

Perceptual Font Manifold from Generative Model

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BACKGROUND:

Font

Viewing 7 of 915 font families

Source Sans Pro

Paul D. Hunt (12 styles)

*Silver mist suffused
the deck of the ship.*

PT Sans

ParaType (4 styles)

*Waves flung
themselves at the
blue evening.*

Titillium Web

Multiple Designers (11 styles)

*The sky was
cloudless and of a
deep dark blue.*

Lobster

Impallari Type, Cyreal (1 style)

*The face of the moon
was in shadow.*

Cardo

David Perry (3 styles)

*The face of the moon
was in shadow.*

Lobster Two

Impallari Type (4 styles)

*Waves flung
themselves at the blue
evening.*

Trochut

Categories

- Serif
- Sans Serif
- Display
- Handwriting
- Monospace

Sorting

Trending ▾

Languages

All Languages ▾

Number of styles



Thickness



Slant



Width

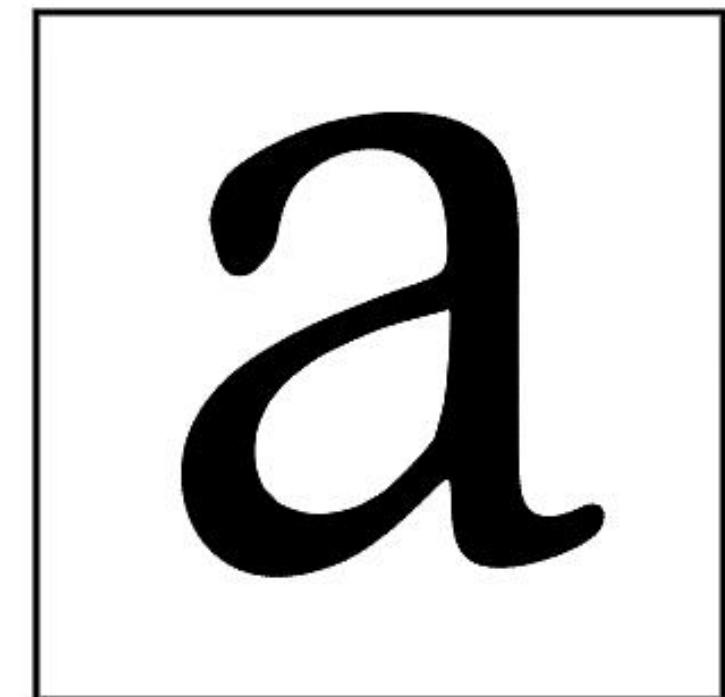
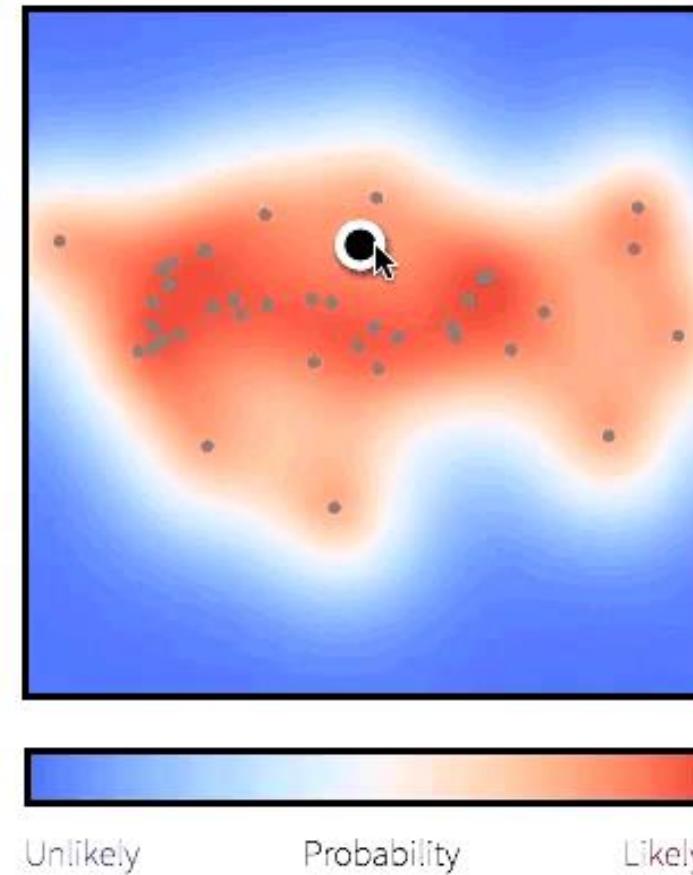
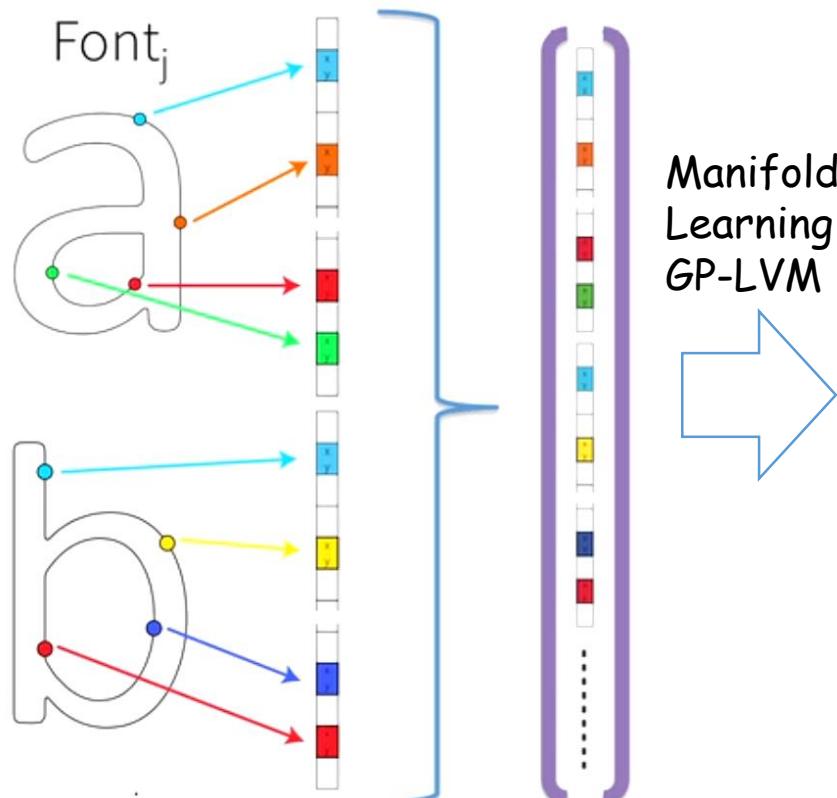


@Google Fonts

It is difficult to explore and design a favorite font type.

BACKGROUND:

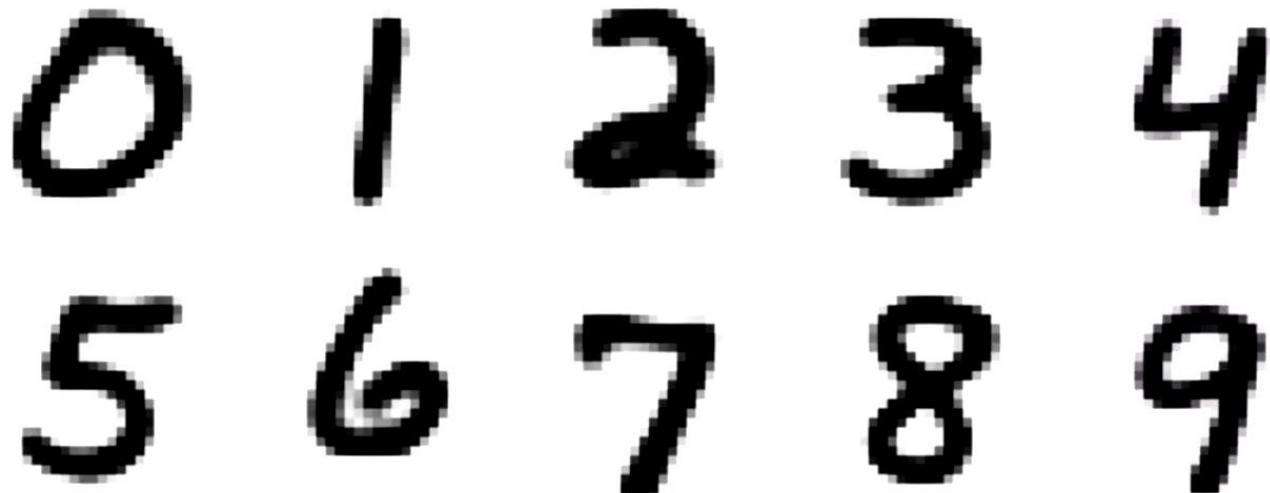
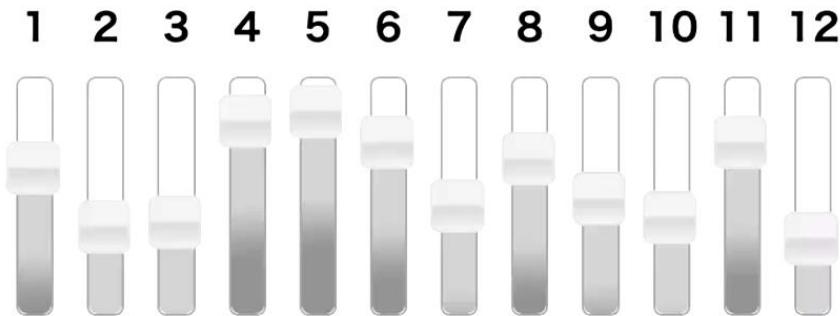
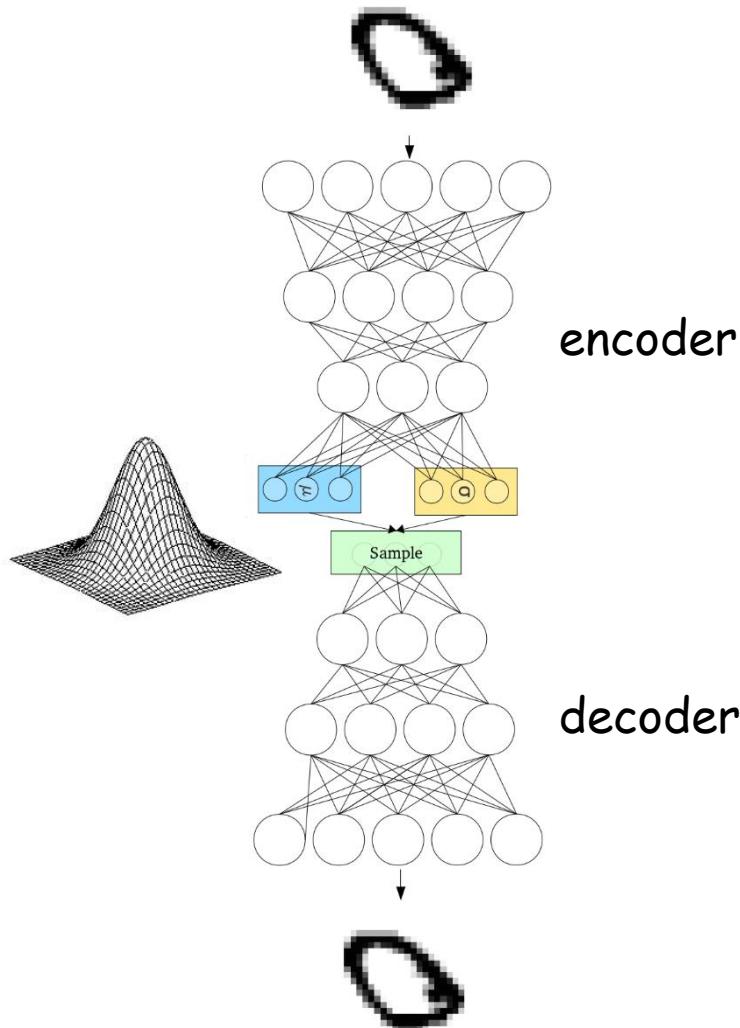
Font Manifold [SIGGRAPH2014]



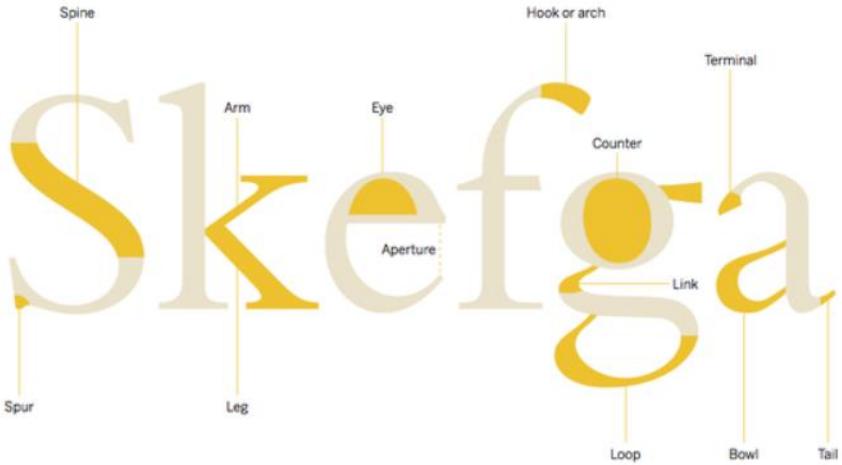
Select Character:

BACKGROUND:

Variational Autoencoder [ICLR2014]



Motivation



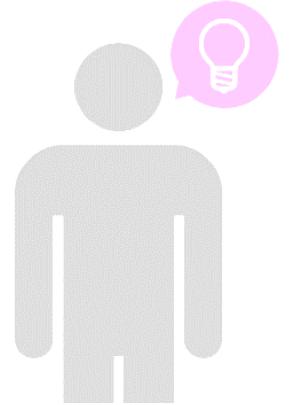
Designing or editing fonts is difficult

Soft Kitty, Warm Kitty

Soft Kitty, Warm Kitty

Soft Kitty, Warm Kitty

Soft Kitty, Warm Kitty



Human perception on fonts is absent

Related Works

GAN

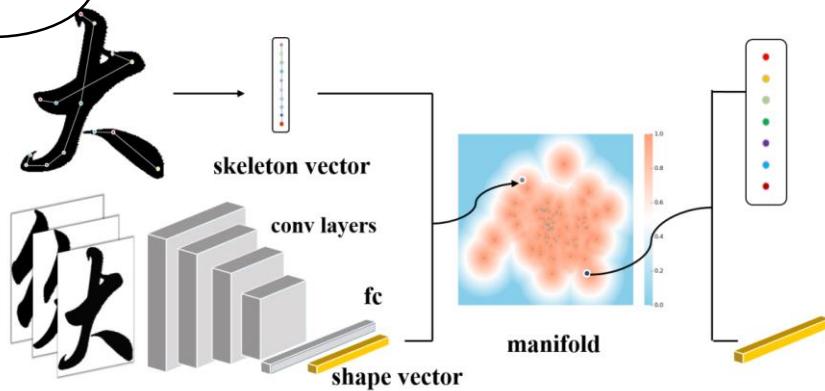


Left: Given movie poster, Right: New movie title generated by MC-GAN.



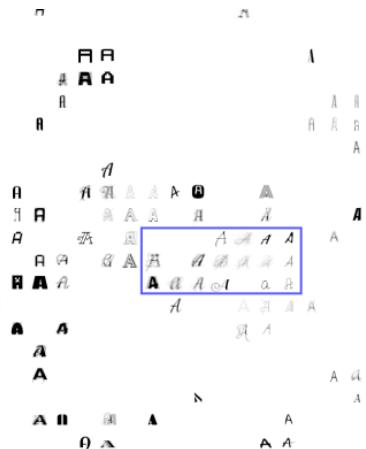
GAN

Multi-Content GAN, CVPR2018



Chinese Fonts Manifold, EG2018

VAE



Font Style Transfer, 2016

Perception



<Task image>

Ours

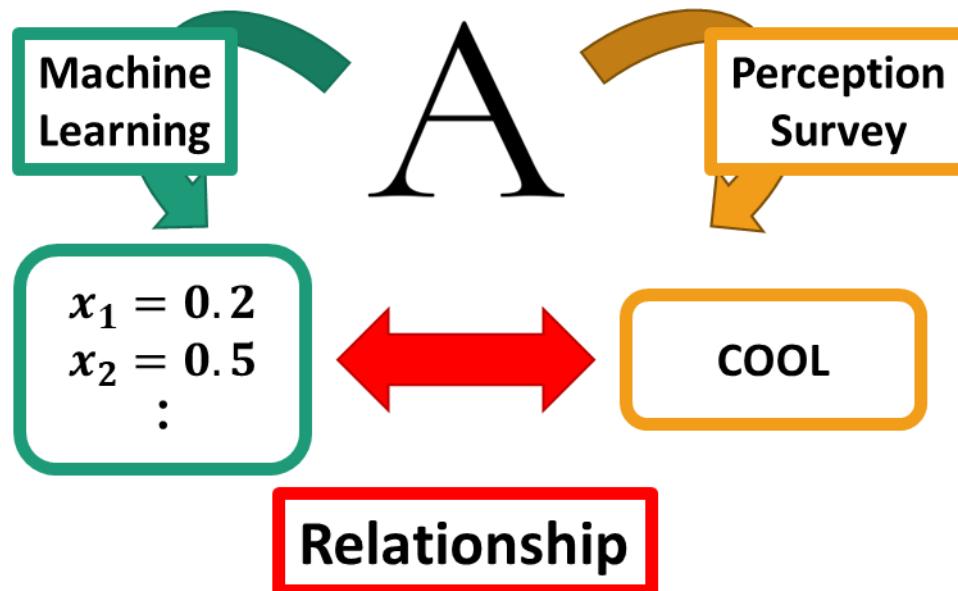
Handgloves
Handgloves
Handgloves

FontMatcher, IUI2018

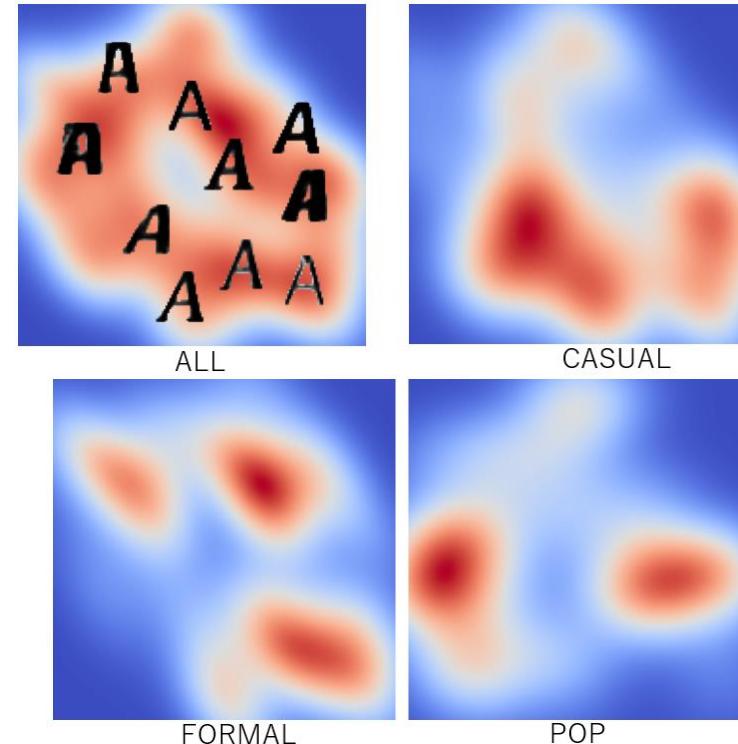
How to introduce human perception into font deep generative models?

Contributions

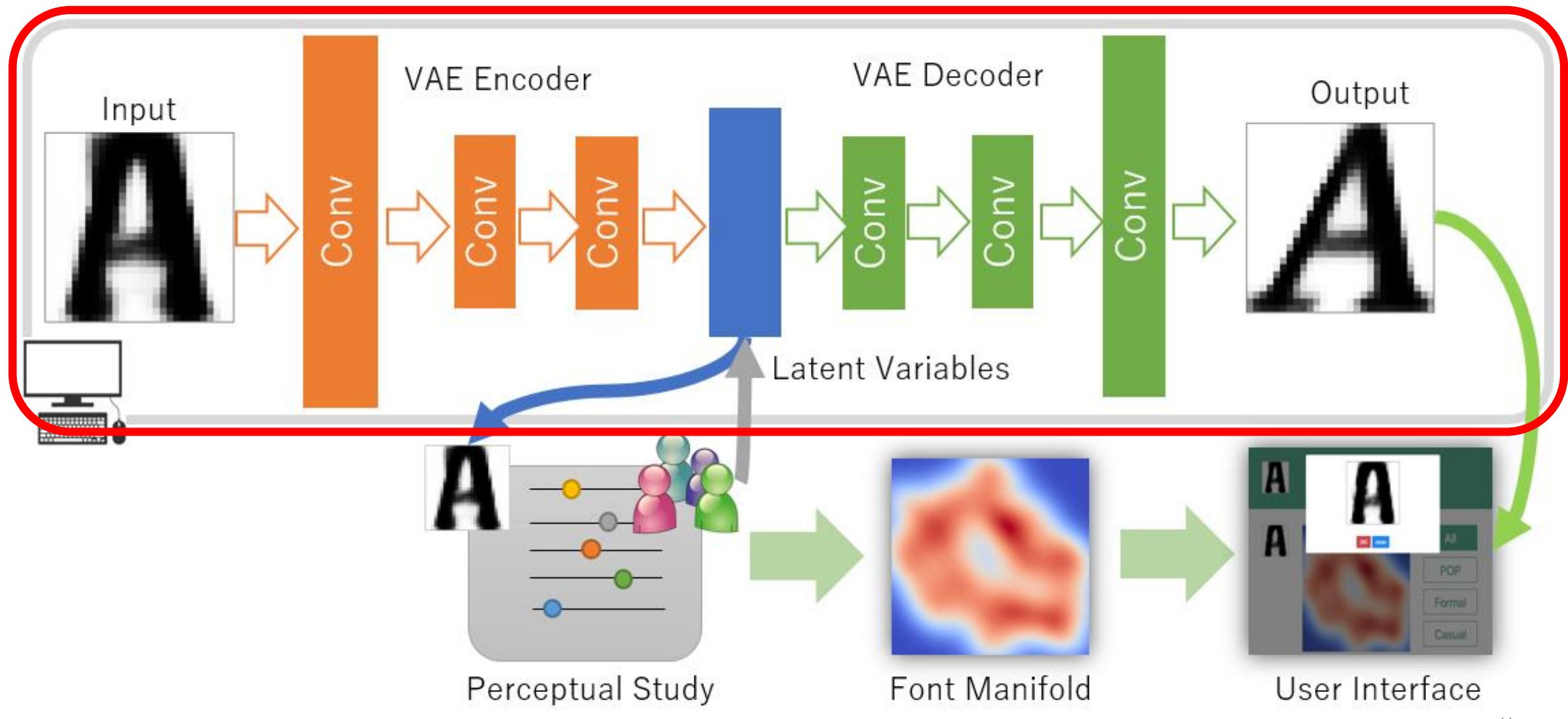
1. Perceptual Study in Learning Process



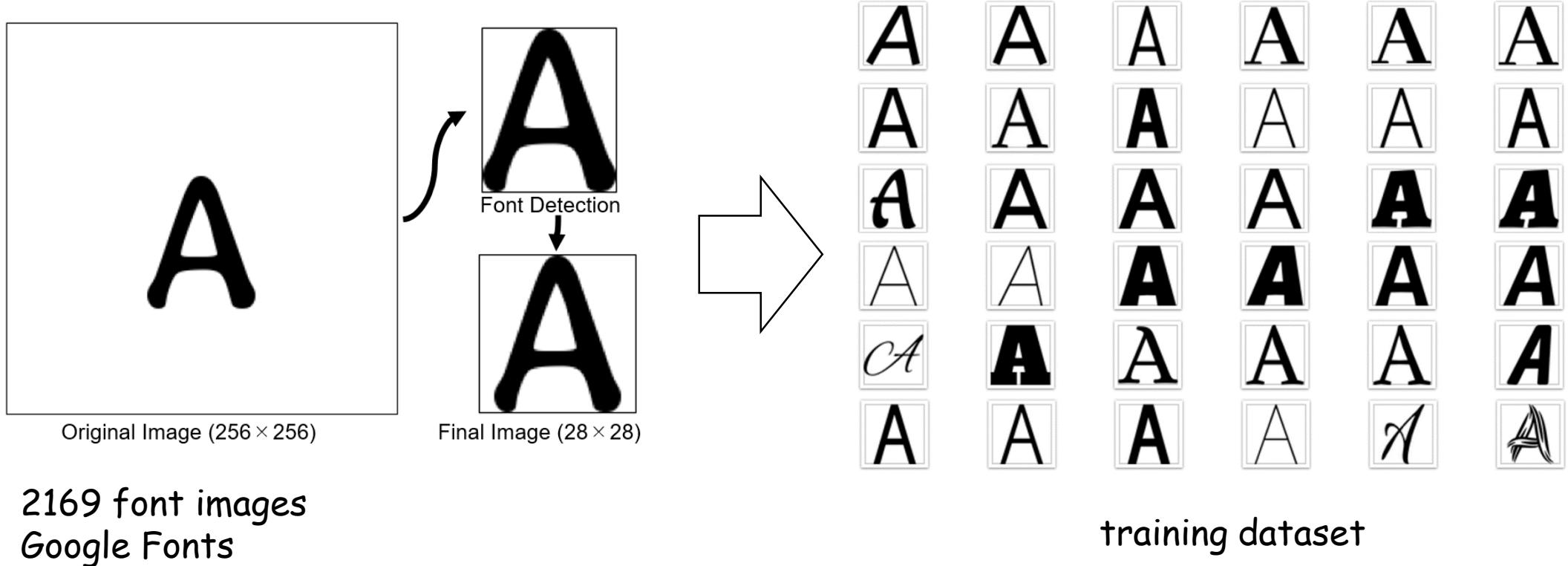
2. UI for Perceptual Font Manifolds



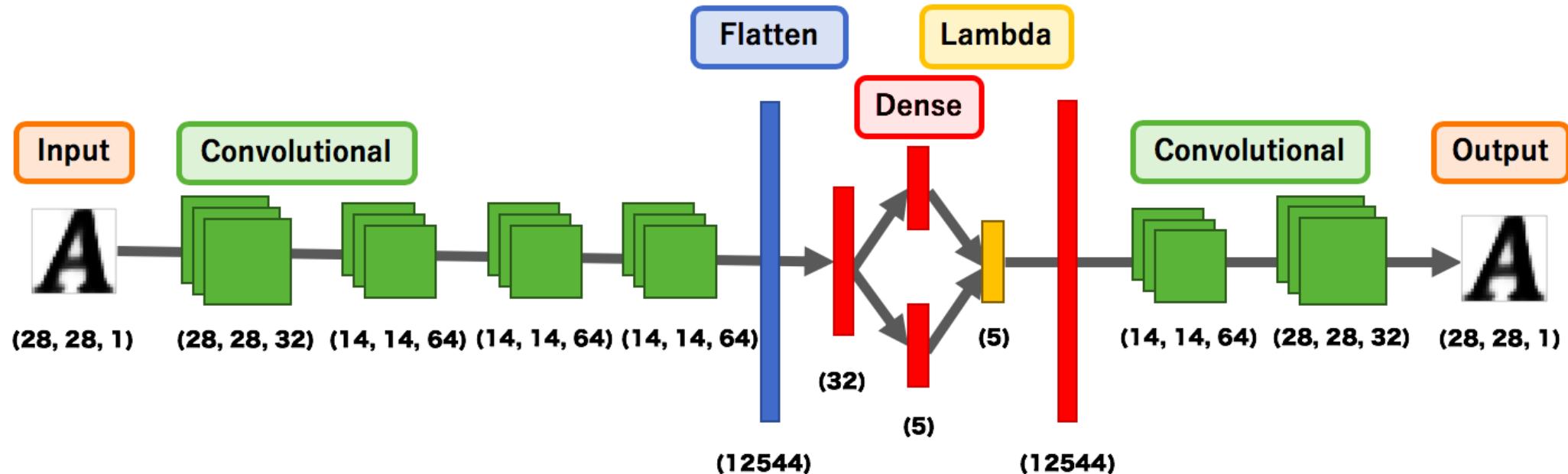
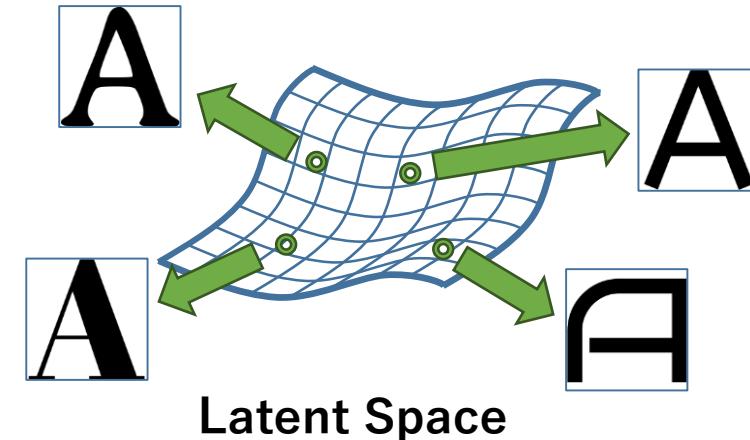
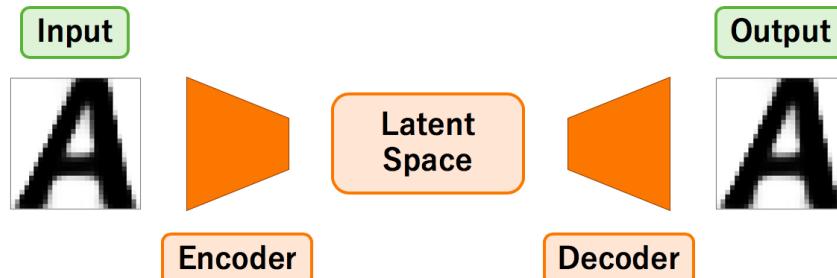
Framework



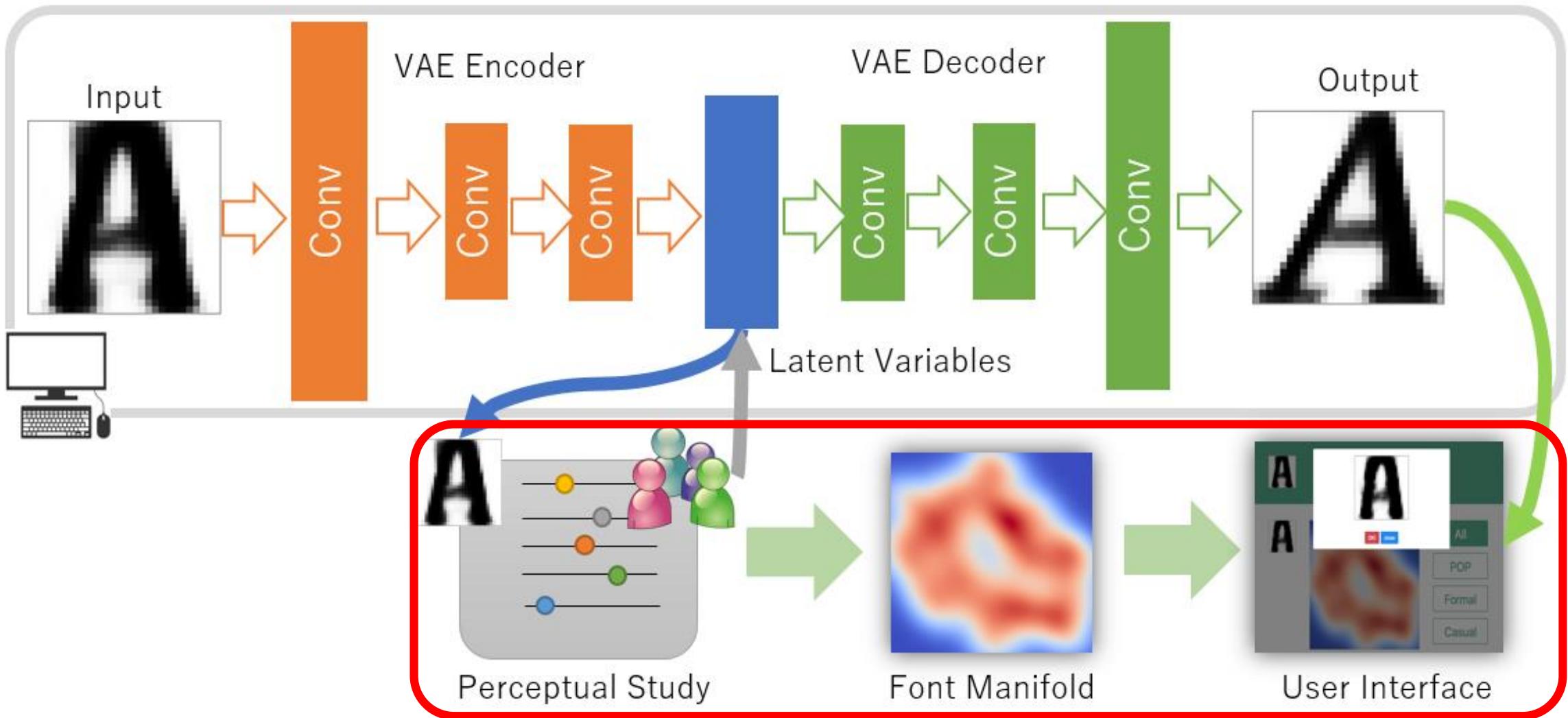
Training Data



Generative Model

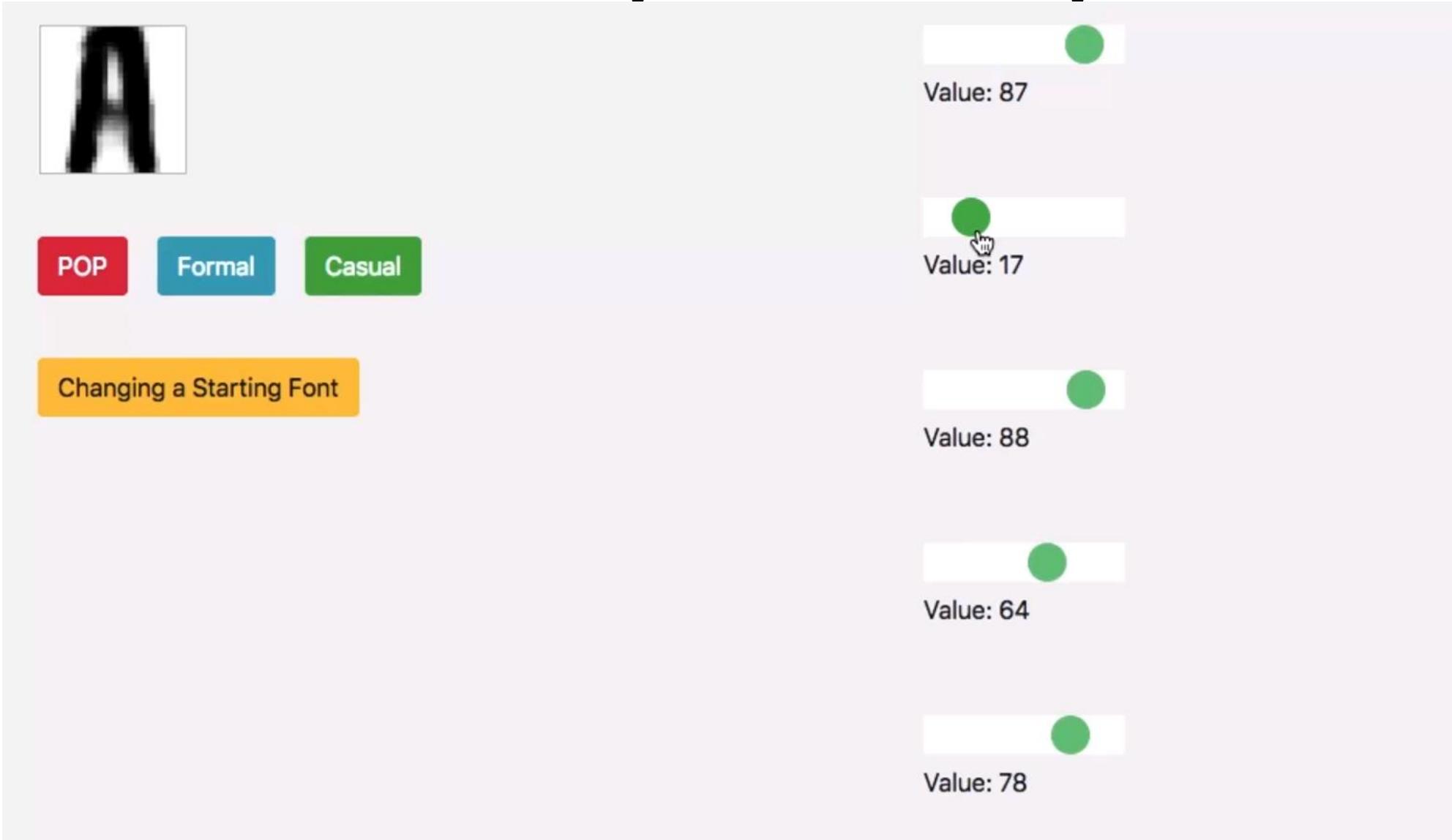


Framework



UI for Perceptual Study

POP	Formal	Casual	Total
273	311	298	884



**Soft Image
Round
Bold**

(1)POP

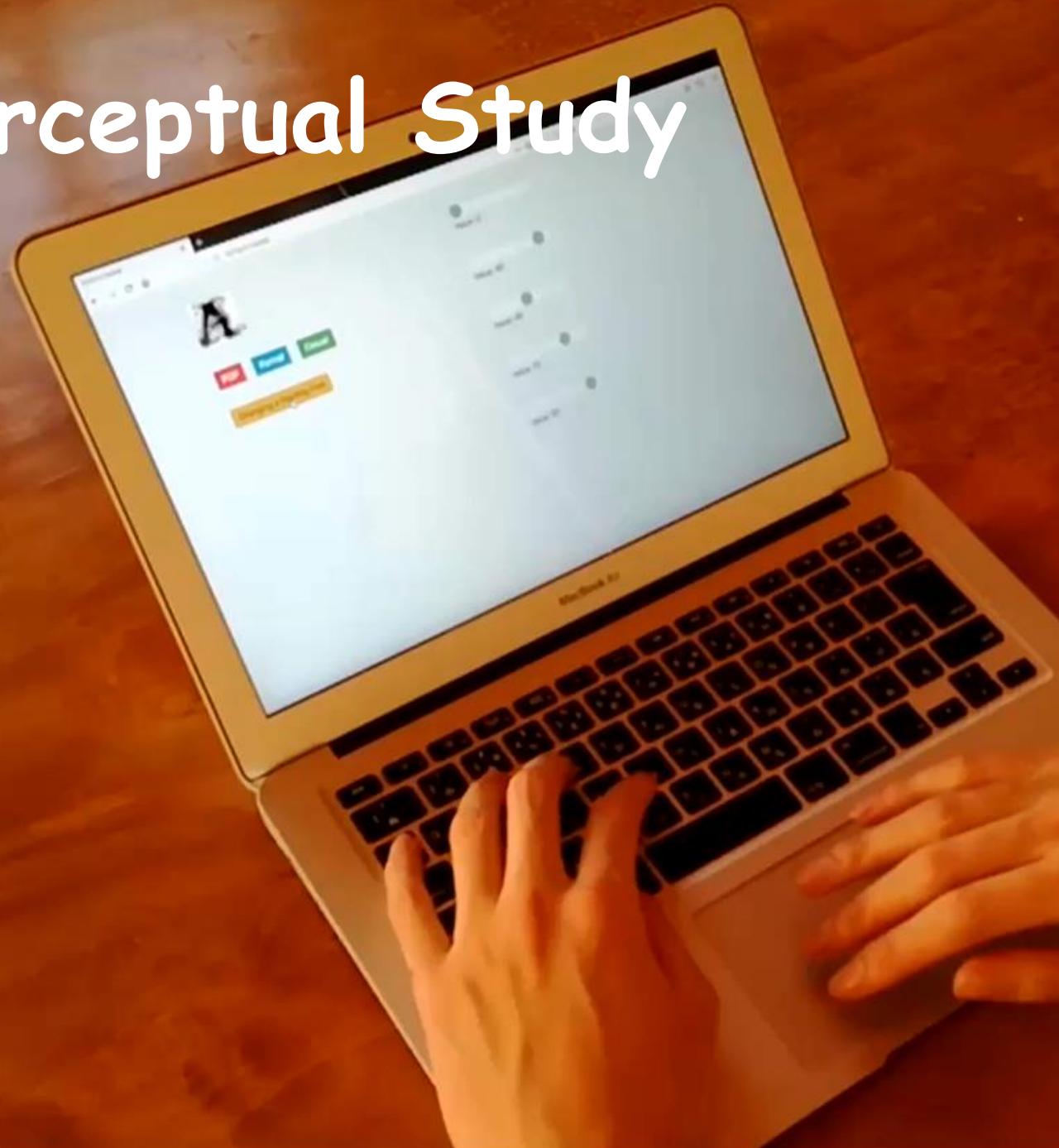
Hard Image
Thesis

Symmetrical
(2)Formal

FREEDOM IMAGE
Slant
Scratchy

(3)Casual

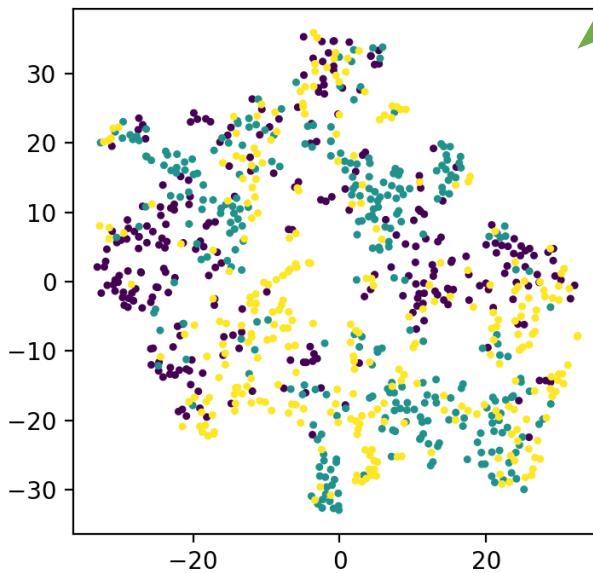
Perceptual Study



Manifold Learning



\rightarrow
t-SNE*



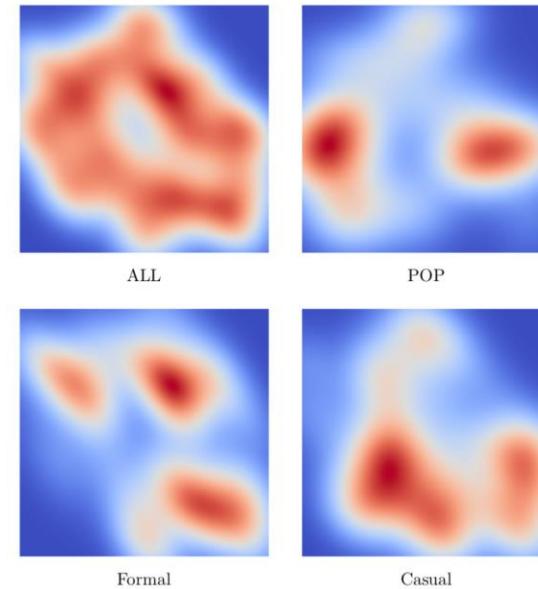
Perceptual Study

dimensionality reduction

Purple: POP
Green: Formal
Yellow: Casual



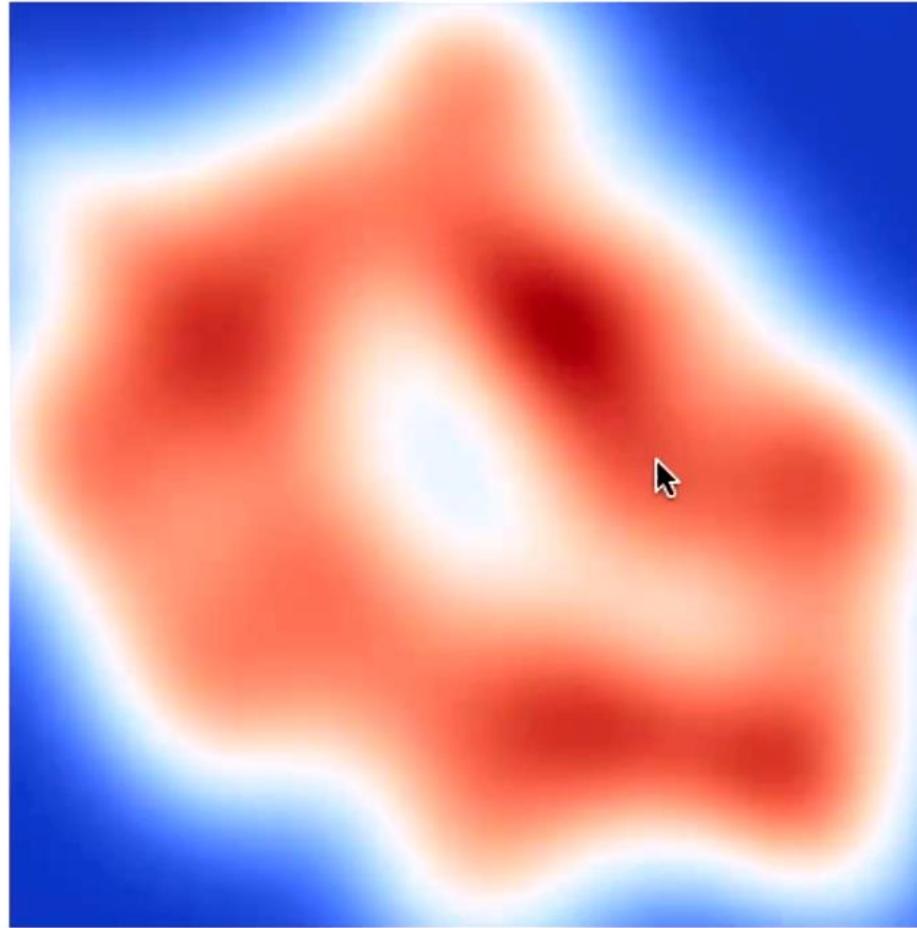
Kernel density estimation



Perceptual Manifolds

*t-distributed Stochastic Neighbor Embedding

UI for Font Manifold



All

POP

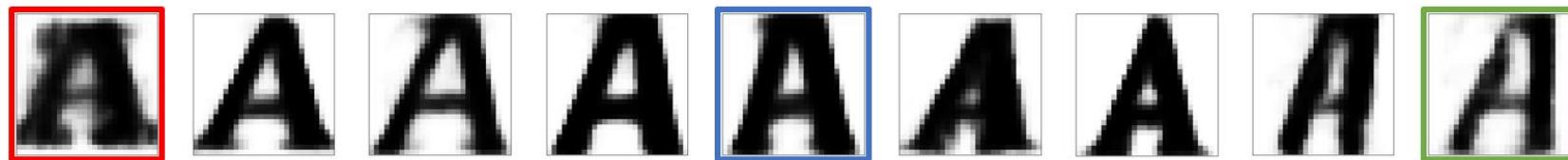
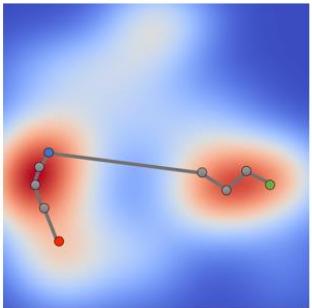
Formal

Casual

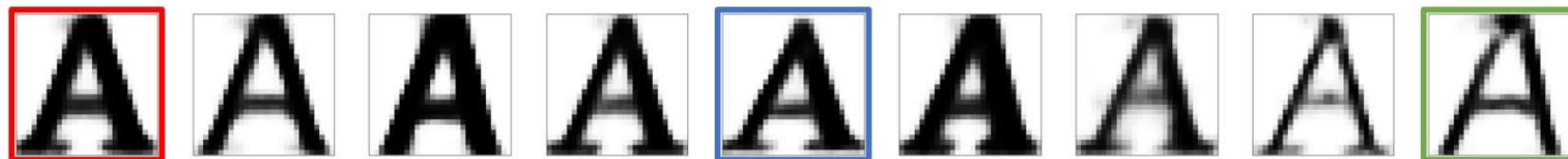
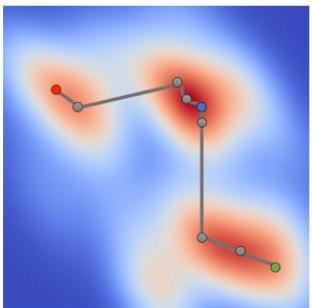
Results

Ubuntu 16.04 LTS,
Intel Core i7-7700 CPU 3.60GHz × 8,
GeForce GTX 1060 3GB GPU
Python 3.5
CUDA 8.0
CuDNN 6.0
Keras-gpu 2.1.6

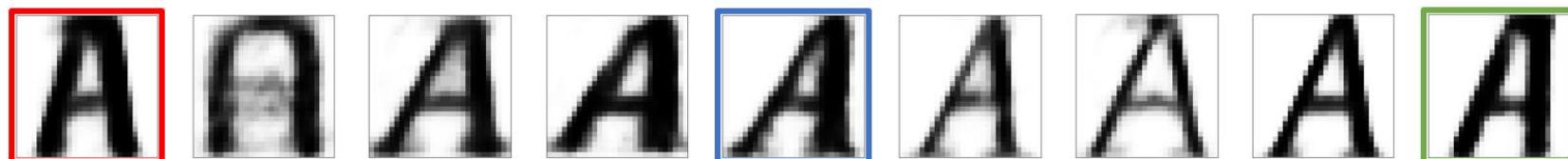
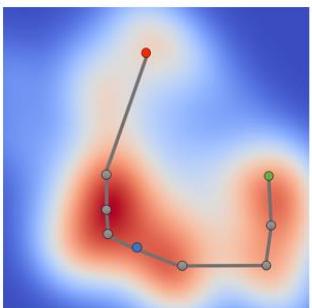
Perceptual Font Manifold



POP



Formal



Casual

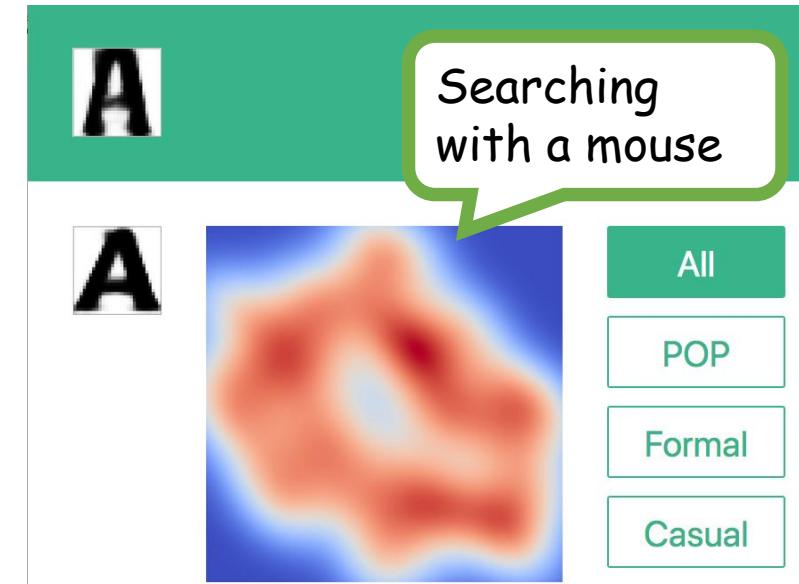
Comparison Study : font exploration



10 target fonts

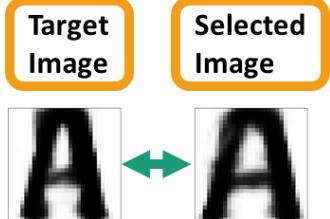
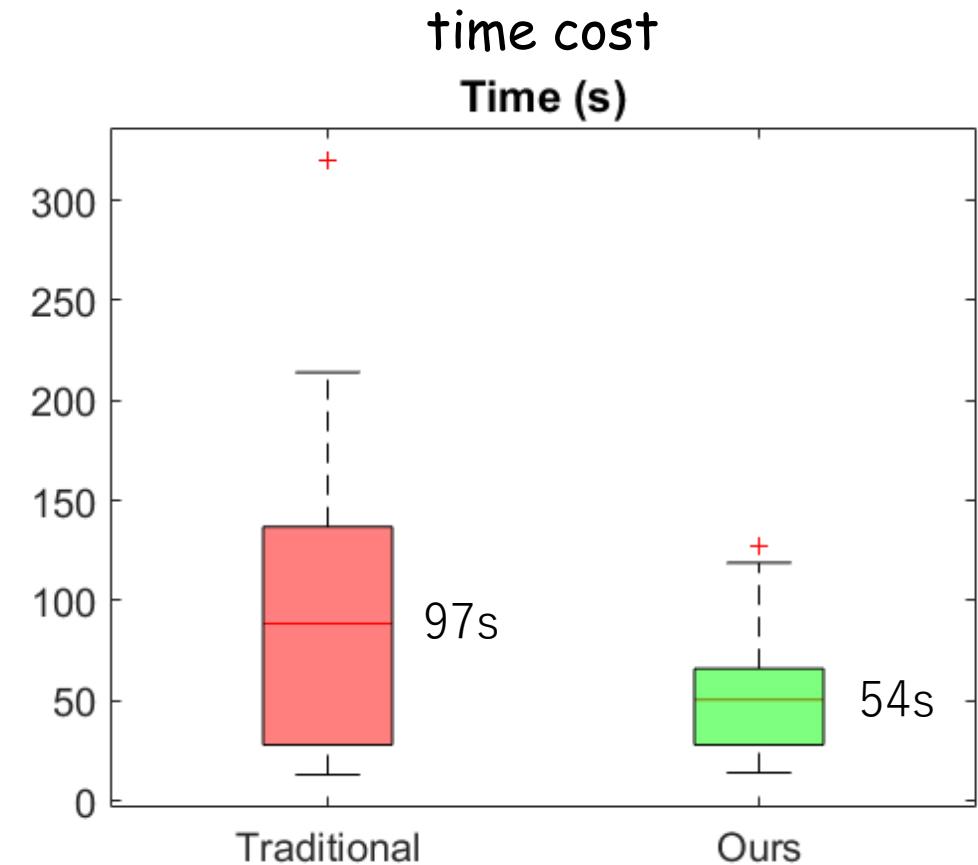
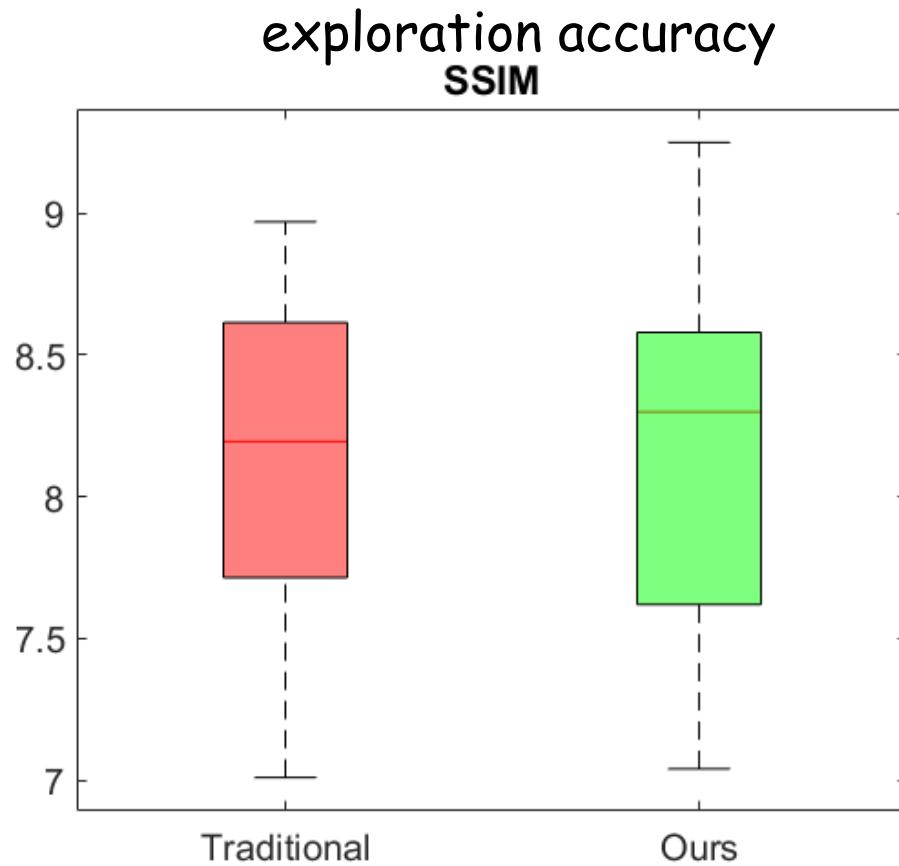
Target Font Image

Arranged in 10 columns and 160 rows



20 graduate students, 2 groups

Comparison Study : results



structural similarity

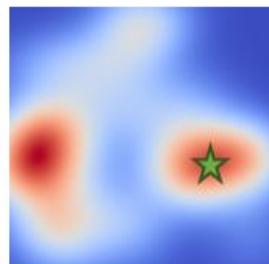
Similarity: S
(SSIM score)
 $0 \leq S \leq 1$

covariance

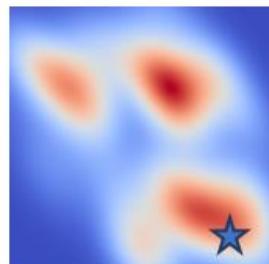
$$SSIM(x, y) = \frac{(2\mu_x\mu_y + C_1)(2\sigma_{xy} + C_2)}{(\mu_x^2 + \mu_y^2 + C_1)(\sigma_x^2 + \sigma_y^2 + C_2)}$$

mean standard deviations

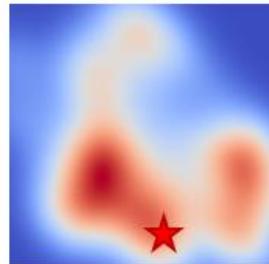
From A to Z



POP



Formal



Casual

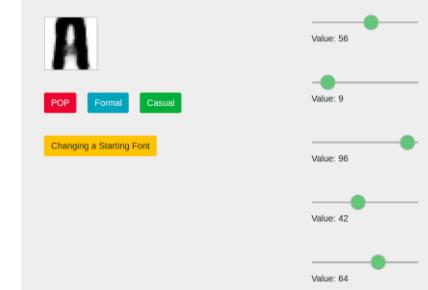
**The quick brown fox
jumps over the lazy dog**

The quick brown fox
jumps over the lazy dog

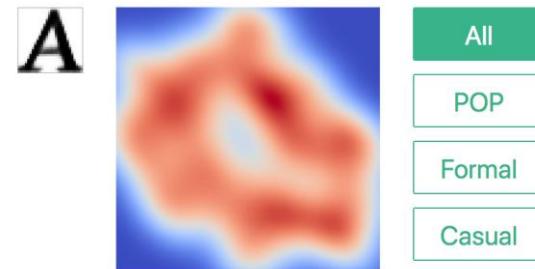
The quick brown fox
jumps over the lazy dog

Conclusions

1. Perceptual study in generative model

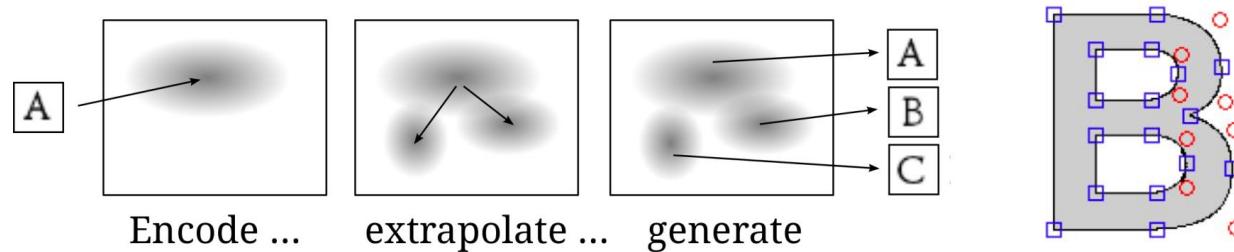


2. UI for perceptual font manifolds



Limitations

1. Only handles "A" fonts
-Font Style Transfer
2. Not for TrueType Fonts



From A to Z: Supervised Transfer of Style and Content Using Deep Neural Network Generators, 2016

Thank You!

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