

Generating Font Variations Using Latent Space Trajectory

Sotaro Kanazawa, I-Chao Shen, Yuki Tatsukawa, Takeo Igarashi
The University of Tokyo

Goal

Generate bitmap font variations using the latent space trajectory of font-specific generative models to assist in designing variable fonts.

Input single-character font bitmap

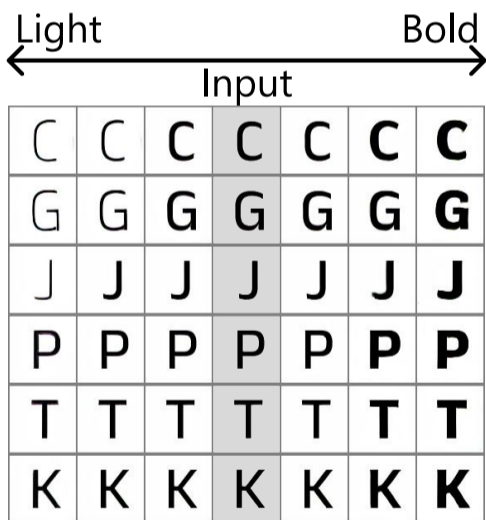
Output bitmap font variations

Motivation

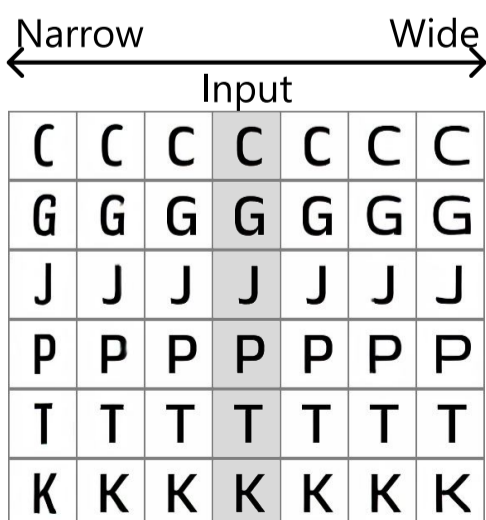
- **Variable fonts** allow you to freely change the parameters of font properties.
- However, their design process is too detailed and time-consuming.
- To tackle this problem, we extend font-specific generative models to assisting in the automatic generation of variable fonts.

Examples Results

Weight Axis

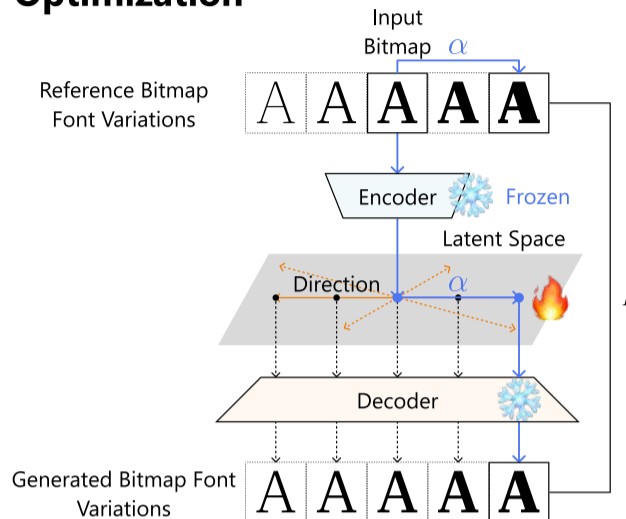


Width Axis

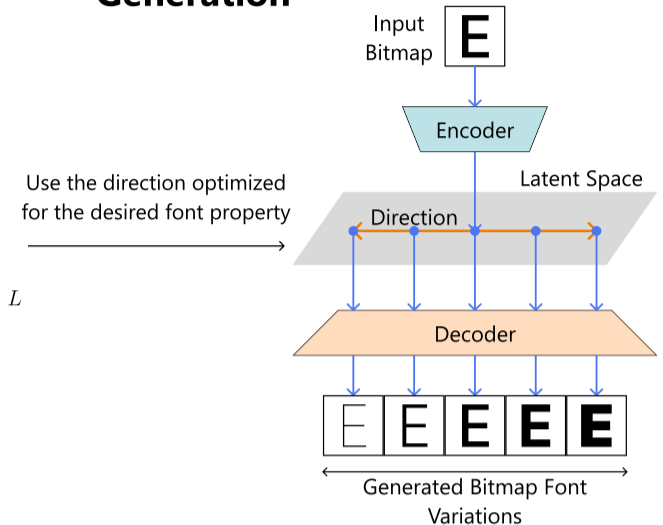


Method

Optimization



Generation



1. **Optimize the direction of a latent space trajectory** of a font-specific generative model [1] based on a method in [2].
2. **Generate bitmap font variations from the bitmap of a single-character font** by leveraging the direction of the trajectory optimized for the desired property.

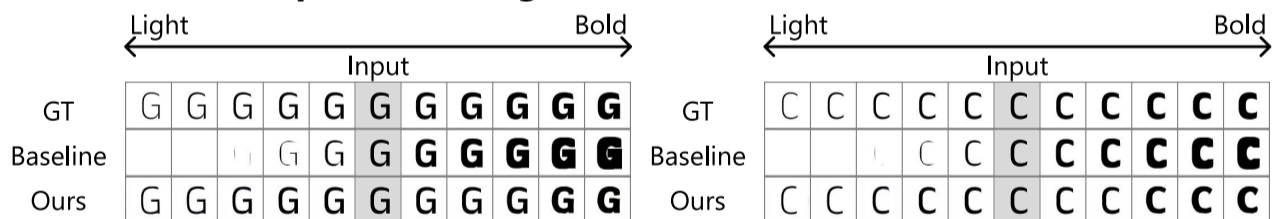
Evaluation

Dataset 250 (Weight) / 60 (Width) variable fonts × 62 characters (0-9, a-z, A-Z)

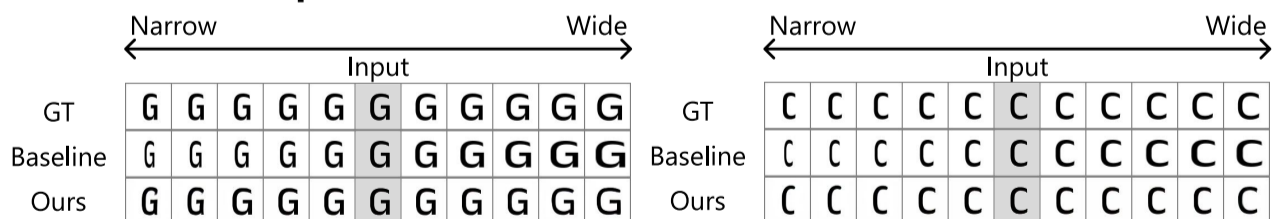
GT Rasterized real-world variable fonts

Baseline Geometric transformation (morphological transformation¹ for weight, horizontal scaling for width)

Qualitative Comparison (Weight Axis)



Qualitative Comparison (Width Axis)



Quantitative Comparison

	Ours (L2 ↓)	Baseline (L2 ↓)
unseen font (weight)	0.1695	0.2590
unseen character (weight)	0.1429	0.1908
unseen font (width)	0.2418	0.09437
unseen character (width)	0.2338	0.07793

¹geometric transformation that erodes or dilates an object in an image

References

- [1] Yangchen Xie, Xinyuan Chen, Li Sun, and Yue Lu. 2021. DG-Font: Deformable Generative Networks for Unsupervised Font Generation. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR). 5130–5140.
- [2] Ali Jahani, Lucy Chai, and Phillip Isola. 2020. On the "steerability" of generative adversarial networks. In International Conference on Learning Representations.

Acknowledgements

This work was partially supported by JST AdCORP, Grant Number JPMJKB2302, JSPS Grant-in-Aid JP23K16921, Japan, and a collaboration with Dentsu Digital.