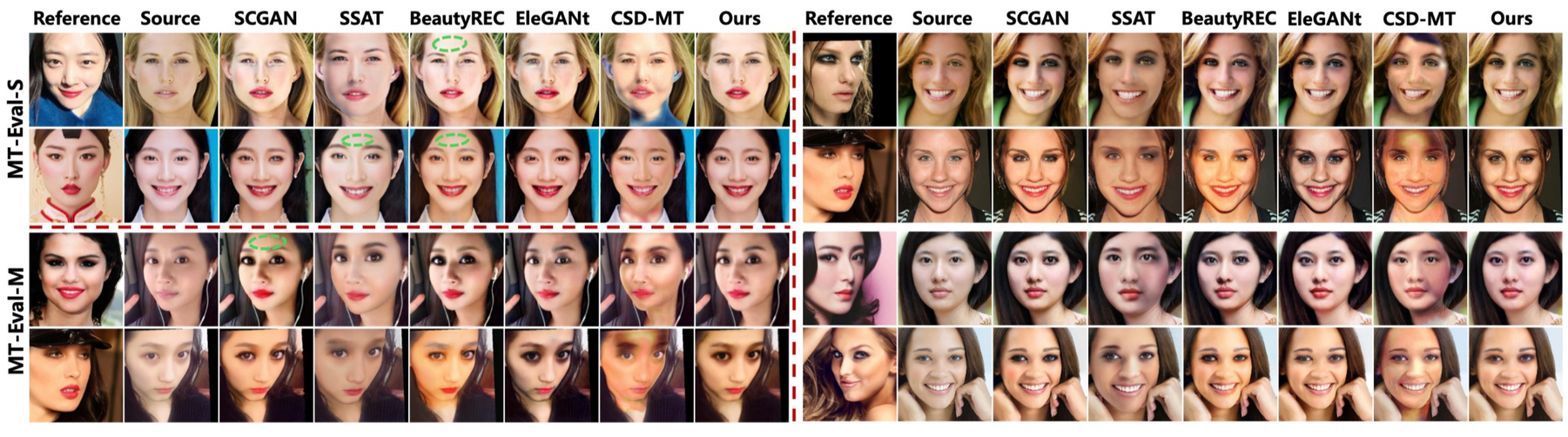
- Then employ objective evaluation metrics for accurate comparison:

$$\text{PSNR}_{cyc} = \frac{1}{P}\sum_{p}^{P}(\text{PSNR}(x_{cyc}^{p}, x)$$

$$\text{P-SSIM}_{cyc} = \frac{1}{P}\sum_{p}^{P}(\text{P-SSIM}(x_{cyc}^{p}, x))$$

Experiments

- Visual comparisons with SOTA makeup transfer methods on MT-Eval. The red circles highlight blurred details and artifacts, while green circles indicate inaccurate color transfers.



- Ablation study: quantitative comparisons between different makeup transfer strategies.

Testset	No align	One-side align	Canonical align
MT-Eval-S	29.83/0.925	29.96/0.927	**30.76/0.953**
MT-Eval-M	29.27/0.922	29.35/0.925	**30.14/0.951**
MT-Eval-L	28.82/0.921	28.88/0.926	**29.67/0.949**

- The cyclic reconstruction comparisons (PSNR_{cyc}/ $\text{P}-\text{SSIM}_{cyc}$) of different methods.

Testset	SSAT	BeautyREC	EleGANt	CSD-MT	Ours
MT-Eval-S	25.22/0.938	25.02/0.917	29.44/0.936	28.21/0.953	**30.76/0.953**
MT-Eval-M	25.19/0.938	24.76/0.911	29.14/0.933	27.82/0.948	**30.14/0.951**
MT-Eval-L	24.95/0.939	24.55/0.910	29.09/0.933	27.72/0.947	**29.67/0.949**

- Ablation study: qualitative comparisons between different makeup transfer strategies.