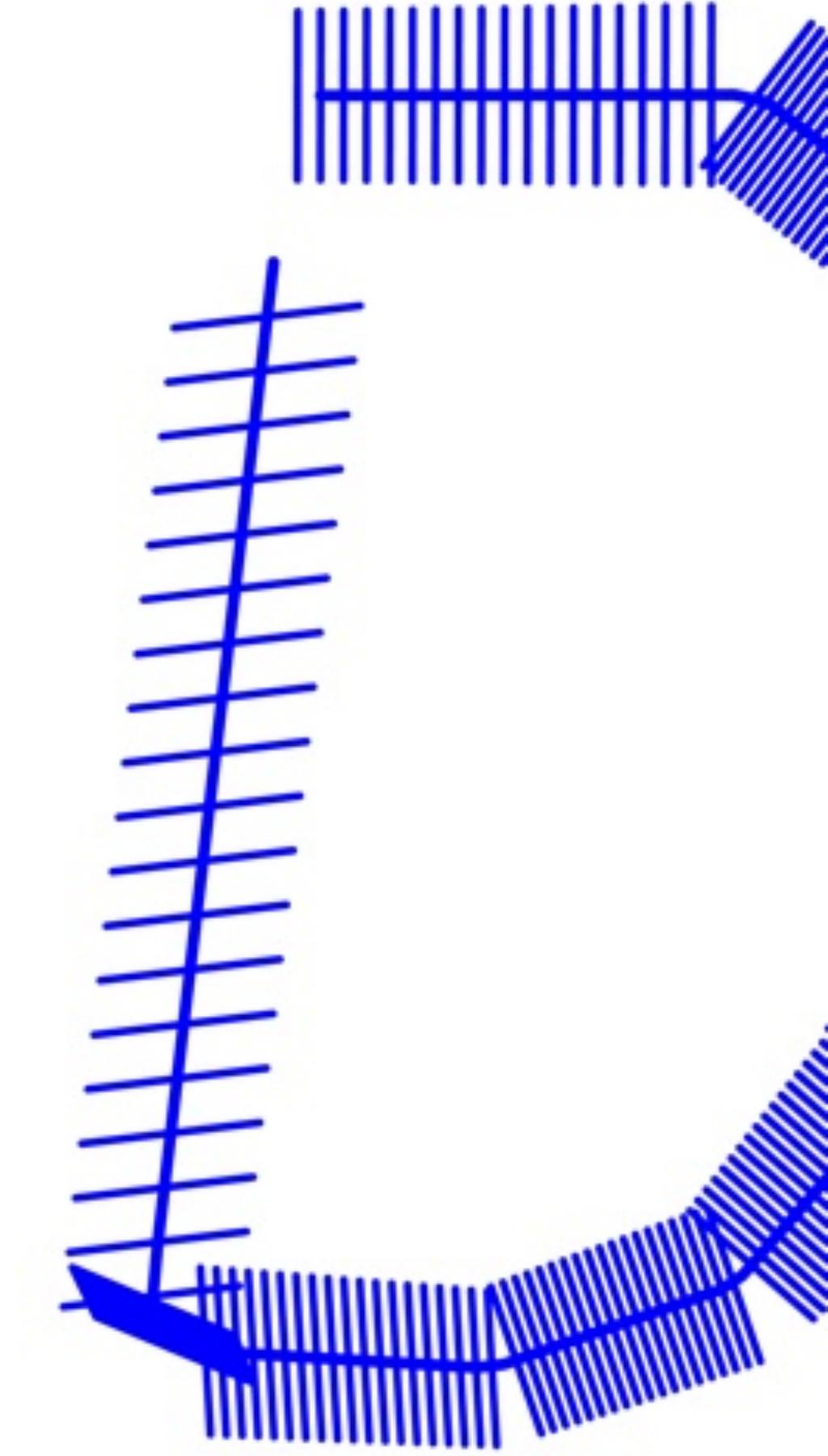


# Deep Learning aligned with *Type Design*



LUÍS GONÇALO  
[lgoncalo@dei.uc.pt](mailto:lgoncalo@dei.uc.pt)

JÉSSICA PARENTE  
[jparente@dei.uc.pt](mailto:jparente@dei.uc.pt)



# **CDV Lab**

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The screenshot shows the homepage of the CDV LAB website. At the top left is the lab's logo, a circular pattern of black dots. To its right is the text "COMPUTATIONAL DESIGN & VISUALIZATION LAB.". On the right side of the header is a navigation menu with links: "About", "People", "Publications", "Projects", "News", and "Snapshots". A search bar with the placeholder "Write Something" is positioned at the top right. Below the header is a grid of 28 portrait photographs arranged in four rows. Each portrait includes the name and title of the individual. The first row contains: Penousal Machado (Scientific Director), João Bicker (Art Director), Filipe Astunção (PhD), Ana Boavida (PhD), João Nuno Correia (PhD), João Miguel Cunha (PhD), and António Leitão (PhD). The second row contains: Pedro Martins (PhD), Tiago Martins (PhD), Catarina Nações (PhD), Evgeni Polisciuc (PhD), Artur Rebelo (PhD), Francisco Baeta (PhD Student), and João Couceiro e Castro (PhD Student). The third row contains: António Cruz (PhD Student), Luís Gonçalo (PhD Student), Daniel Lopes (PhD Student), Solange Margarido (PhD Student), Jéssica Parente (PhD Student), Sérgio Rebelo (PhD Student), and Ana Rodrigues (PhD Student). The fourth row contains: Luís Espírito Santo (PhD Student), André C. Santos (PhD Student), Mariana Seiga (PhD Student), Pedro Silva (PhD Student), José Maria Simões (PhD Student), Bruna Sousa (PhD Student), and Adriano Vinhas (MSc).

Row	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
1	Penousal Machado Scientific Director	João Bicker Art Director	Filipe Astunção PhD	Ana Boavida PhD	João Nuno Correia PhD	João Miguel Cunha PhD	António Leitão PhD
2	Pedro Martins PhD	Tiago Martins PhD	Catarina Nações PhD	Evgeni Polisciuc PhD	Artur Rebelo PhD	Francisco Baeta PhD Student	João Couceiro e Castro PhD Student
3	António Cruz PhD Student	Luís Gonçalo PhD Student	Daniel Lopes PhD Student	Solange Margarido PhD Student	Jéssica Parente PhD Student	Sérgio Rebelo PhD Student	Ana Rodrigues PhD Student
4	Luís Espírito Santo PhD Student	André C. Santos PhD Student	Mariana Seiga PhD Student	Pedro Silva PhD Student	José Maria Simões PhD Student	Bruna Sousa PhD Student	Adriano Vinhas MSc

The screenshot shows a website for the Computational Design & Visualization Lab. At the top left is the lab's logo, a circular pattern of dots. To its right is the text "COMPUTATIONAL DESIGN & VISUALIZATION LAB.". On the right side of the header is a navigation menu with links: "About", "People", "Publications", "Projects", "News", and "Snapshots". A search bar labeled "Write Something" is positioned at the top right. Below the header is a grid of 28 member profiles, arranged in four rows of seven. Each profile consists of a small portrait photo and two lines of text: the person's name and their title/role. The profiles are:

Row	Column	Name	Title
1	1	Penousal Machado	Scientific Director
1	2	João Bicker	Art Director
1	3	Filipe Antunes	PhD
1	4	Ana Boavida	PhD
1	5	João Nuno Correia	PhD
1	6	João Miguel Cunha	PhD
1	7	António Leitão	PhD
2	1	Pedro Martins	PhD
2	2	Tiago Martins	PhD
2	3	Catarina Maçãs	PhD
2	4	Evgueni Polischuk	PhD
2	5	Artur Rebelo	PhD
2	6	Francisco Baeta	PhD Student
2	7	João Couceiro e Castro	PhD Student
3	1	António Cruz	PhD Student
3	2	Luis Gonçalo	PhD Student
3	3	Daniel Lopes	PhD Student
3	4	Selange Margarido	PhD Student
3	5	Jéssica Parente	PhD Student
3	6	Sérgio Rebelo	PhD Student
3	7	Ana Rodrigues	PhD Student
4	1	Luís Espírito Santo	PhD Student
4	2	André C. Santos	PhD Student
4	3	Mariana Seiga	PhD Student
4	4	Pedro Silva	PhD Student
4	5	José Maria Simões	PhD Student
4	6	Bruna Sousa	PhD Student
4	7	Adriano Vinhas	MSc

The screenshot shows a website for the Computational Design & Visualization Lab. At the top left is the lab's logo, a circular pattern of dots. To its right is the text "COMPUTATIONAL DESIGN & VISUALIZATION LAB.". On the far right is a search bar with the placeholder "Write Something". The main content area displays a grid of 28 profile cards, each containing a small portrait and the name of a member along with their title. The profiles are arranged in four rows: Row 1 has 7 profiles, Row 2 has 7 profiles, Row 3 has 7 profiles, and Row 4 has 7 profiles. The profiles are: 1. Penousal Machado (Scientific Director), 2. João Bicker (Art Director), 3. Filipe Antunes (PhD), 4. Ana Boavida (PhD), 5. João Nuno Correia (PhD), 6. João Miguel Cunha (PhD), 7. António Leitão (PhD); 8. Pedro Martins (PhD), 9. Tiago Martins (PhD), 10. Catarina Maçãs (PhD), 11. Evgeni Polischuk (PhD), 12. Artur Rebelo (PhD), 13. Francisco Baeta (PhD Student), 14. João Couceiro e Castro (PhD Student); 15. António Cruz (PhD Student), 16. Luís Gonçalo (PhD Student), 17. Daniel Lopes (PhD Student), 18. Solange Margarido (PhD Student), 19. Jéssica Parente (PhD Student), 20. Sérgio Rebelo (PhD Student), 21. Ana Rodrigues (PhD Student); 22. Luís Espírito Santo (PhD Student), 23. André C. Santos (PhD Student), 24. Mariana Seiga (PhD Student), 25. Pedro Silva (PhD Student), 26. José Maria Simões (PhD Student), 27. Bruna Sousa (PhD Student), 28. Adriano Vinhas (MSc).

The screenshot shows the homepage of the CDV LAB website. At the top left is the lab's logo, a circular pattern of black dots. To its right is the text "COMPUTATIONAL DESIGN & VISUALIZATION LAB.". On the right side of the header is a navigation menu with links: "About", "People", "Publications", "Projects", "News", and "Snapshots". A search bar with the placeholder "Write Something" is positioned at the top right. Below the header is a grid of 28 portrait photographs of individuals, arranged in four rows of seven. Each portrait includes the name and title of the person. The first row contains: Penousal Machado (Scientific Director), João Bicker (Art Director), Filipe Astunção (PhD), Ana Boavida (PhD), João Nuno Correia (PhD), João Miguel Cunha (PhD), and António Leitão (PhD). The second row contains: Pedro Martins (PhD), Tiago Martins (PhD), Catarina Nações (PhD), Evgeni Polisciuc (PhD), Artur Rebelo (PhD), Francisco Baeta (PhD Student), and João Couceiro e Castro (PhD Student). The third row contains: António Cruz (PhD Student), Luís Gonçalo (PhD Student), Daniel Lopes (PhD Student), Solange Margarido (PhD Student), Jéssica Parente (PhD Student), Sérgio Rebelo (PhD Student), and Ana Rodrigues (PhD Student). The fourth row contains: Luís Espírito Santo (PhD Student), André C. Santos (PhD Student), Mariana Seiga (PhD Student), Pedro Silva (PhD Student), José Maria Simões (PhD Student), Bruna Sousa (PhD Student), and Adriano Vinhas (MSc).

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The screenshot shows the homepage of the Computational Design & Visualization Lab (CDV LAB) at the University of Coimbra. The page features a navigation bar with links to About, People, Publications, Projects, News, and Snapshots. A search bar is located in the top right corner. The main content area displays six project cards:

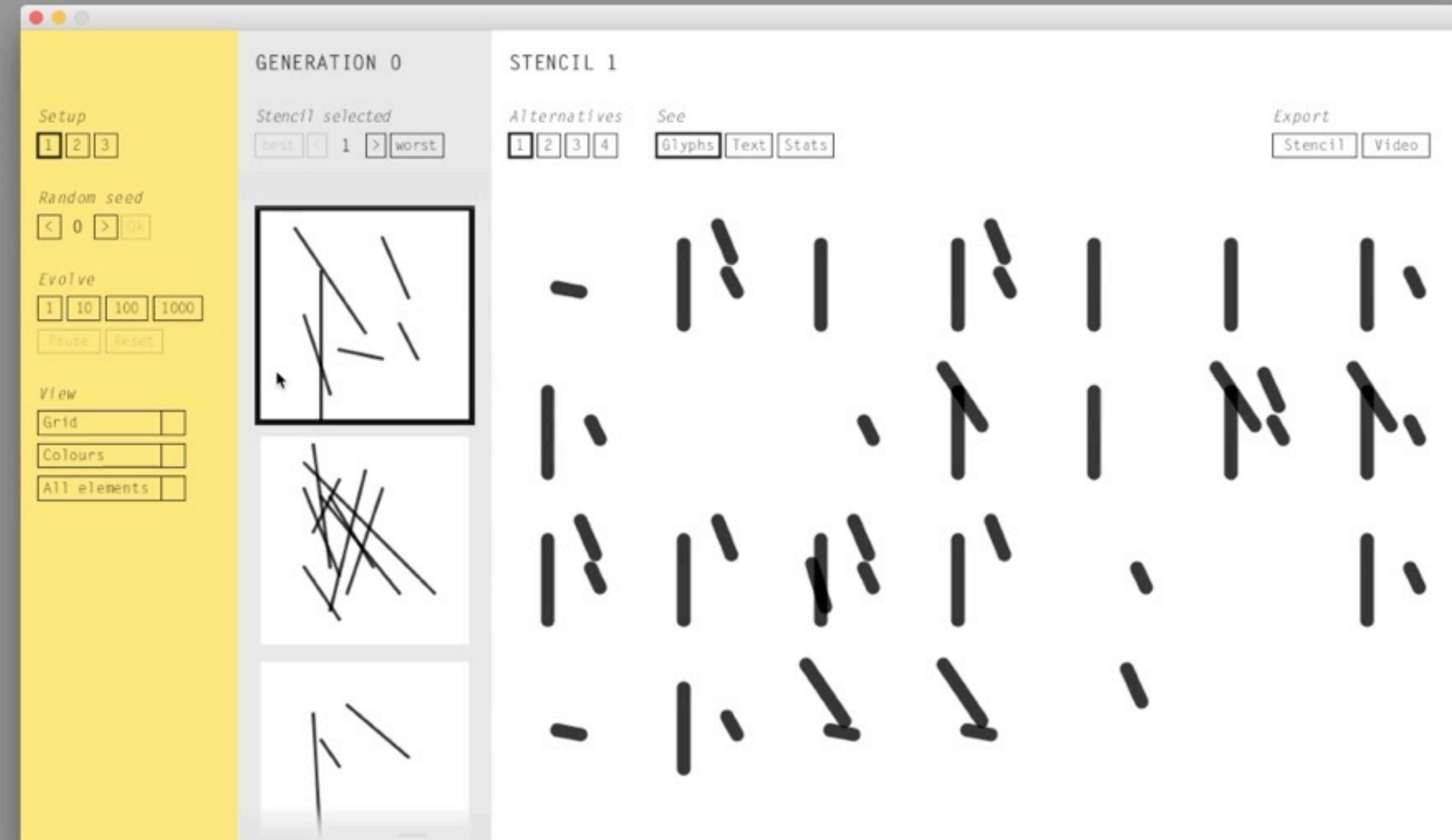
- Using Autoencoders to Generate Skeleton-based Typography** (23/01/2023): An image of a large letter 'A' composed of multiple colored skeletons (red, blue, black).
- CroP – Coordinated Panels Visualization** (12/01/2023): An image showing several circular panels with internal dot patterns in yellow, red, and orange.
- Digitally Analog Typography: hybrid systems in typographic production** (22/11/2022): An image of a stylized letter 'T' with complex geometric and organic shapes integrated into its structure.
- PhDs – Portugal has Doctors: A Visualization of Academia Achievements in Portugal from 1970 to 2022** (19/07/2022): An image of a scatter plot showing academic achievements in Portugal from 1970 to 2022, with data points in purple, blue, and white.
- ATOVis—a Visualization Tool for the Detection of Financial Fraud** (27/04/2022): An image of a circular visualization with concentric rings and red highlights.
- EvoDesigner: Towards aiding creativity in graphic design** (26/04/2022): An image showing a grid of various graphic design compositions.

On the left side of the page, there is a sidebar with a circular logo and a list of research topics and publications, such as Evolutionary Computation, GECCO, Genetic Programming, Generative Adversarial Networks, Generative Art, Generative Design, Genetic Algorithms, Genetic Programming, Geovisualization, Graph Visualization, Graphic Design, Information Aesthetics, Information Visualization, Installation, Interaction, Interactive Evolutionary Computation, Interactive Installation, Machine Learning, Moving Poster, Nature Inspired, NeuroEvolution, New Media Design, Object Detection, Physics Engine, Poster, Processing, SIGGRAPH, Sound, Swarm Intelligence, Time-series Visualization, Typography, Web Design, Web Development, exhibition, performance, and sonification.



POSTER FACTORY, Sérgio Rebelo, João Bicker and Penousal Machado, 2017 - 2020

[HTTPS://CDV.DEI.UC.PT/POSTERS-FACTORY/](https://cdv.dei.uc.pt/posters-factory/)





ADEA, Daniel Lopes, João Nuno Correia and Penousal Machado, 2020  
[HTTPS://CDV.DEI.UC.PT/ADEA/](https://cdv.dei.uc.pt/ADEA/)   [HTTPS://ADEA.DEI.UC.PT/](https://ADEA.DEI.UC.PT/)



GENERATIVE TYPE DESIGN, Jéssica Parente, Tiago Martins, João Bicker and Penousal Machado, 2020

[HTTPS://CDV.DEI.UC.PT/GENERATIVE-TYPE-DESIGN/](https://cdv.dei.uc.pt/generative-type-design/)

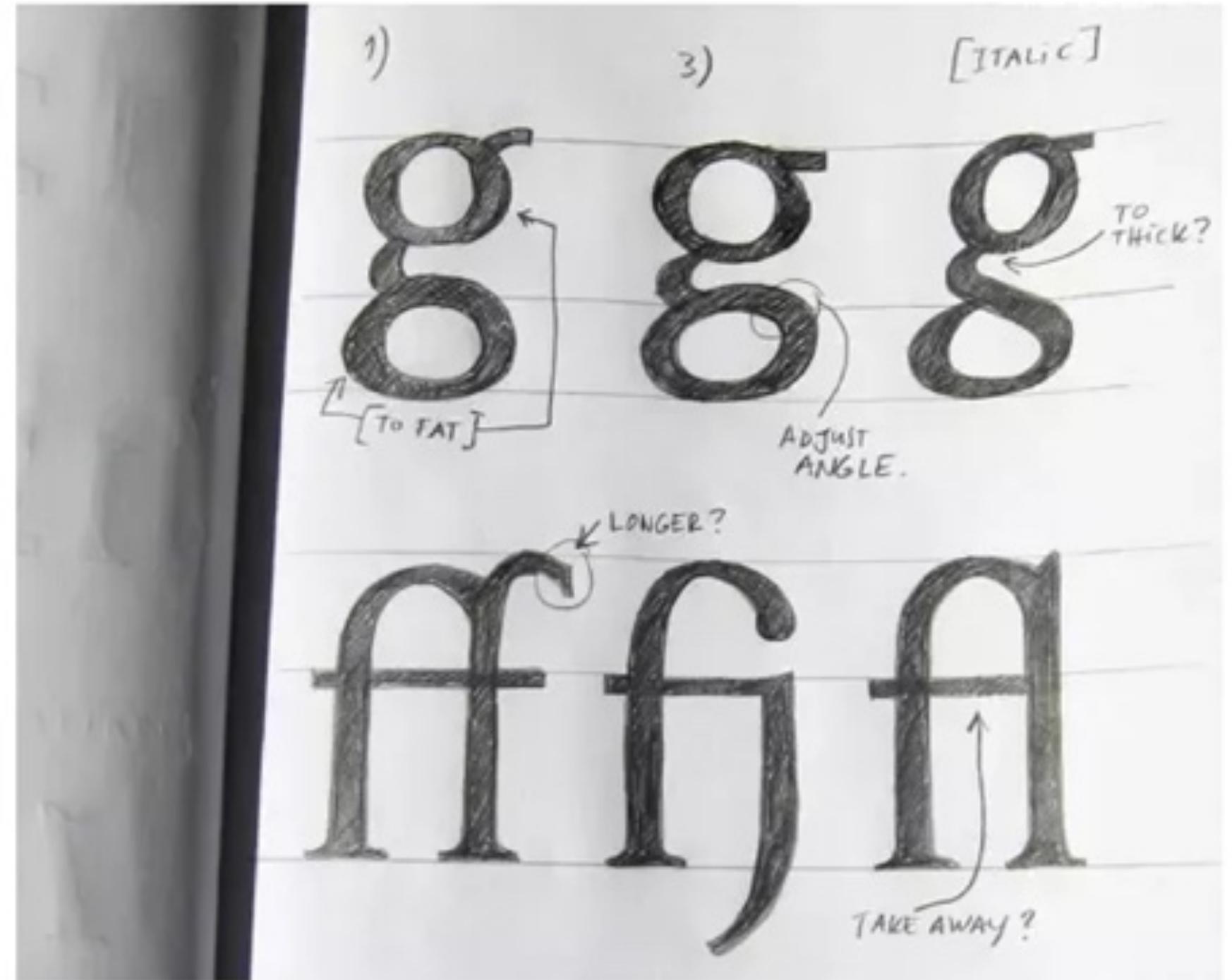
# Motivation

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# Laborous work

## Laborious work

Type Design is a time-consuming  
and complex discipline









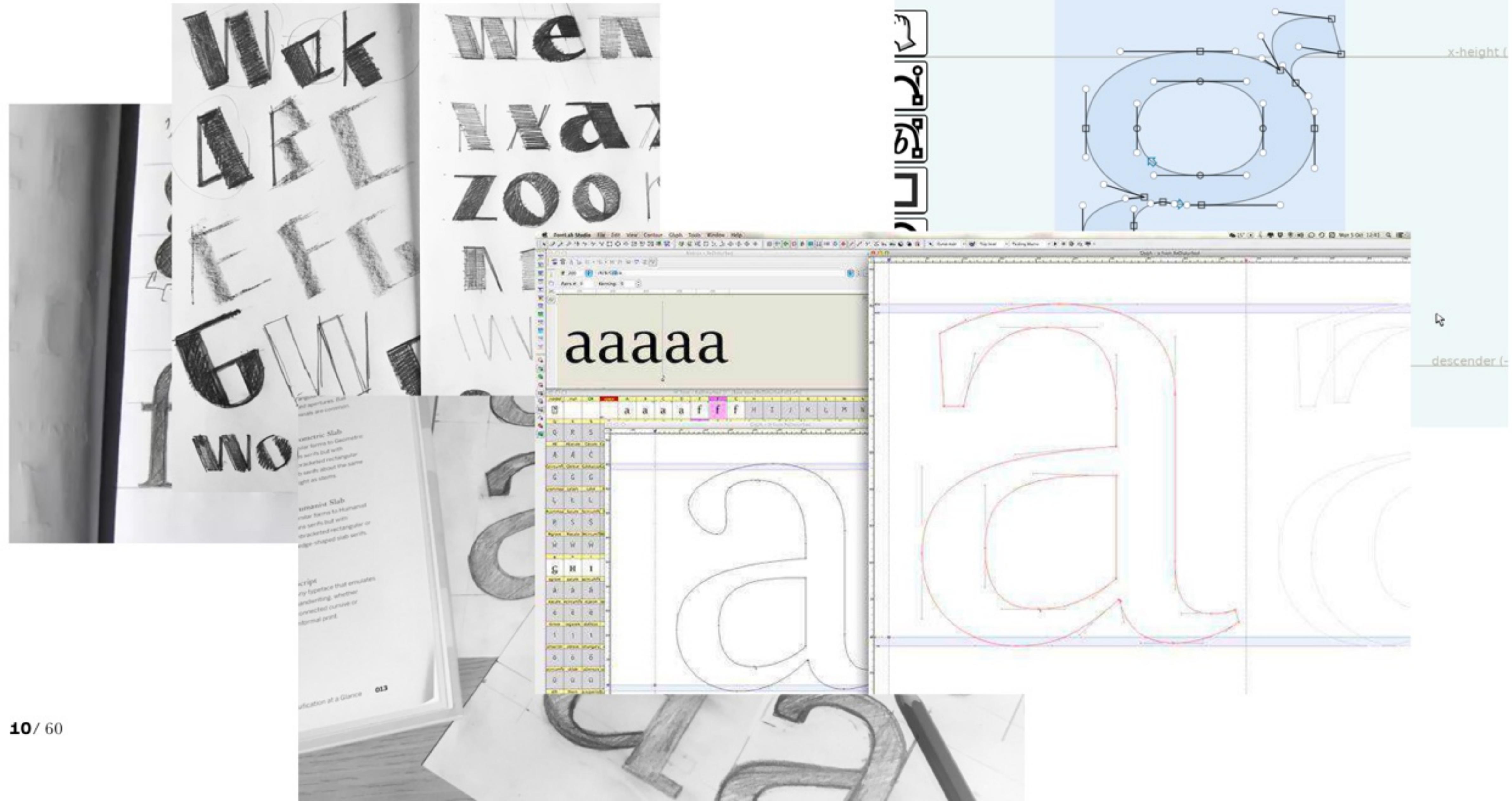
gular edit g X

ph Curve Contour Guidelines Layers

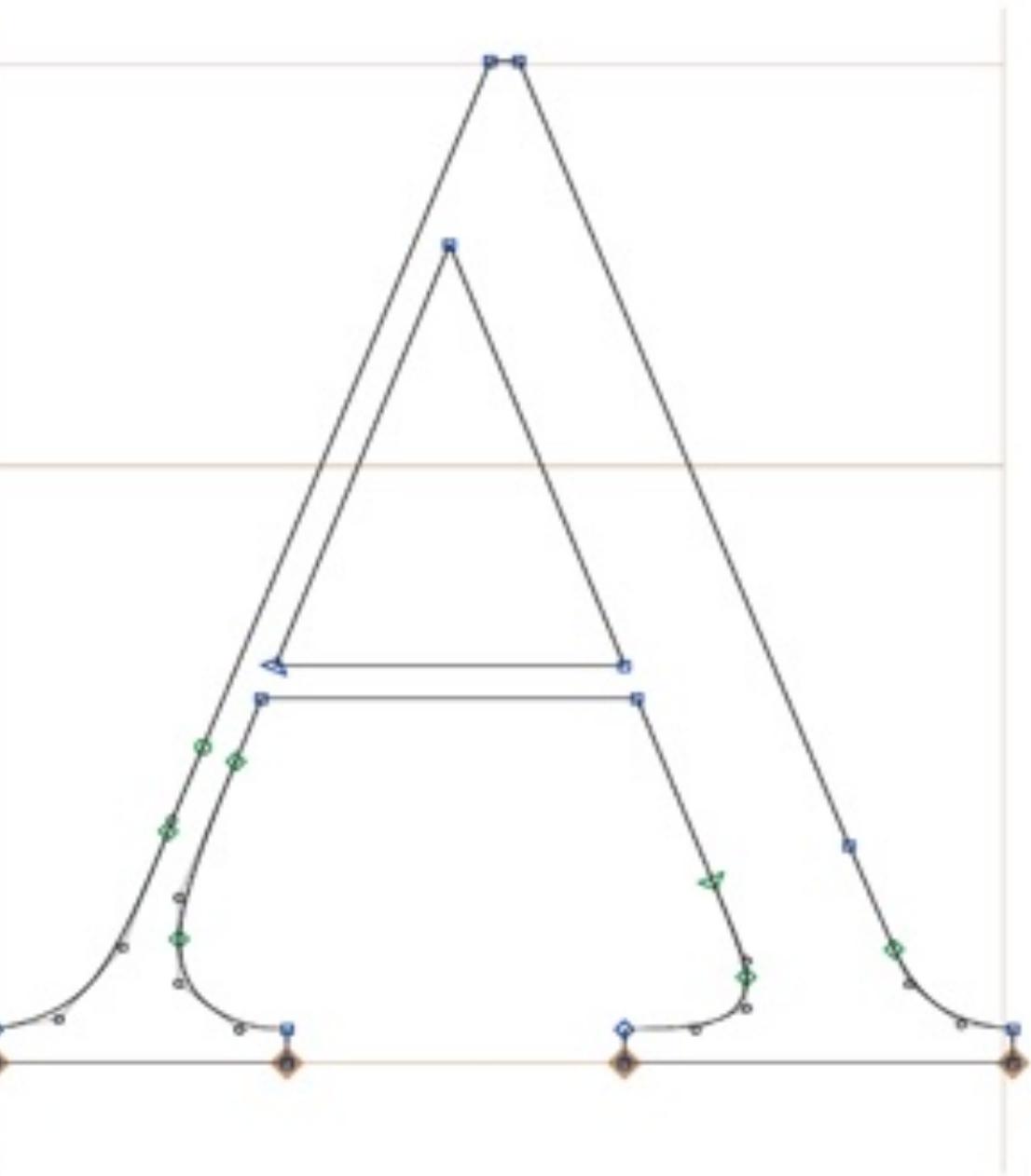
x-height (-)

descender (-)

63%



A



A

# MAPS

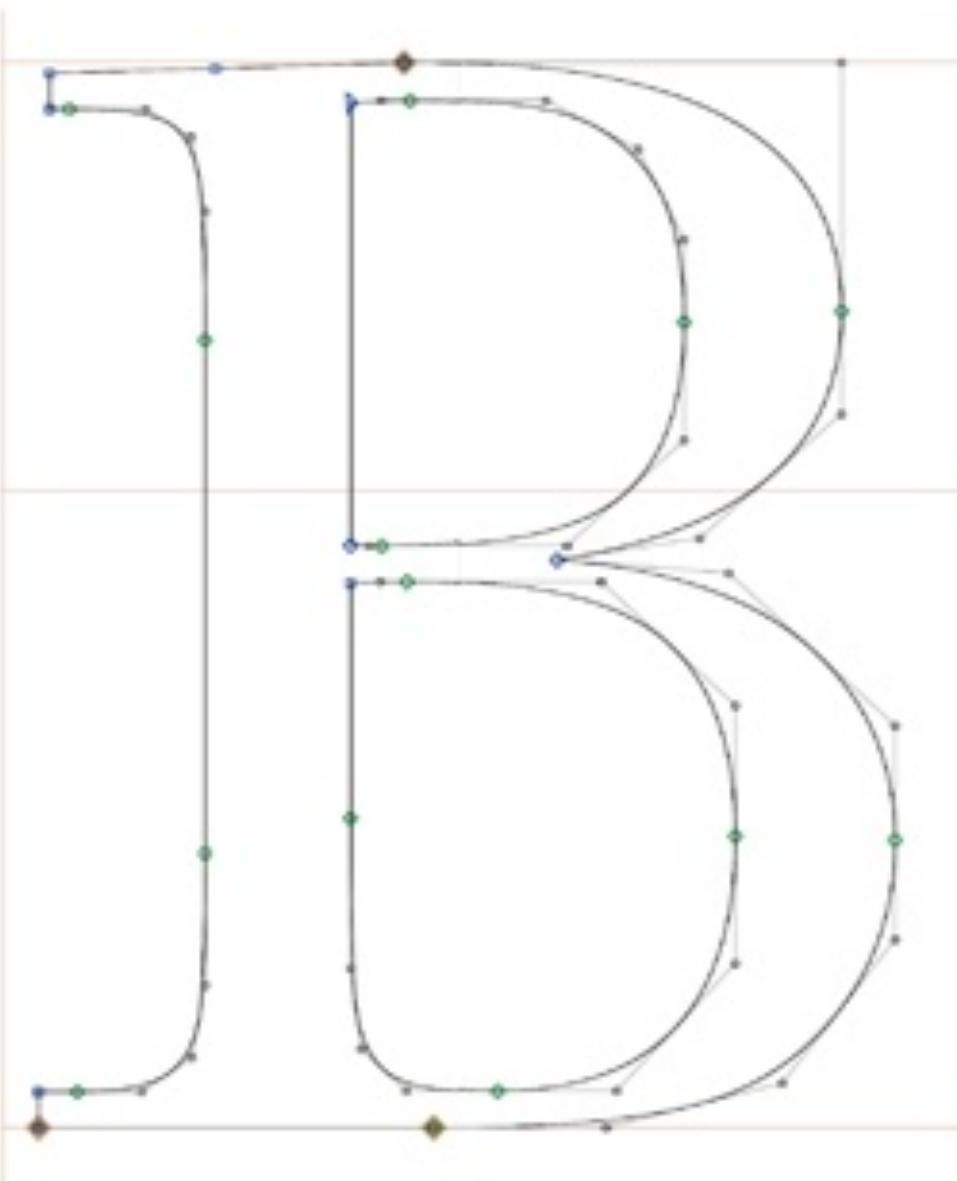
MAPS

INNOVATION  
IN DESIGN

MOTIVATION

A

# B



A B C D E F G H I

K L M N O P Q R

S T U V W X Y Z

A R C H I T E C T U R

K

S

a b c d e f g h i j k l

m n o p q r s t u v

w x y z

A D

K

S

0123456789

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i @ # € \$ % & /

w ð y z



## Laborious work

Type Design is a time-consuming  
and complex discipline

## Take advantage of Machine Learning

A B C D E F G H  
I J K L M N O P  
Q R S T U V W X  
Y Z a b c d e f  
g h i j k l m n  
o p q r s t u v  
w x y z 0 1 2 3  
4 5 6 7 8 9

DEEP-FONTS, Erik Bernhardsson, 2016

A B C D E F G H  
I J K L M N O P  
Q R S T U V W X  
Y Z a b c d e f  
g h i j k l m n  
o p q r s t u v  
w x y z 0 1 2 3  
4 5 6 7 8 9

DEEP-FONTS, Erik Bernhardsson, 2016

The image displays a grid of 10 rows, each containing all the letters of the English alphabet (A through Z) in a single, continuous horizontal line. The letters are rendered in various distinct font styles, including serif, sans-serif, monospace, and decorative fonts.

GLYPHGAN, Hideaki Hayashi, Kohtaro Abe, Seiichi Uchida, 2019

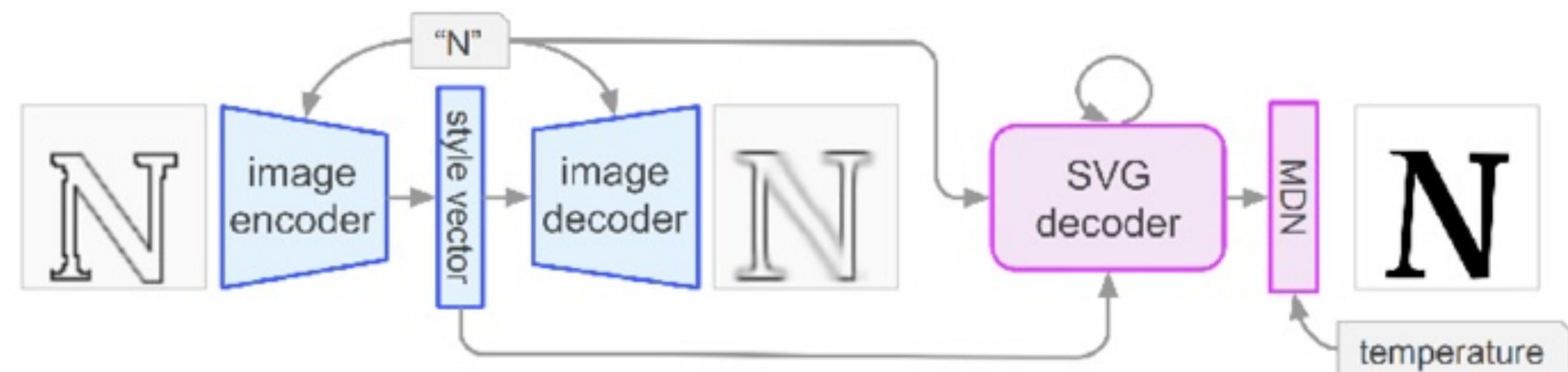
A B C D E F G H  
I J K L M N O P  
Q R S T U V W X  
Y Z A D C E G R  
G H I J K L M H  
O N C F S T W V  
W X Y Z

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed molestie, ligula et cursus pulvinar, felis tortor lobortis nunc, ut posuere leo arcu vel est. Sed urna augue, vulputate id arcu sit amet, interdum imperdiet mauris. Nam vel odio tristique, interdum quam ac, porttitor massa. Duis imperdiet ac sem eget facilisis. Aliquam fringilla nulla vel magna eleifend, a egestas justo scelerisque. Vestibulum eget varius lectus. Nam elementum volutpat cursus. Integer nec mauris et dui gravida varius. Nunc fringilla malesuada diam ut ornare. Cras et porttitor purus. Curabitur pretium fermentum egestas. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Curabitur lobortis, sem in sodales rutrum, lacus est pellentesque diam, elementum tincidunt augue magna id lorem. Mauris a tristique dolor. Pellentesque accumsan convallis velit eu facilisis. Donec venenatis mattis ligula. Proin lacus orci, lobortis eget facilisis et, sollicitudin eget nunc. Sed interdum consequat tempus. In hac habitasse platea dictumst. Donec

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adie tristisque, interdum quam et, portitor massa. Duis imperdiet et sem  
egri Gorilla. Aliquam fringilla nulla vel magna eleifend, a egretas justus non  
hesque. Vestibulum egri varius lectus. Nam elementum volupat euras. In  
teger nec mauris et adi gracida varius. Nunc fringilla malesuada diam et  
ornata. Cras et portitor puma. Curabitur pretium formatum egretas. Per  
letrisque habitant morbi tristique metus et lectus et malesuada fames ac  
turpis egretas. Curabitur loborum, non in malesuada, latus et pelle-  
mper diam, elementum blandit augue magna loborum. Maiores a trist-  
isque dolor. Primumque accumsan conallis velit ex facilis. Donec vena  
mattis ligula. Proin latus arcu, loboris egri Gorilla et, nullibus egri non.  
Sed interdum conquisit tempus. In hac habitasse platea dictumst. Donec

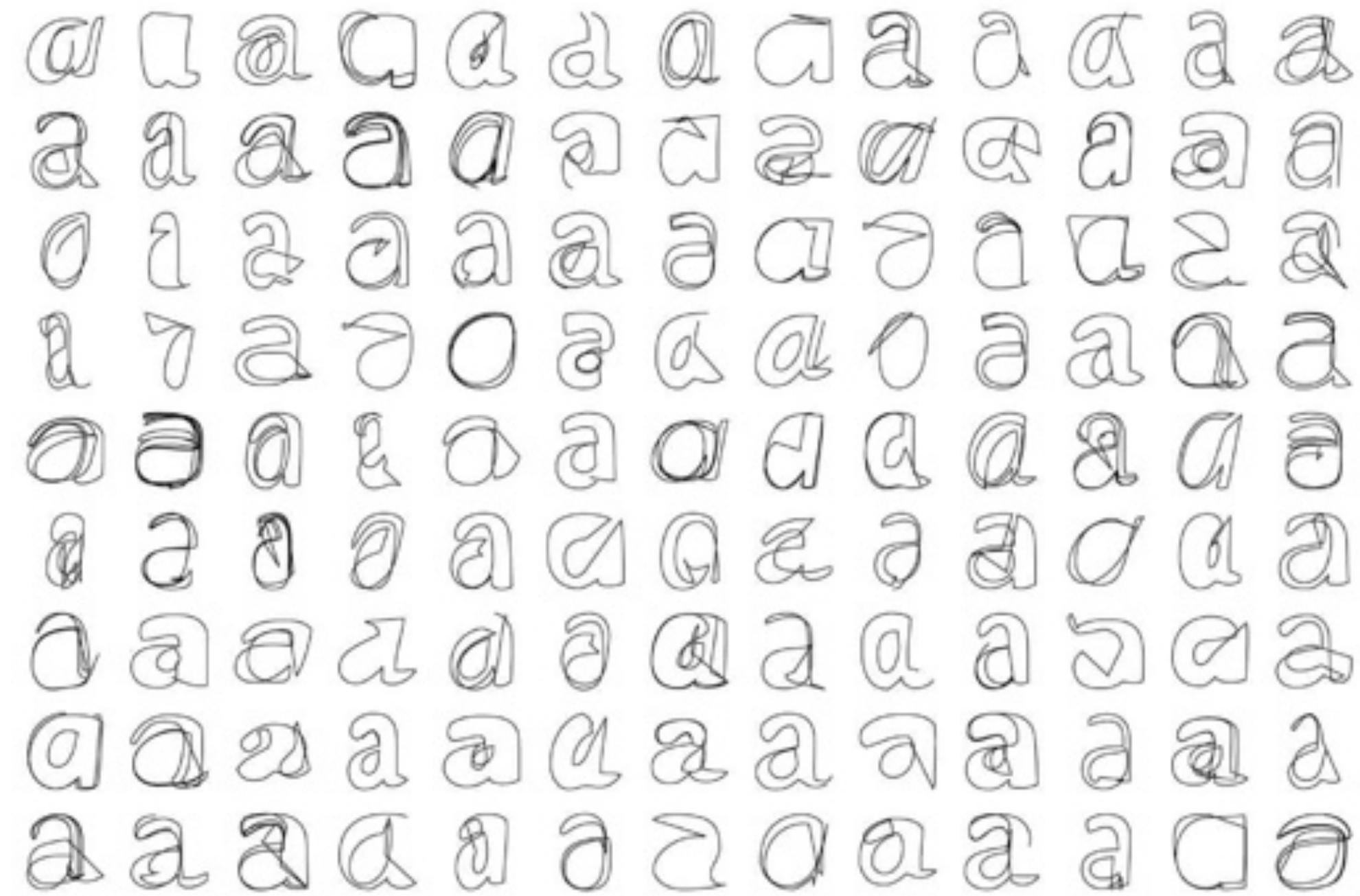


# Image Autoencoder

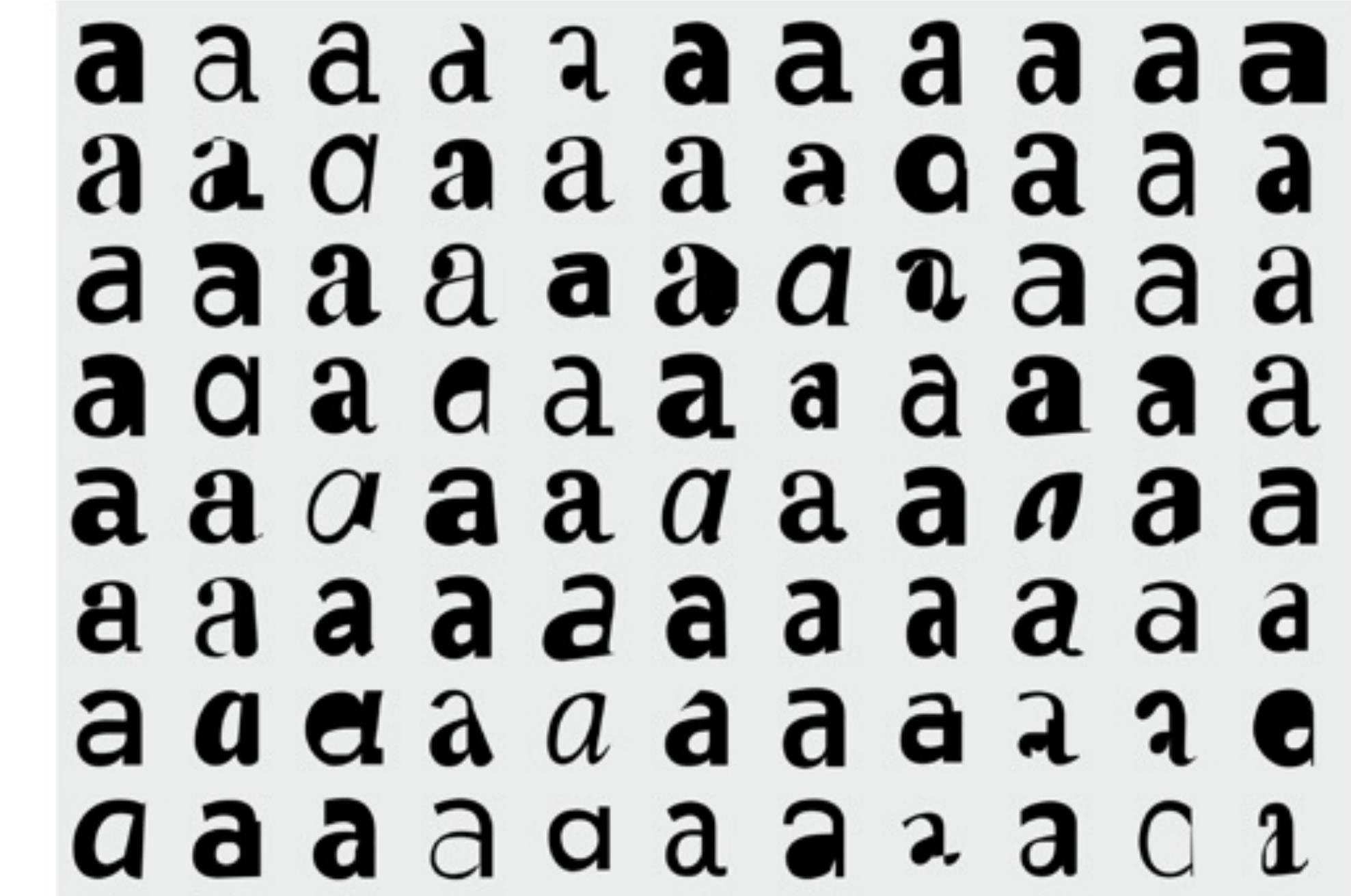


A B C D E F G H I J K L M N O P Q R S T U V W X Y **L**  
a b c d e f g h i j k l m n o p q r s t u v w x y z  
  
**O 1 2 3 4 5 6 7 8 9**  
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z  
a b c d e f g h i j k l m n o p q r s t u v w x y z

A LEARNED REPRESENTATION FOR SCALABLE VECTOR GRAPHICS,  
Raphael Gontijo Lopes, David Ha, Douglas Eck, Jonathon Shlens



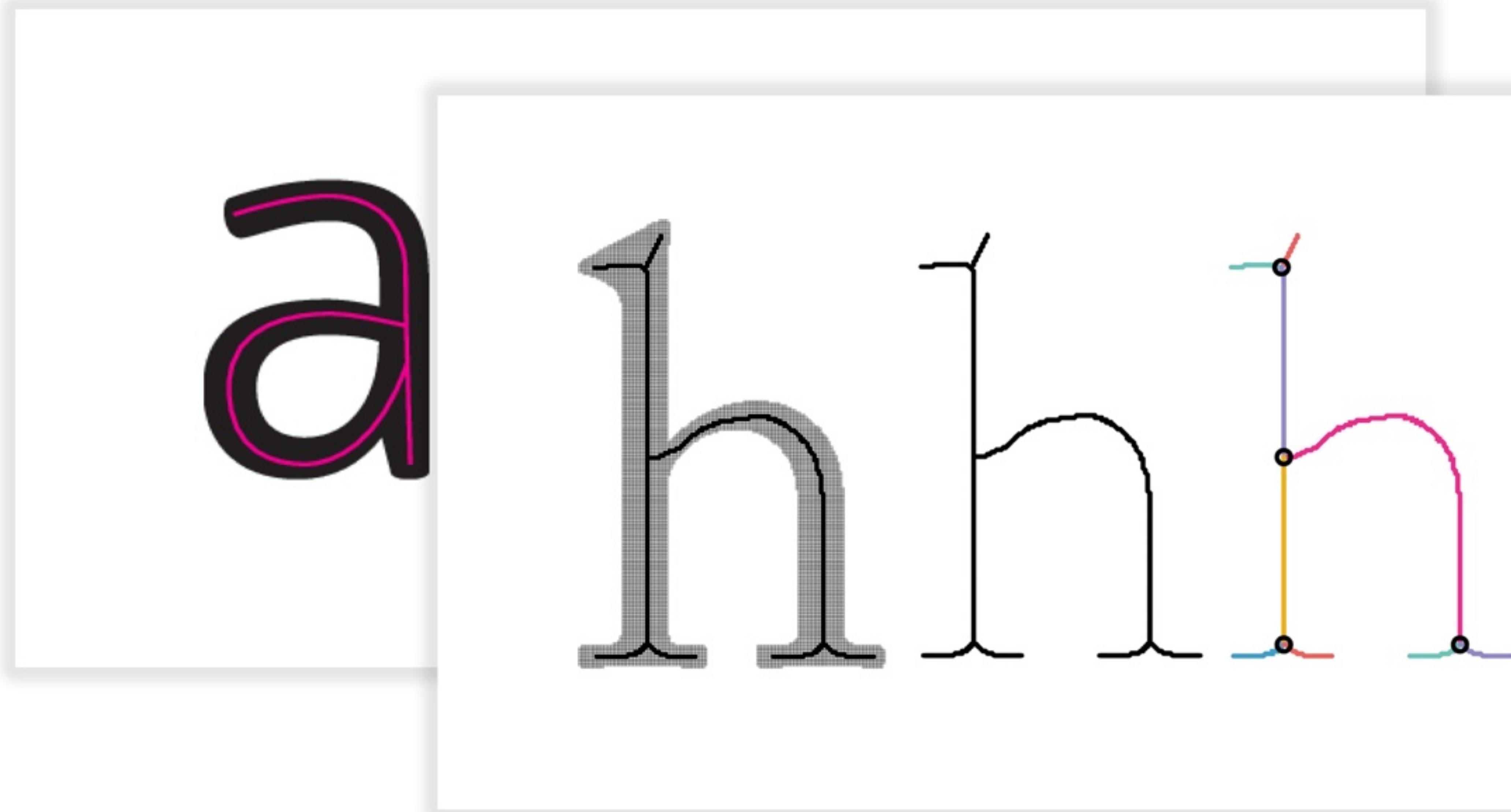
PATHFINDER, Jean Böhm,  
[SketchRNN]



PATHFINDER, Jean Böhm,  
[GPT2]







## Laborious work

Type Design is a time-consuming  
and complex discipline

## Take advantage of Machine Learning

– Vector-based approach

## Laborious work

Type Design is a time-consuming  
and complex discipline

## Take advantage of Machine Learning

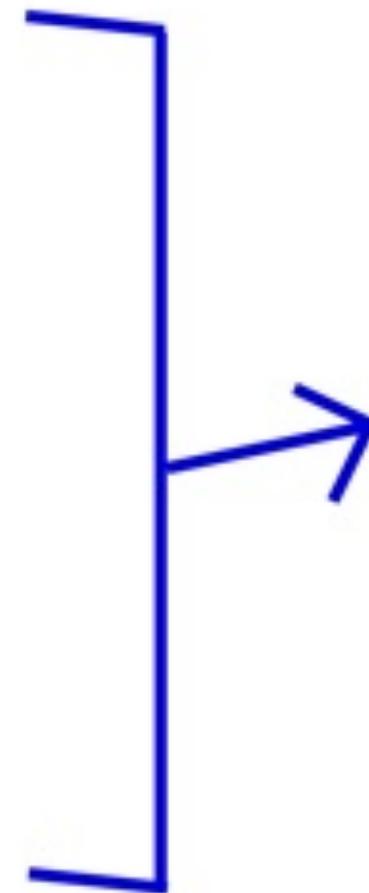
- Vector-based approach
- Skeleton-based approach

## Laborious work

Type Design is a time-consuming and complex discipline

## Take advantage of Machine Learning

- Vector-based approach
- Skeleton-based approach



**Take advantage  
of these to create  
design artifacts**

**Goal**

We propose an **Autoregressive model** that creates  
**new glyph skeletons** by **interpolating between existing ones**.

# Data

---

# Google Fonts

Serif,  
Sans Serif,  
Monospace,  
Display,  
Handwriting

# Google Fonts

Serif,  
Sans Serif,  
**Monospace,**  
Display,  
Handwriting

# Google Fonts

Serif,  
Sans Serif,  
Monospace,



Collection  
of **2623 fonts**  
in TTF format

# Google Fonts

Serif,  
Sans Serif,  
Monospace,



Collection  
of **2623 fonts**  
in TTF format



**26 characters**  
of the Latin alphabet  
in their capital format

# Google Fonts

Serif,  
Sans Serif,  
Monospace,



Collection  
of **2623 fonts**  
in TTF format



Collection  
of **68 198 glyphs**



**26 characters**  
of the Latin alphabet  
in their capital format



**Input  
Glyph**

Each glyph of  
the collected data  
(68 198 glyphs)

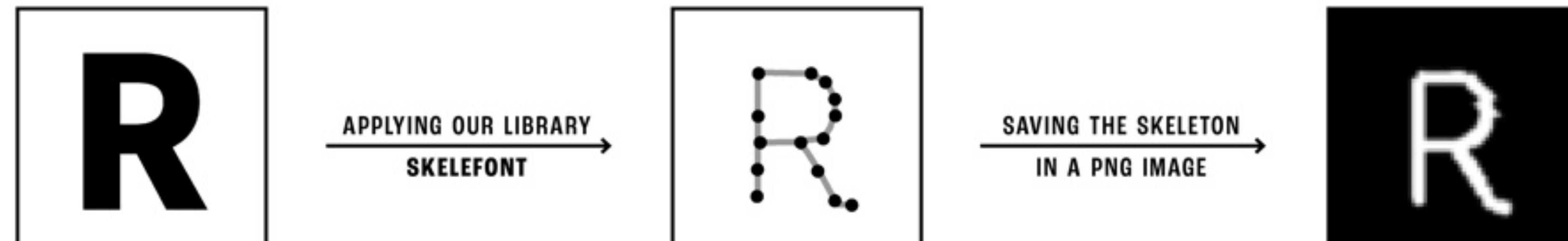


**Input  
Glyph**

Each glyph of  
the collected data  
(68 198 glyphs)

**Extracted  
Skeleton**

A list of ordered:  
**point coordinates**  
and **stroke width**



**Input  
Glyph**

Each glyph of  
the collected data  
(68 198 glyphs)

**Extracted  
Skeleton**

A list of ordered:  
**point coordinates**  
and **stroke width**

**Model's  
Input**

64 x 64px  
b&w image

# **Network Architecture of the Conditional Variational Auto Encoder\***

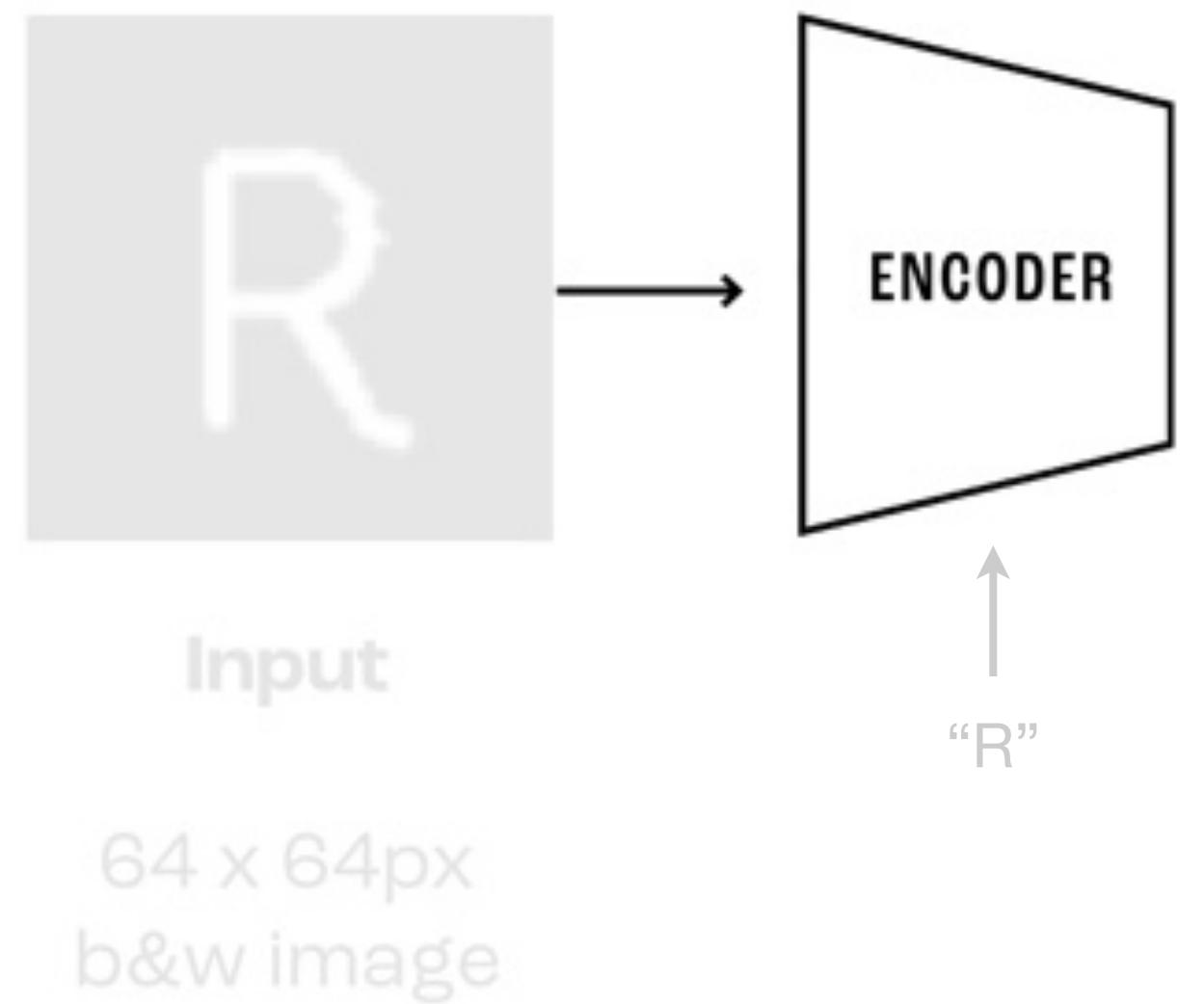


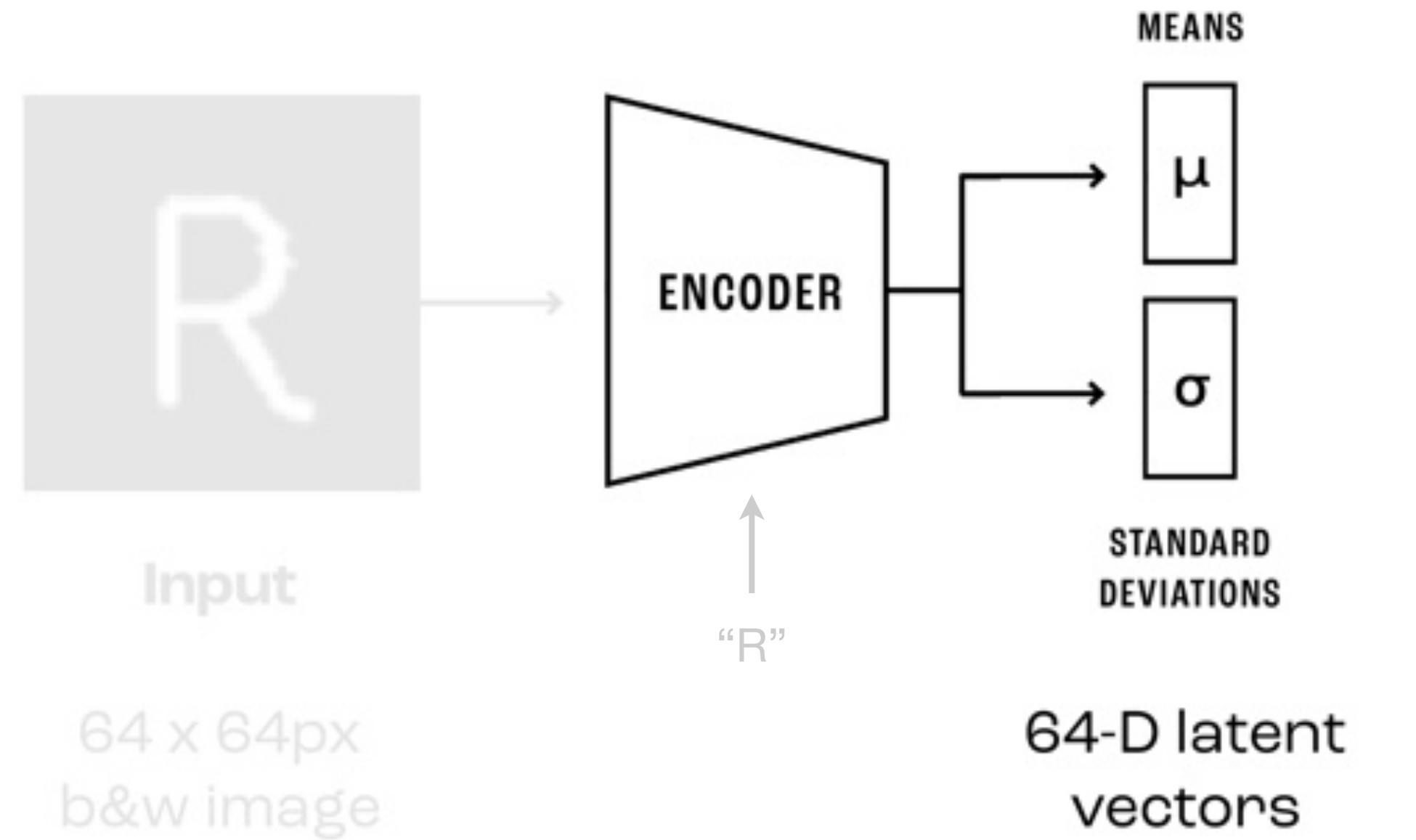
**Input**

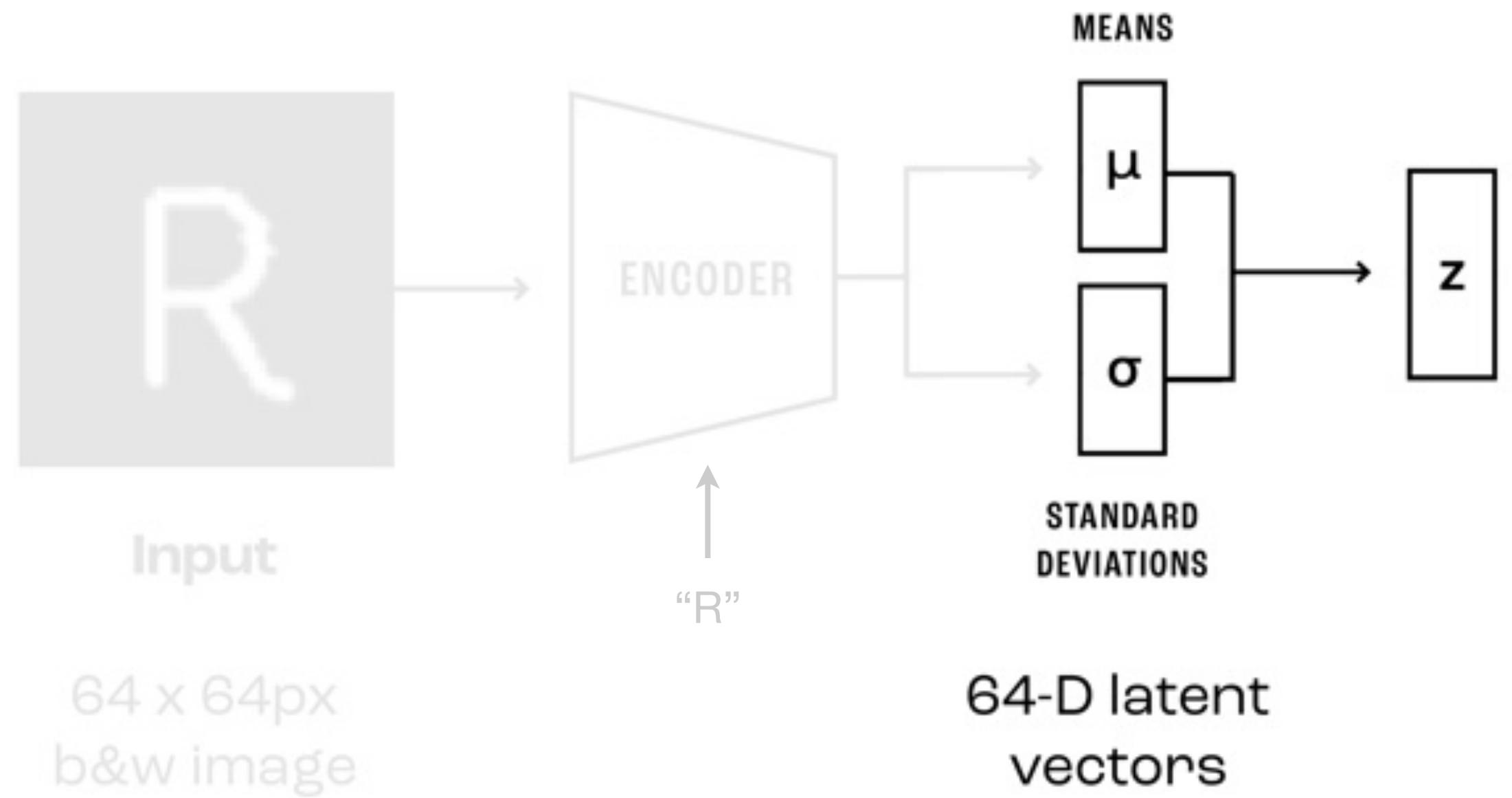
64 x 64px  
b&w image

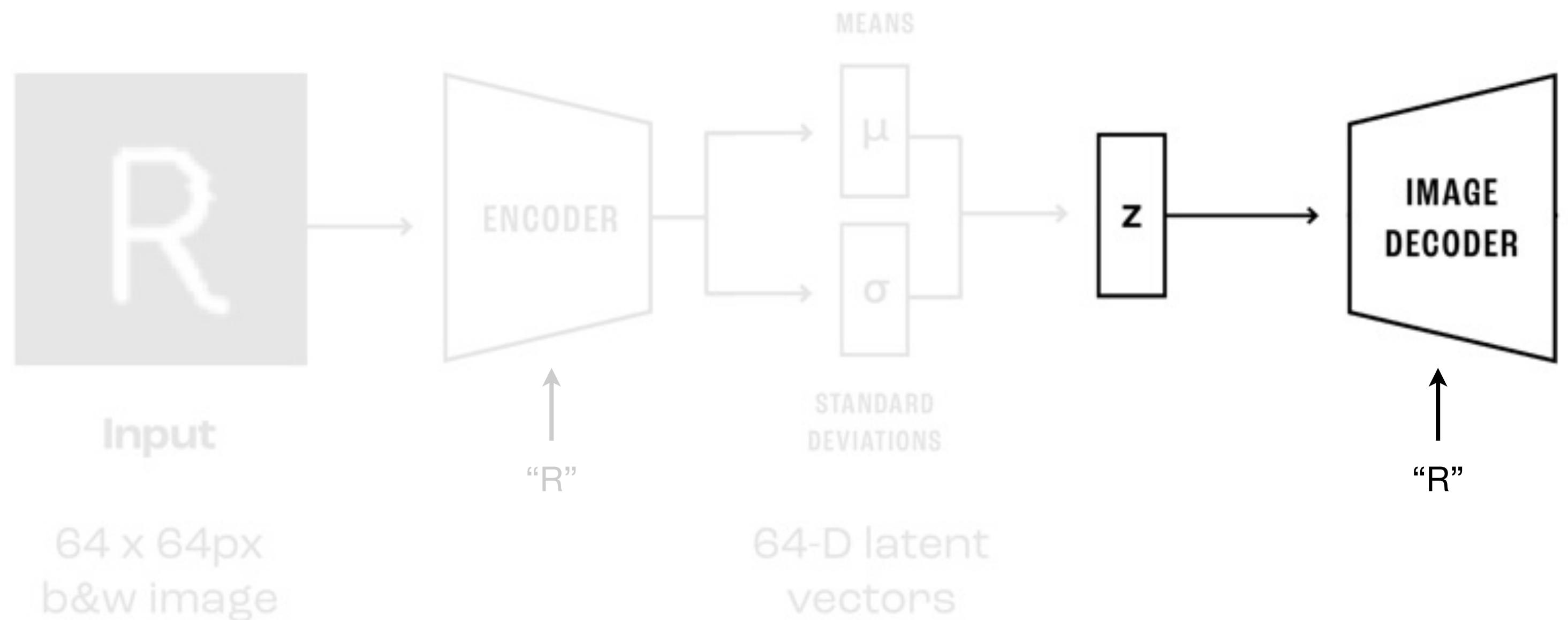


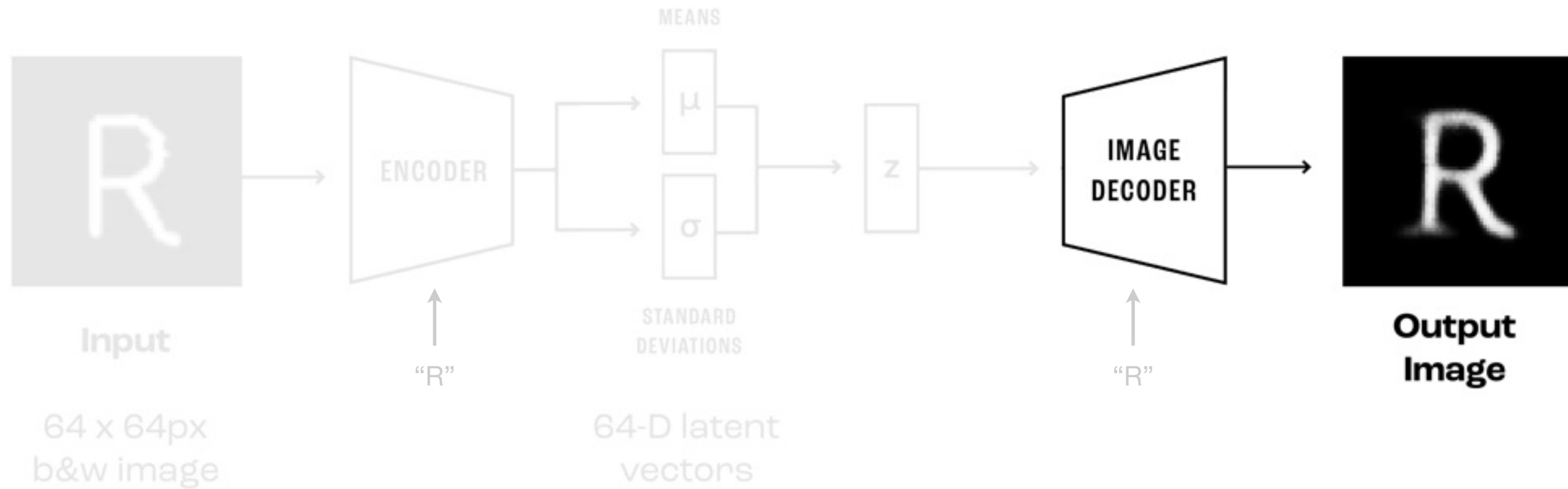
“R”

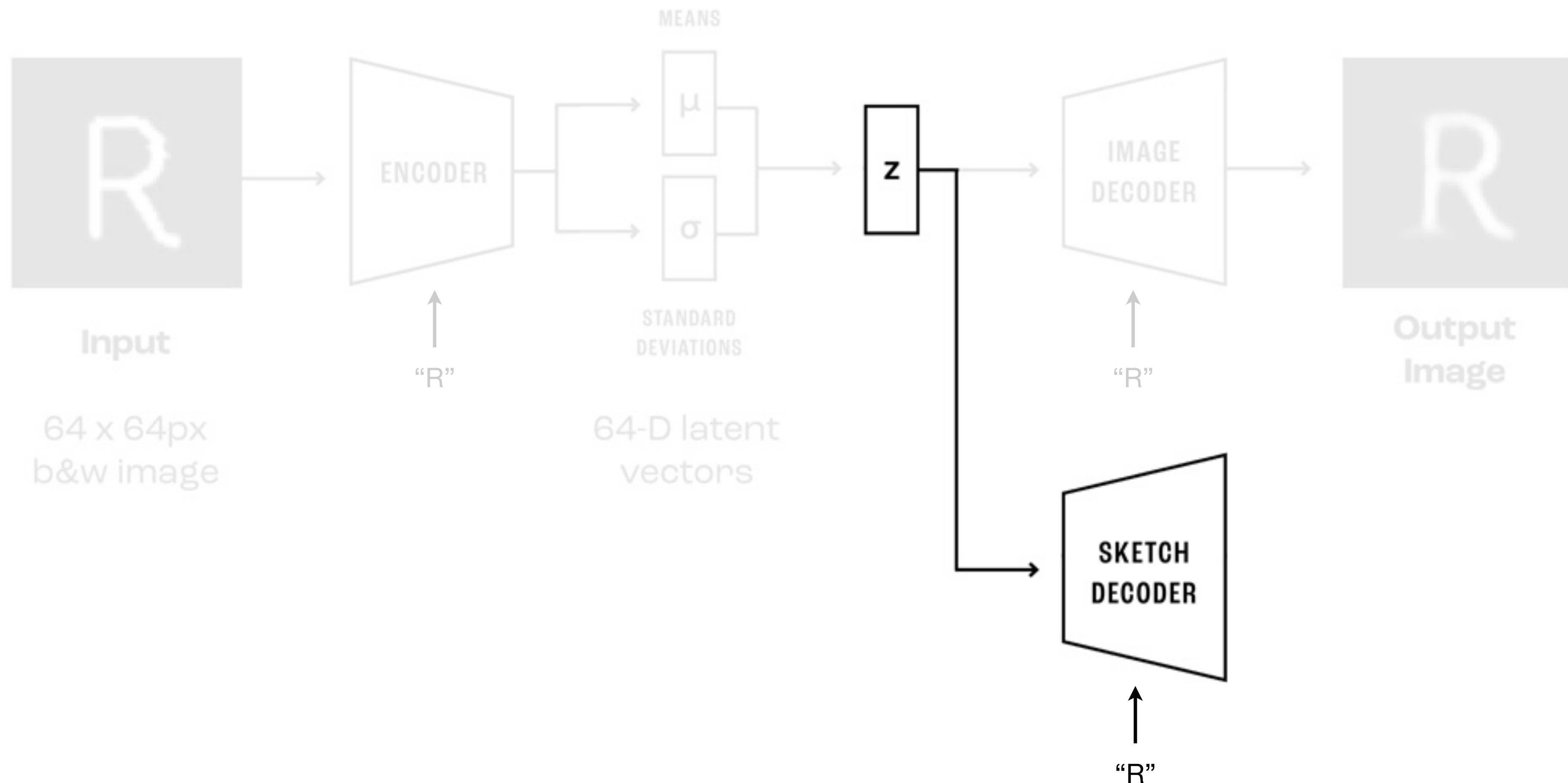


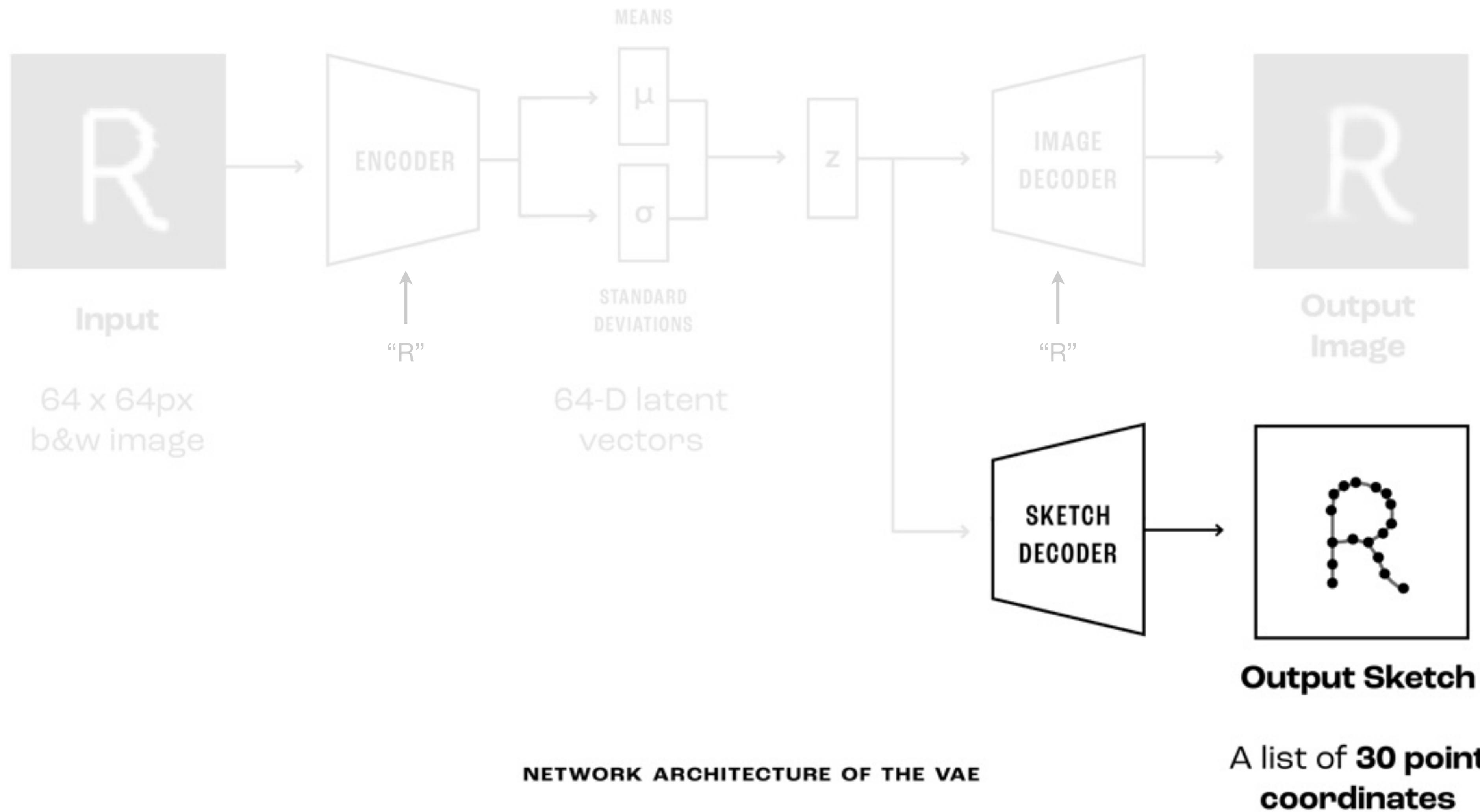






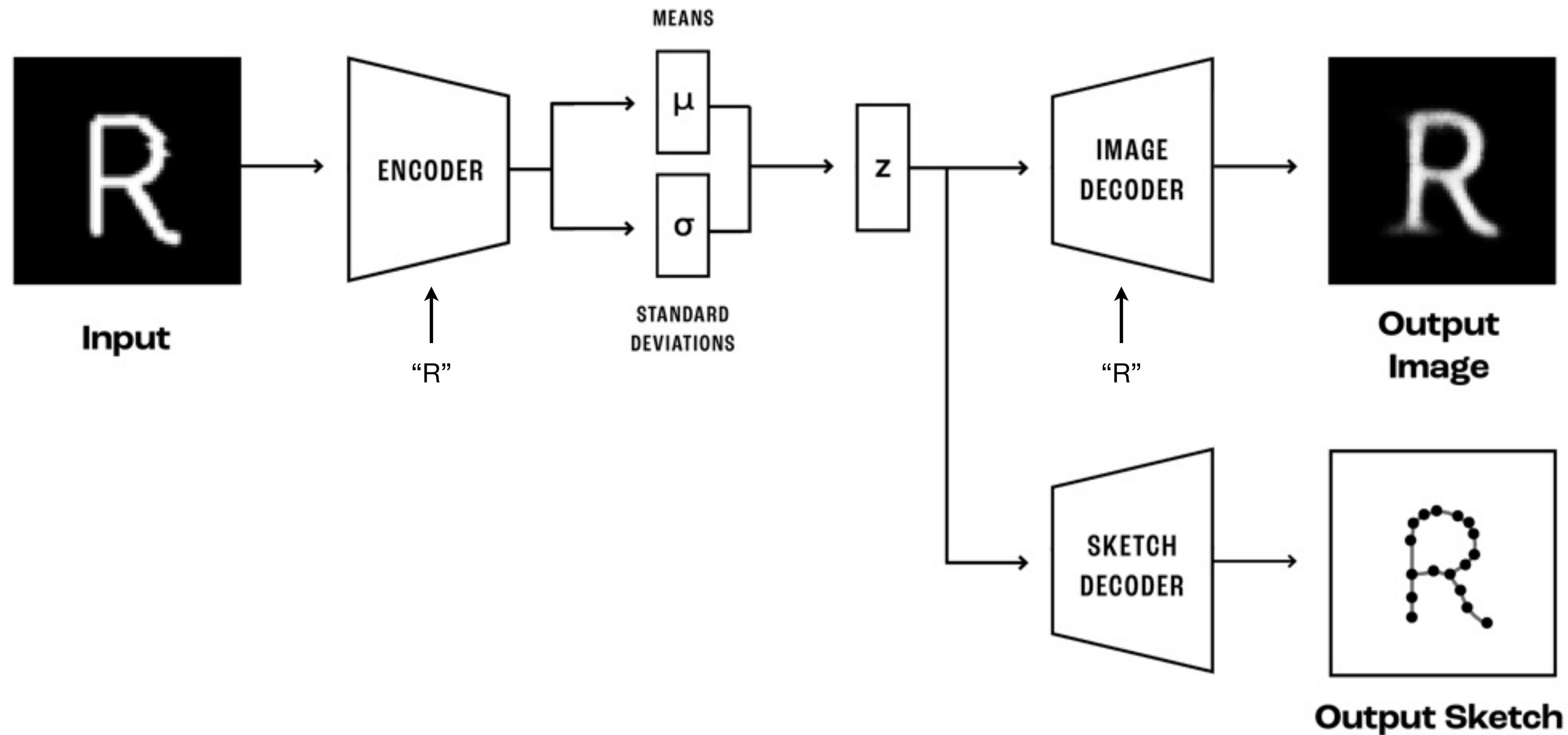


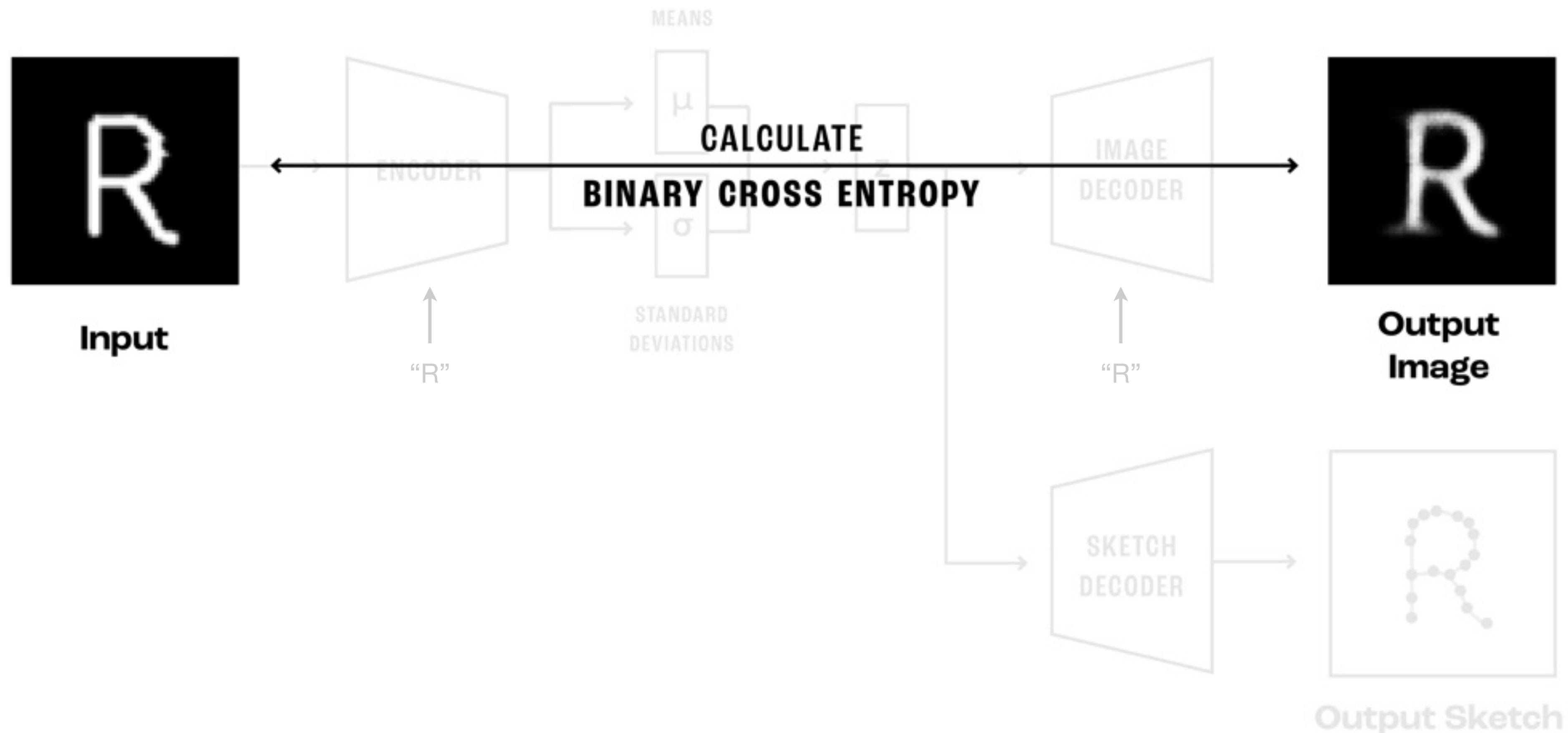


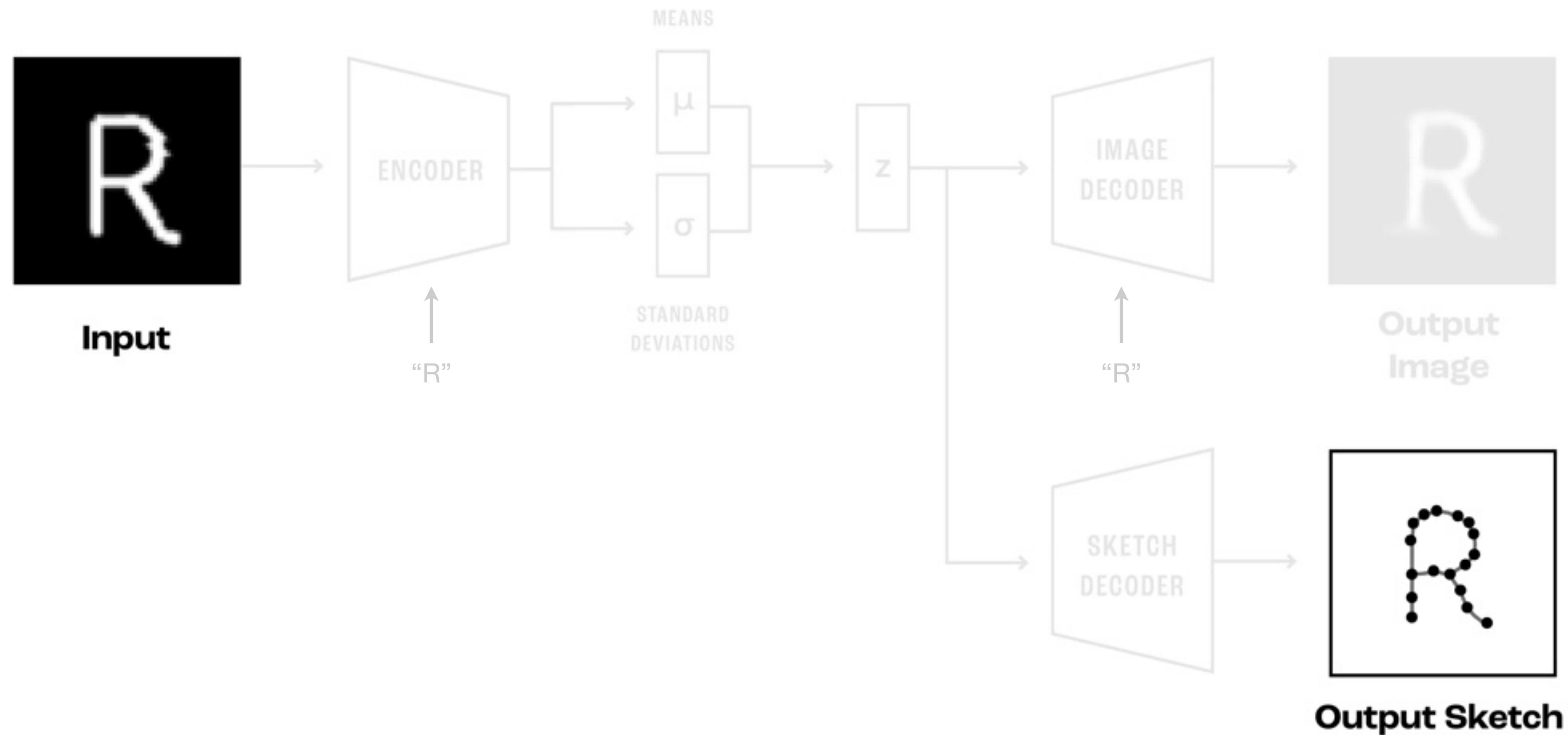


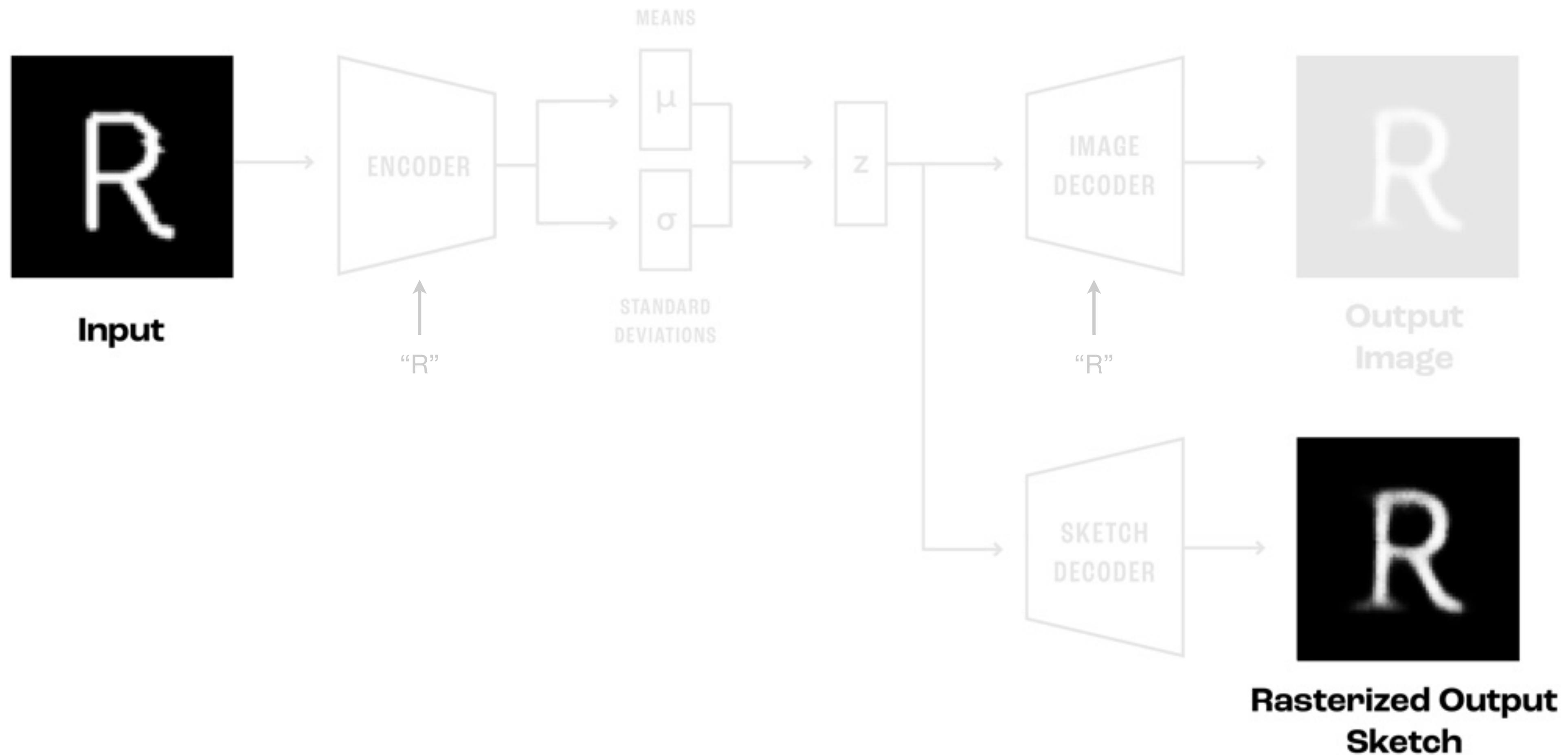
# **Network Architecture of the VAE**

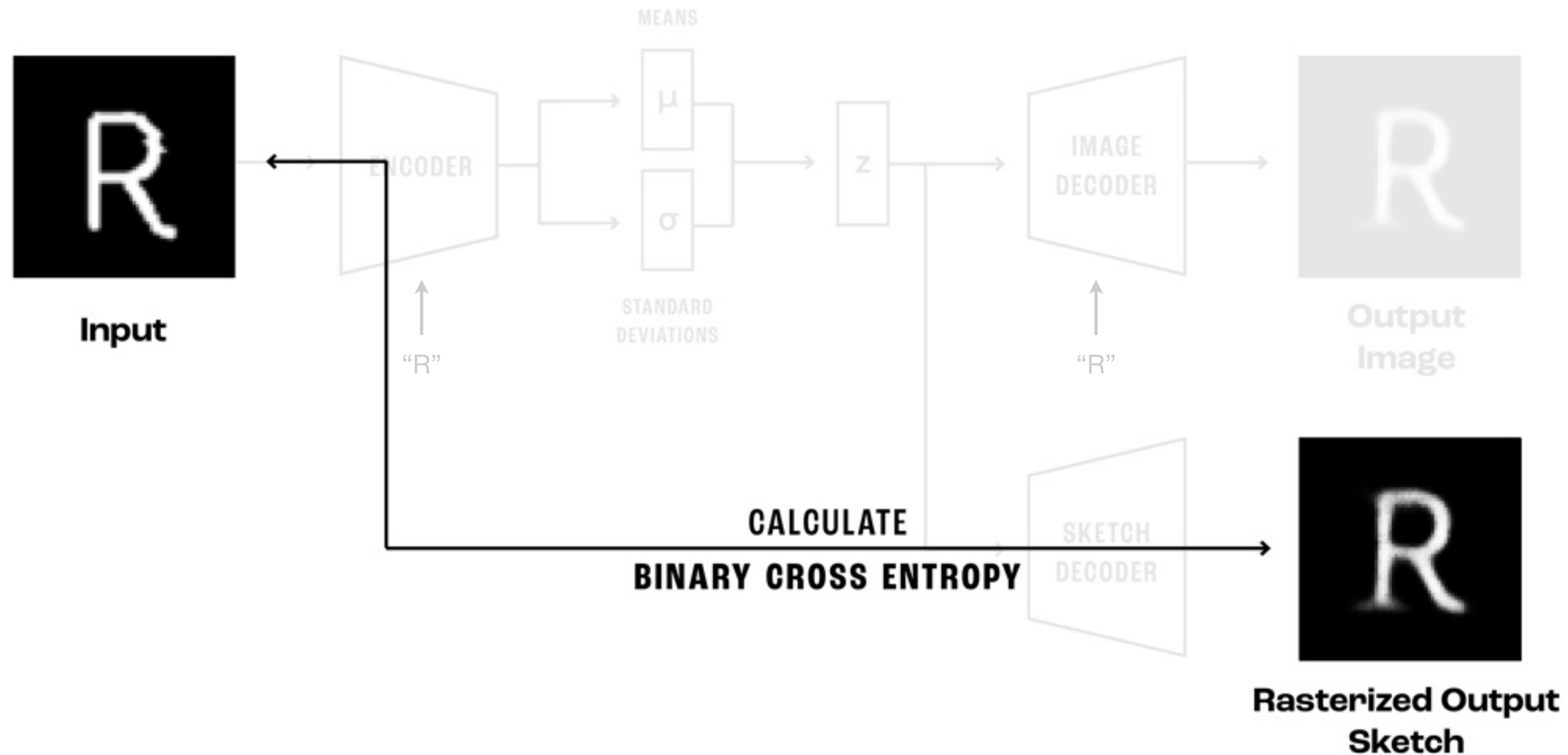
→ Loss Function

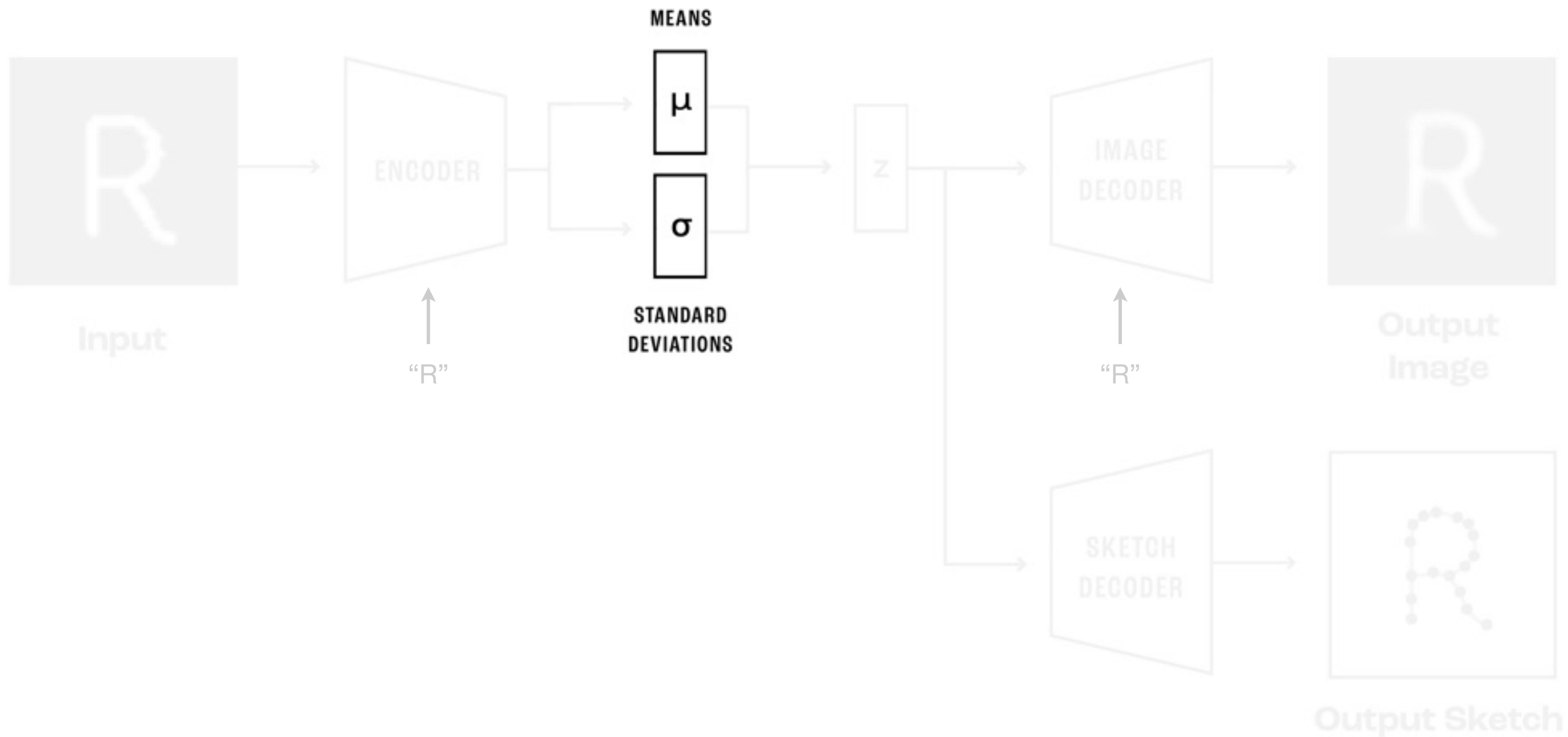


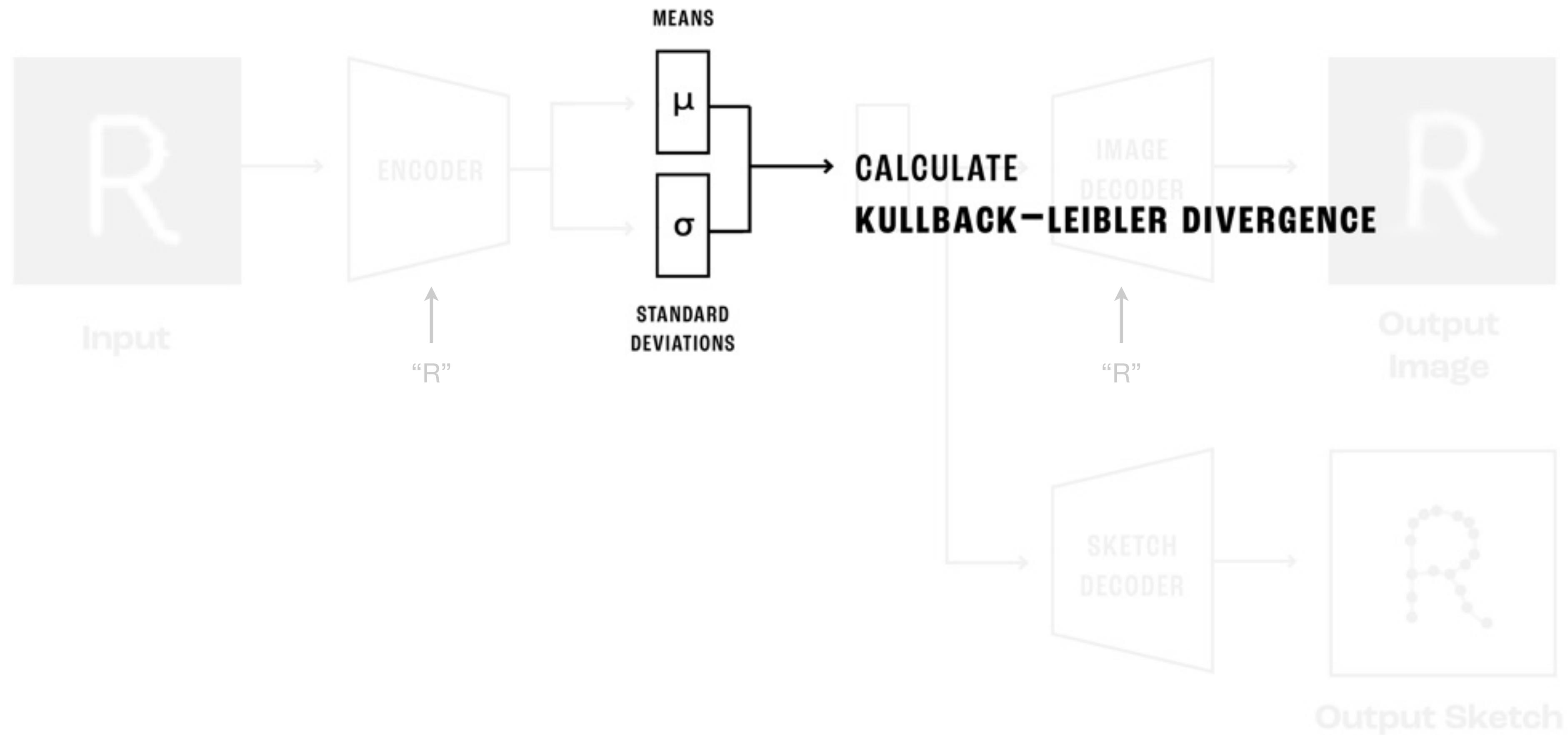












## Loss Function

## Loss Function

### **Binary Cross Entropy**

Between the Input  
and Output Image

## Loss Function

**Binary Cross  
Entropy**

+

**Binary Cross  
Entropy**

Between the Input  
and Output Image

Between the Input  
Image and the Rasterized  
Output Sketch

## Loss Function

**Binary Cross  
Entropy**

+

**Binary Cross  
Entropy**

+

**Kullback–Leibler  
Divergence**

Between the Input  
and Output Image

Between the Input  
Image and the Rasterized  
Output Sketch

On the Mean  
and Standard Deviation

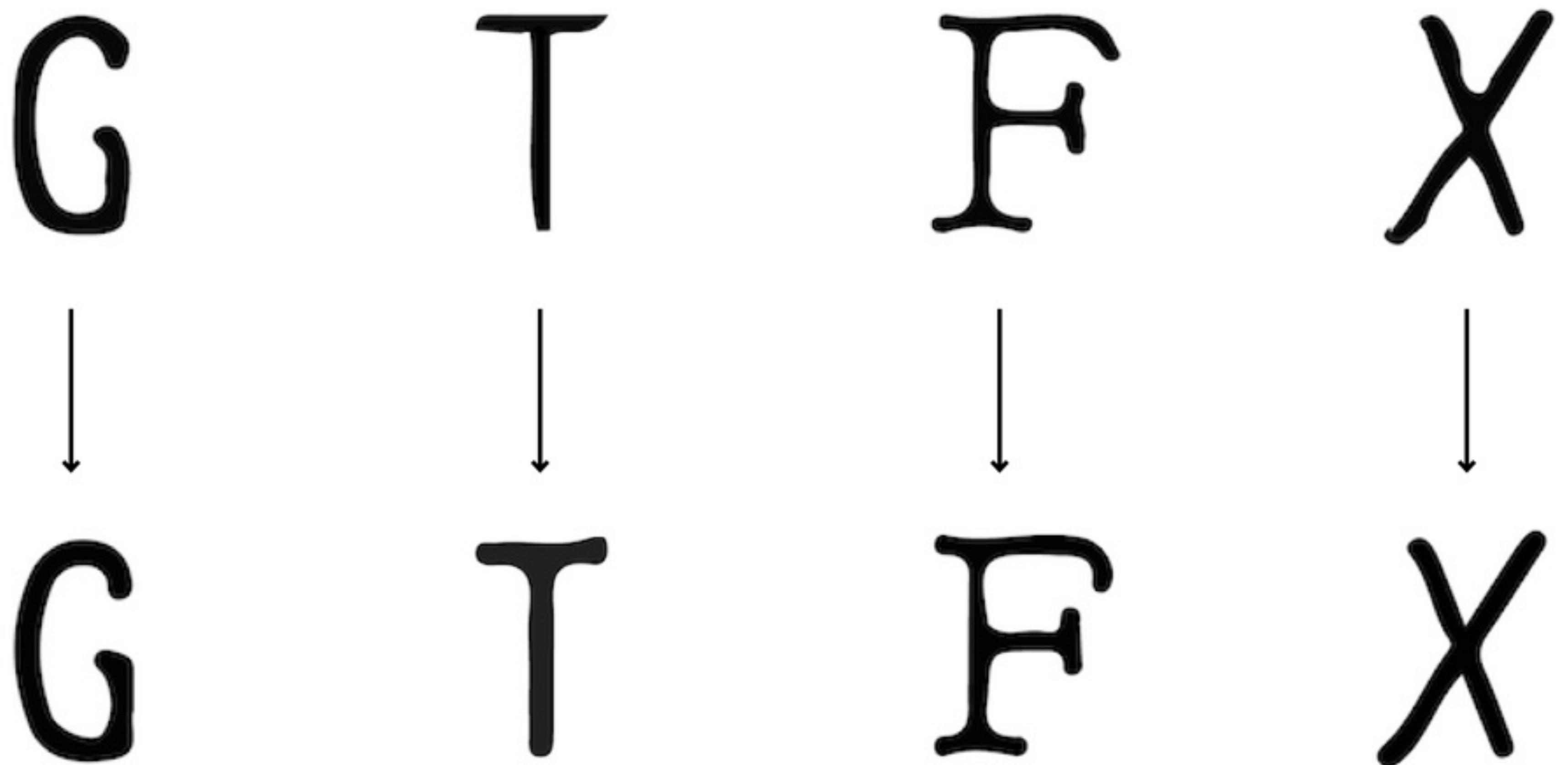
# Results

VAE and Sketch Decoder were trained for **50 epochs**,  
with a **learning rate of 0.001** and a **batch size of 256**.

# Results

## I. Reconstruct skeletons

G T F X



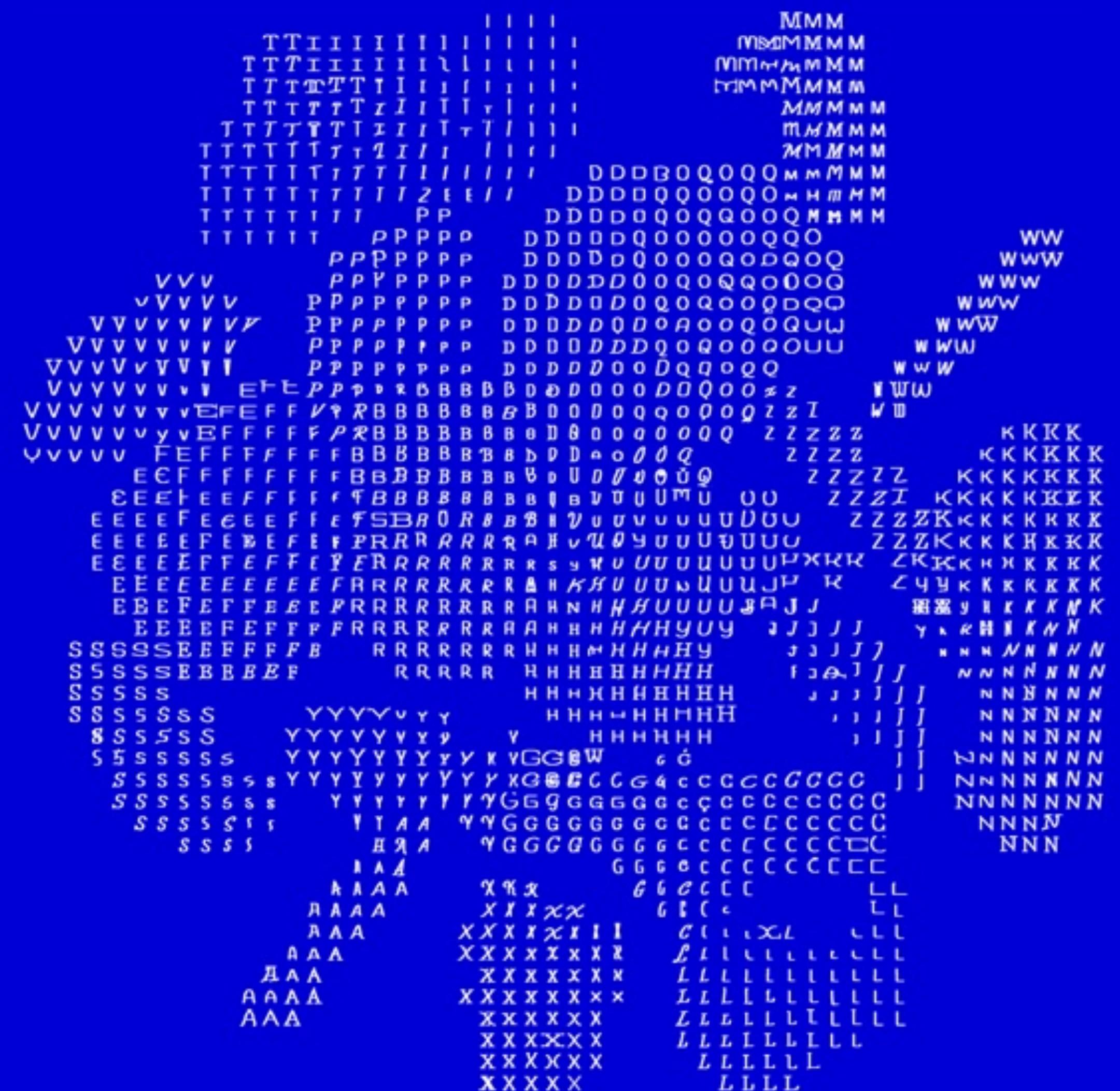


## Results

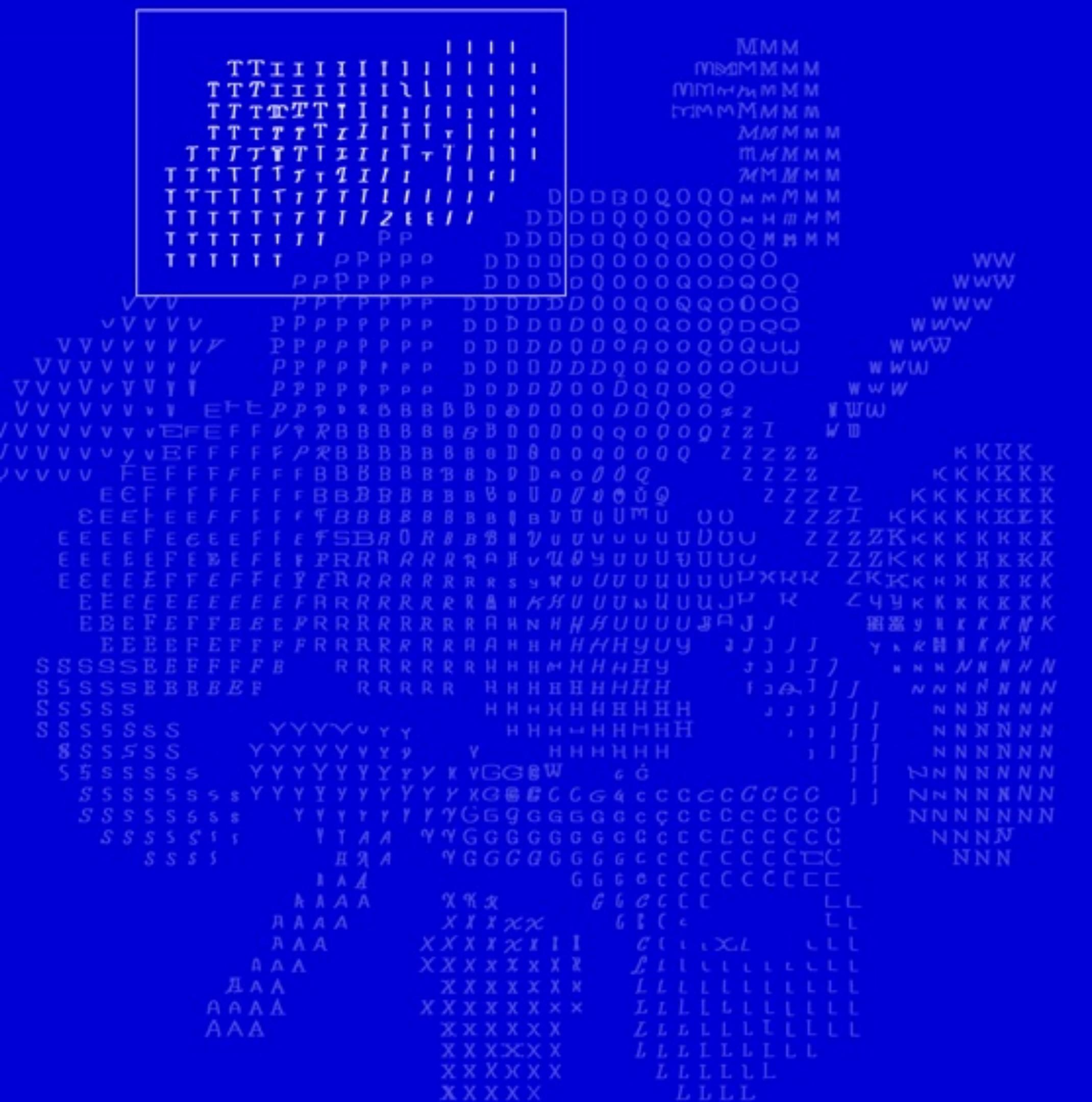
### II. Latent Space Representation of Font Style

**CAPTION**

t-SNE visualisation of the learned latent space  $z$  for all the capital letters of the Latin alphabet.



**CAPTION**  
t-SNE visualisation of  
the learned latent space  $z$   
for all the capital letters  
of the Latin alphabet.



**CAPTION**

t-SNE visualisation of the learned latent space  $z$  for all the capital letters of the Latin alphabet.



**CAPTION**

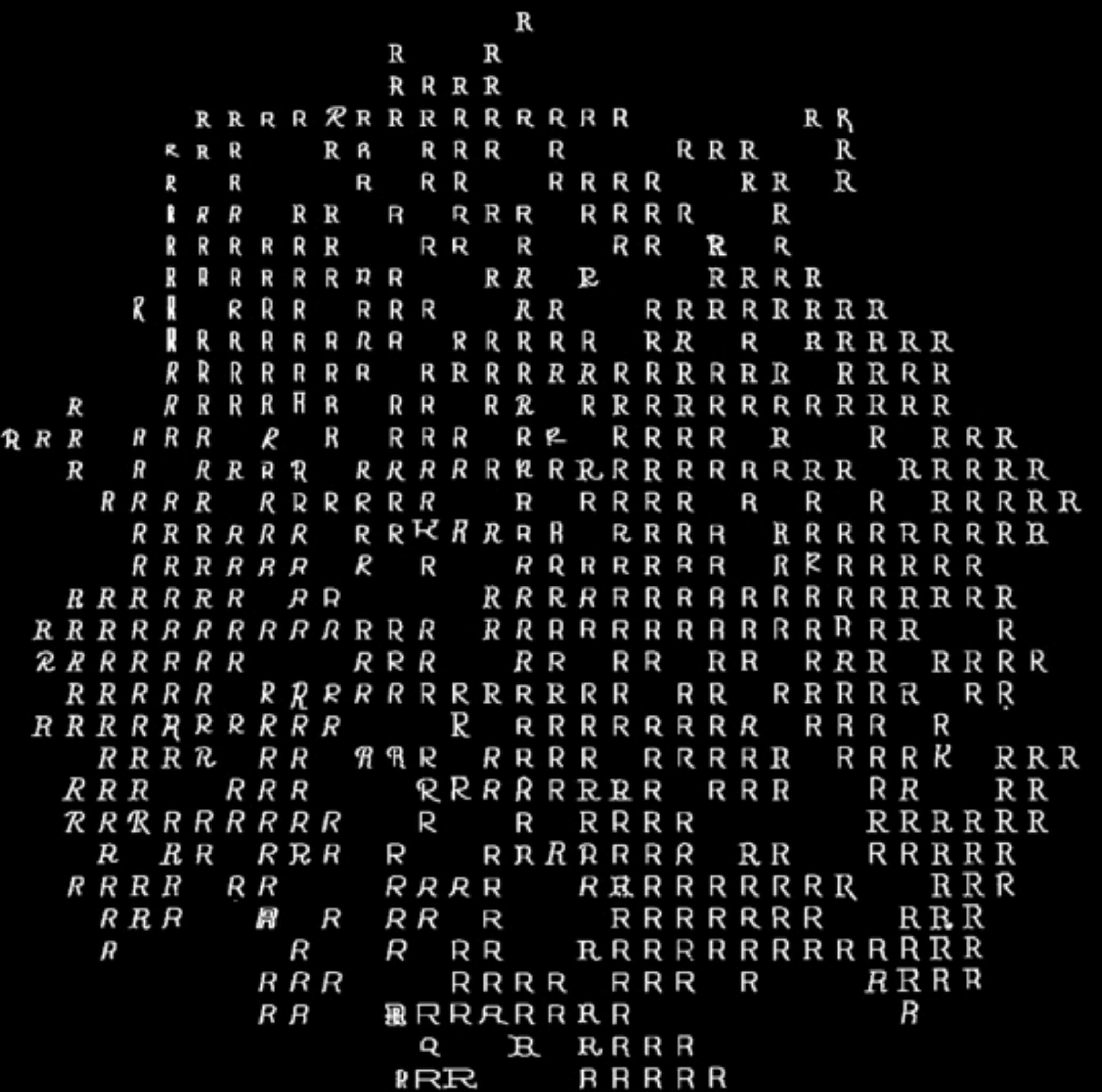
t-SNE visualisation of the learned latent space  $z$  for all the capital letters of the Latin alphabet.



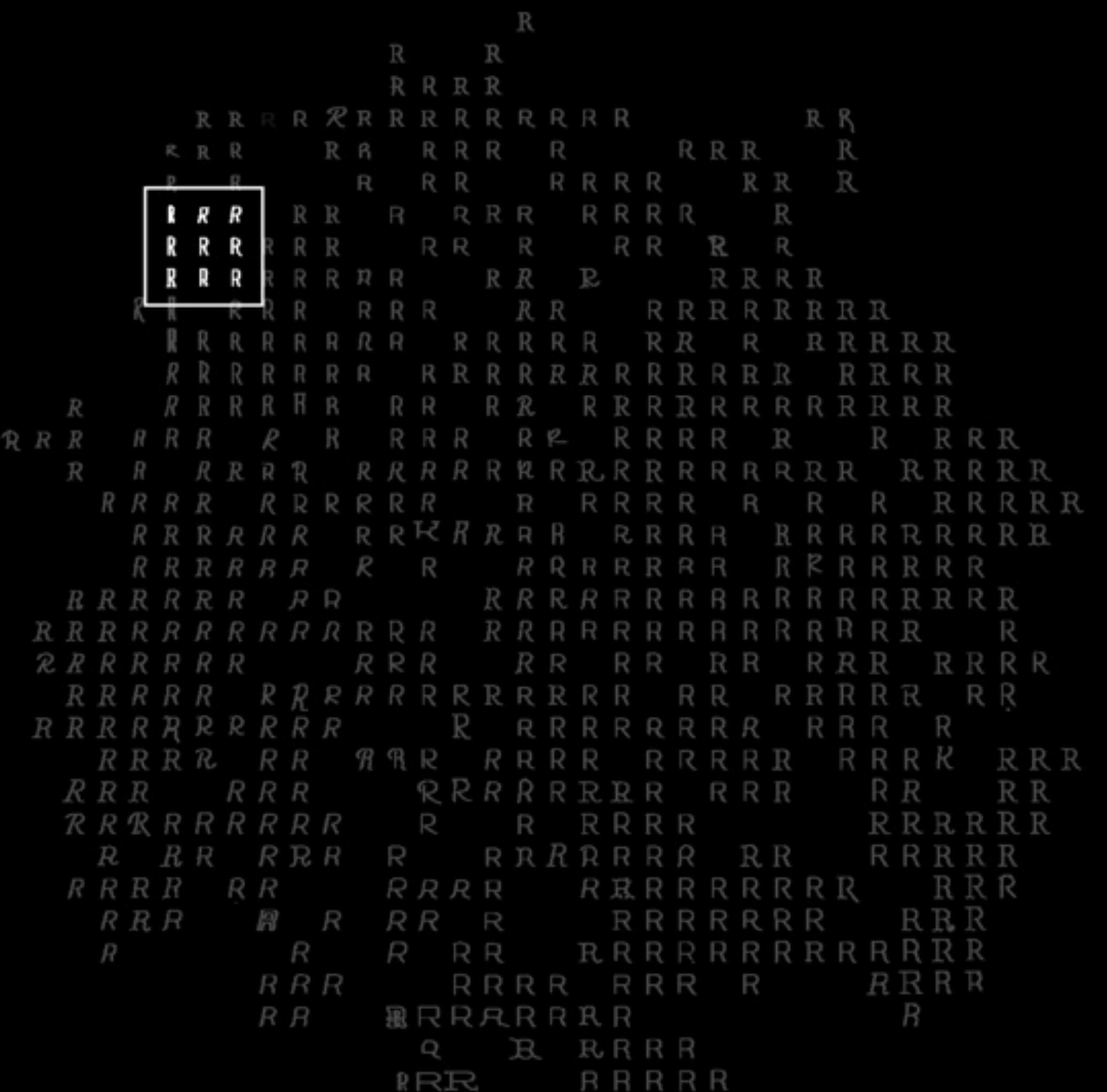
**CAPTION**

t-SNE visualisation of the learned latent space  $z$  for all the capital letters of the Latin alphabet.

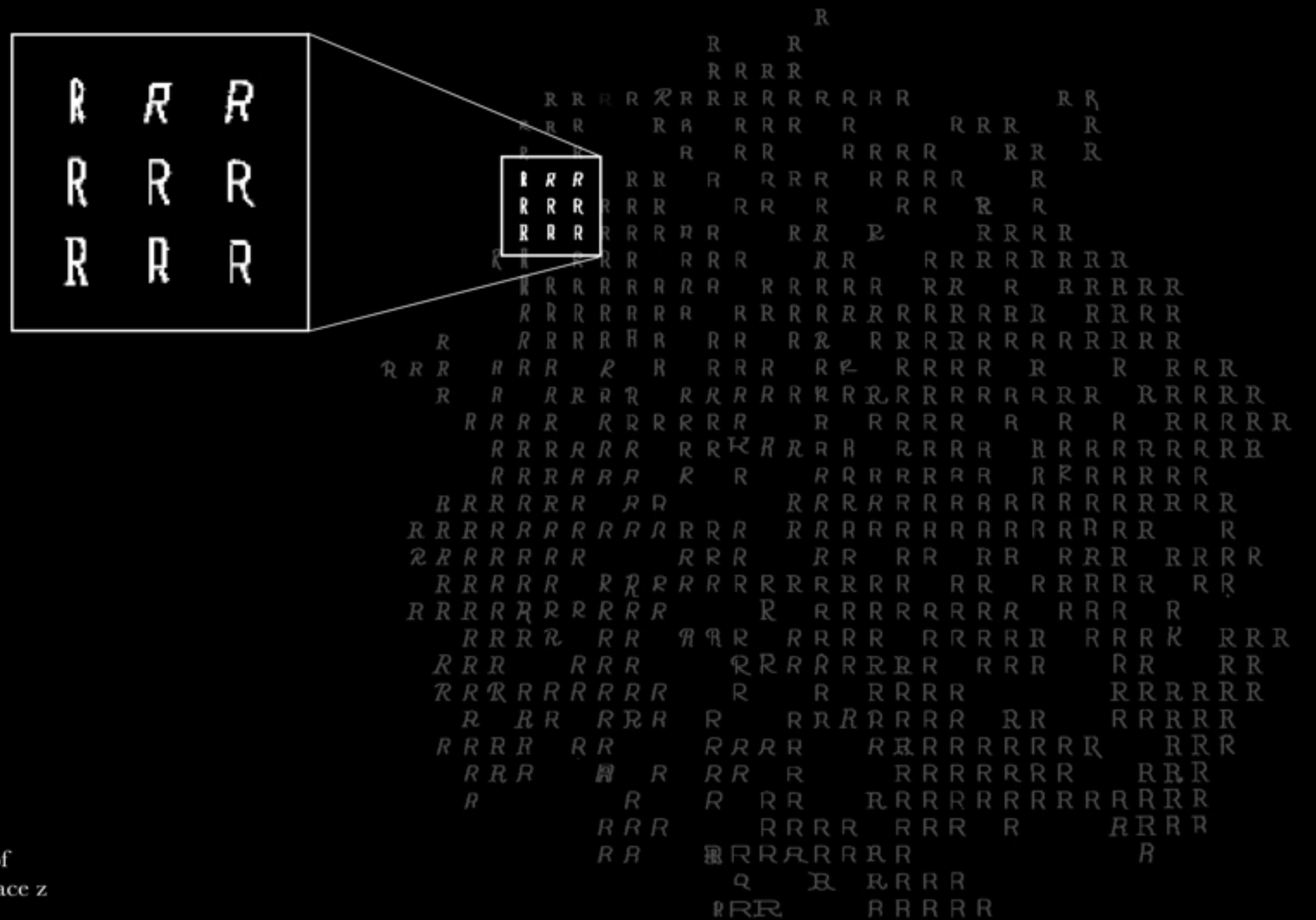


**CAPTION**

t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

**CAPTION**

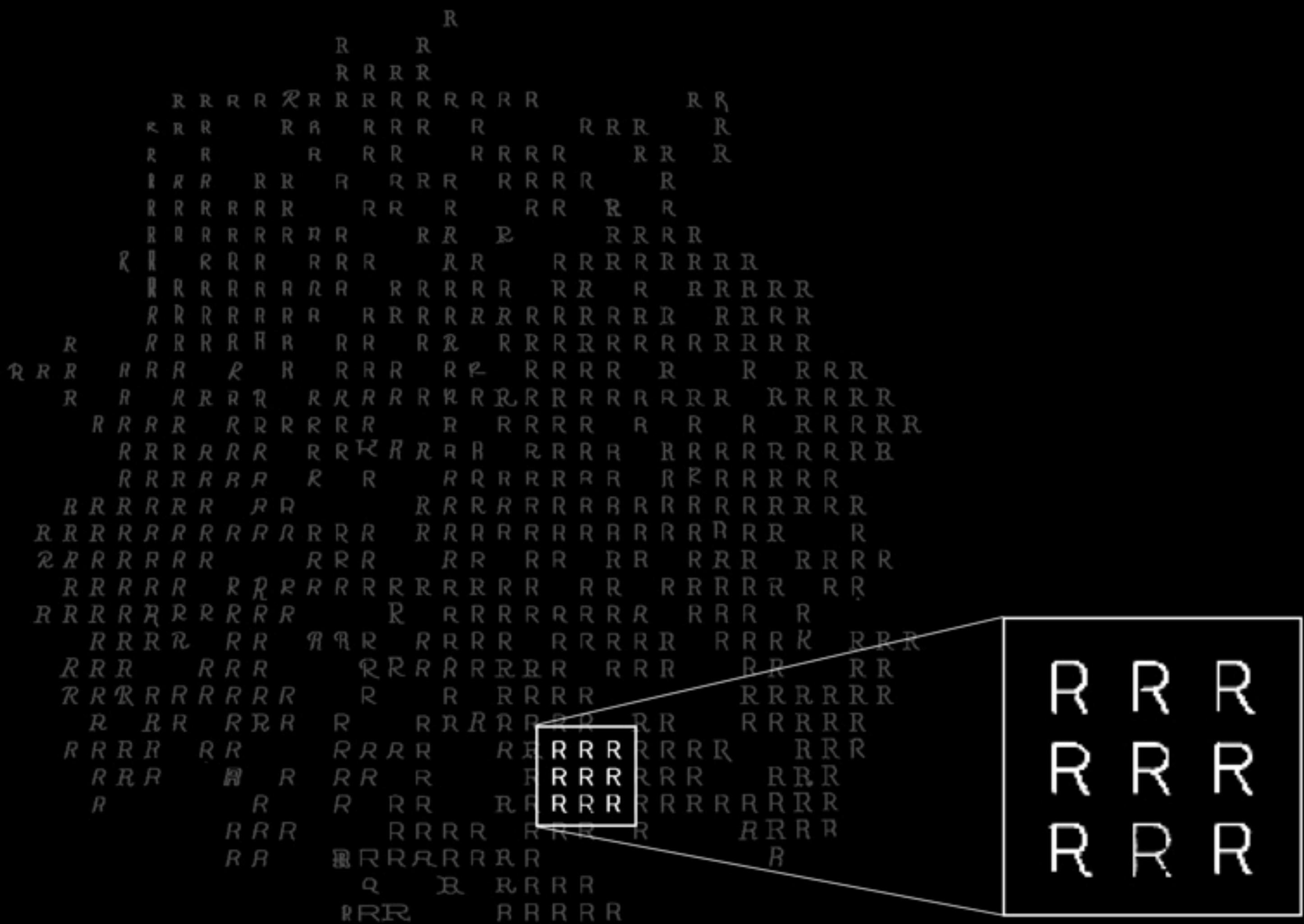
t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

**CAPTION**

t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

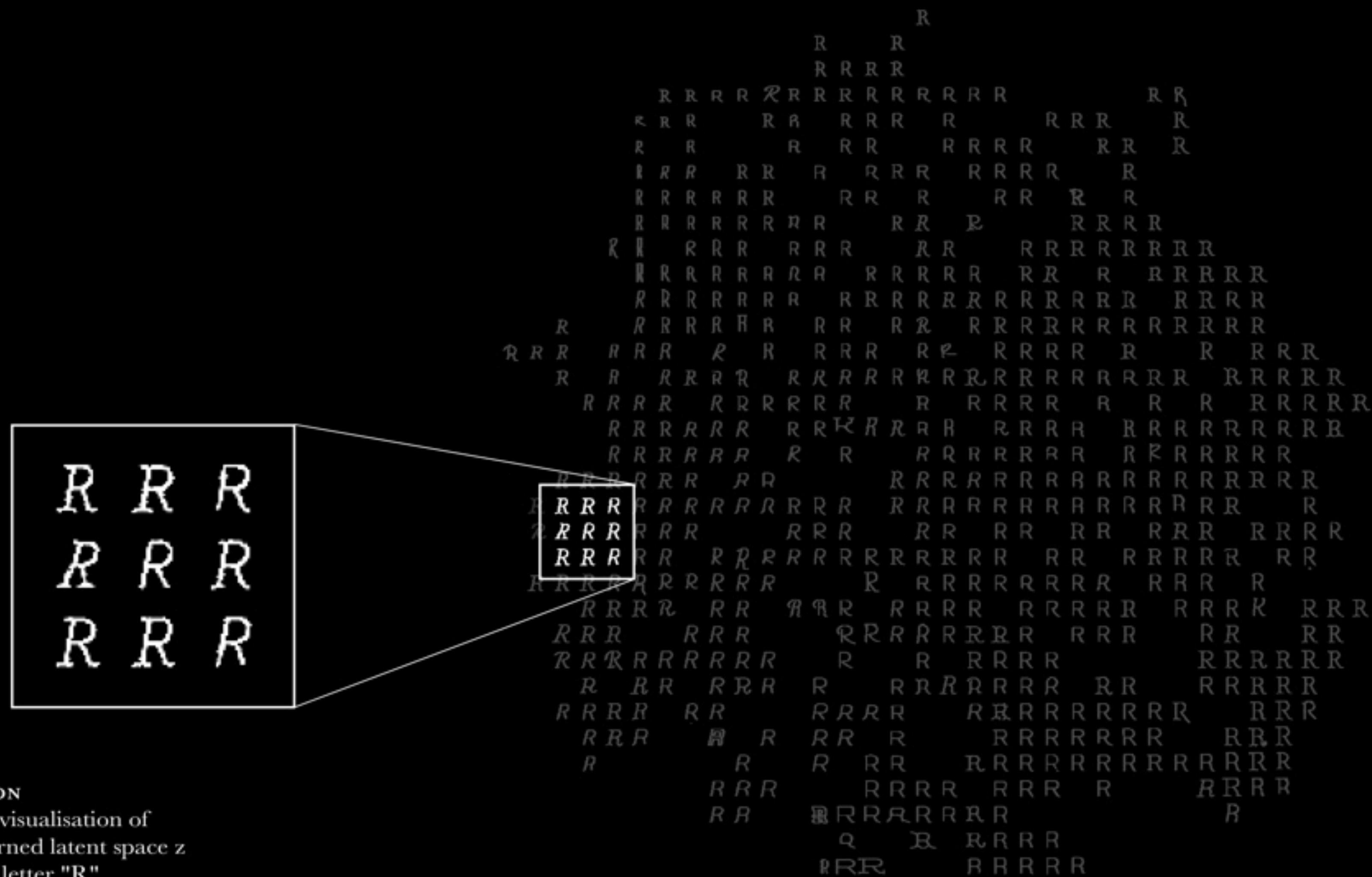
**CAPTION**

t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

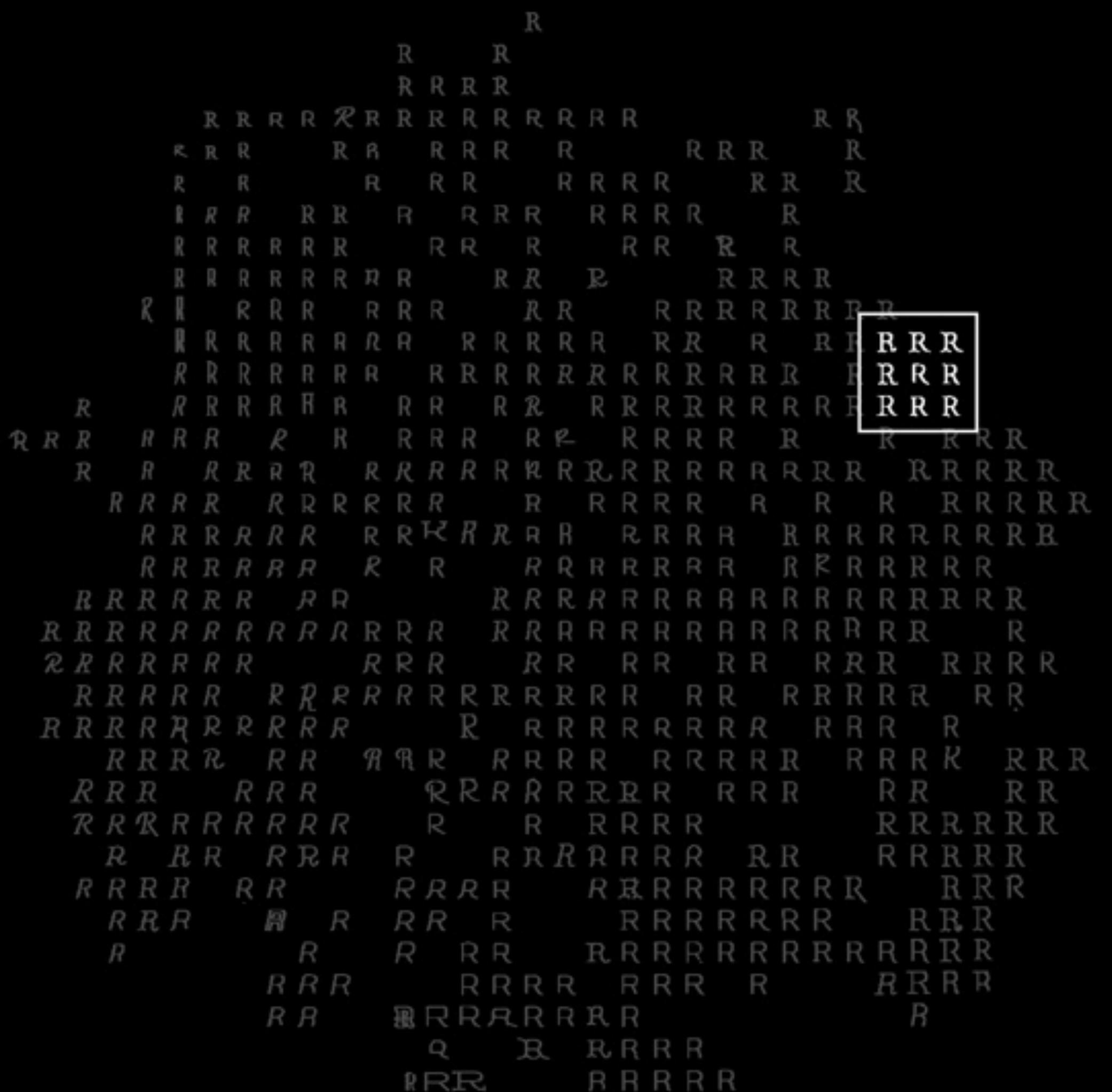


CAPTION  
t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

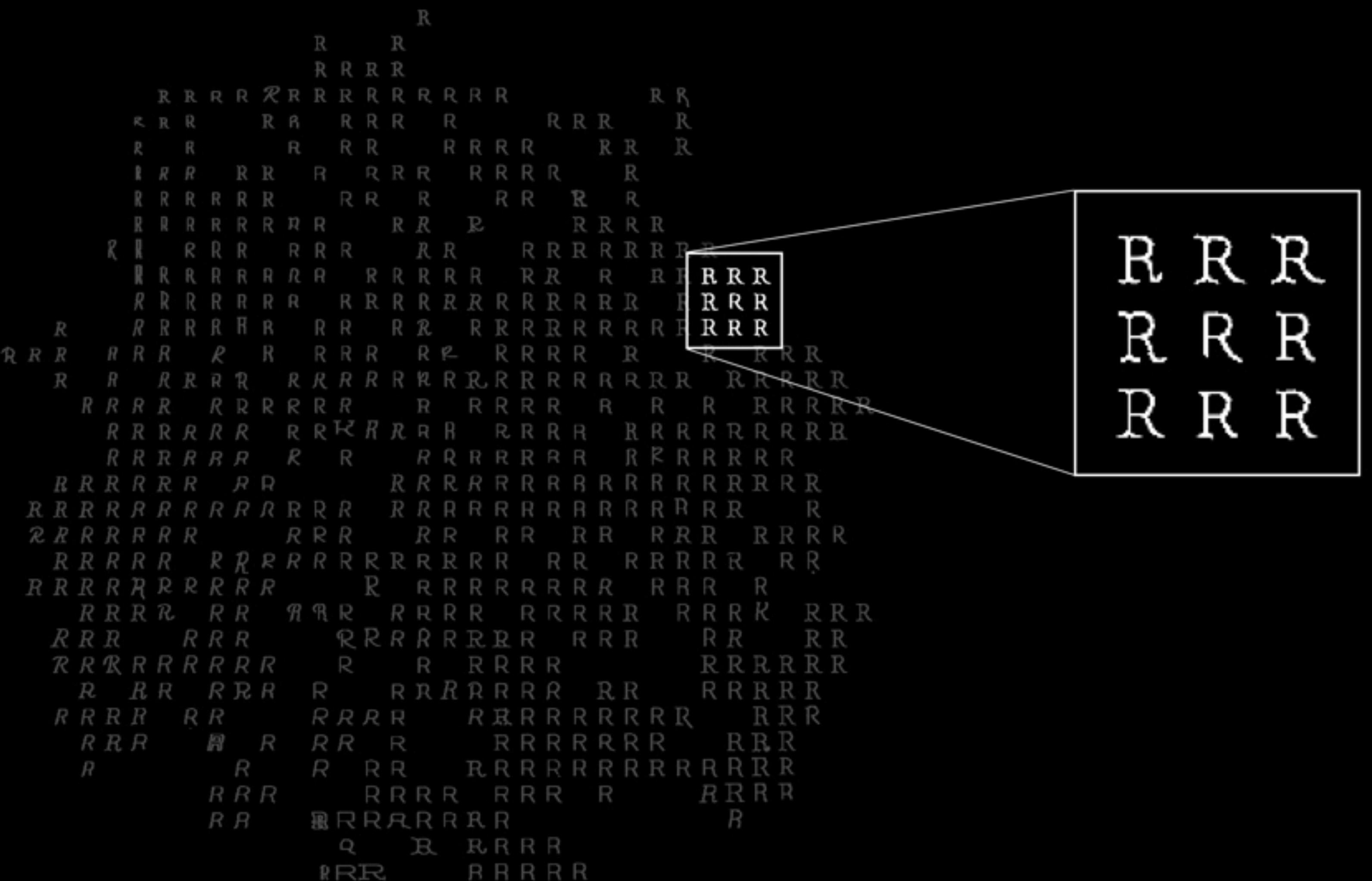
**CAPTION**  
t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

**CAPTION**

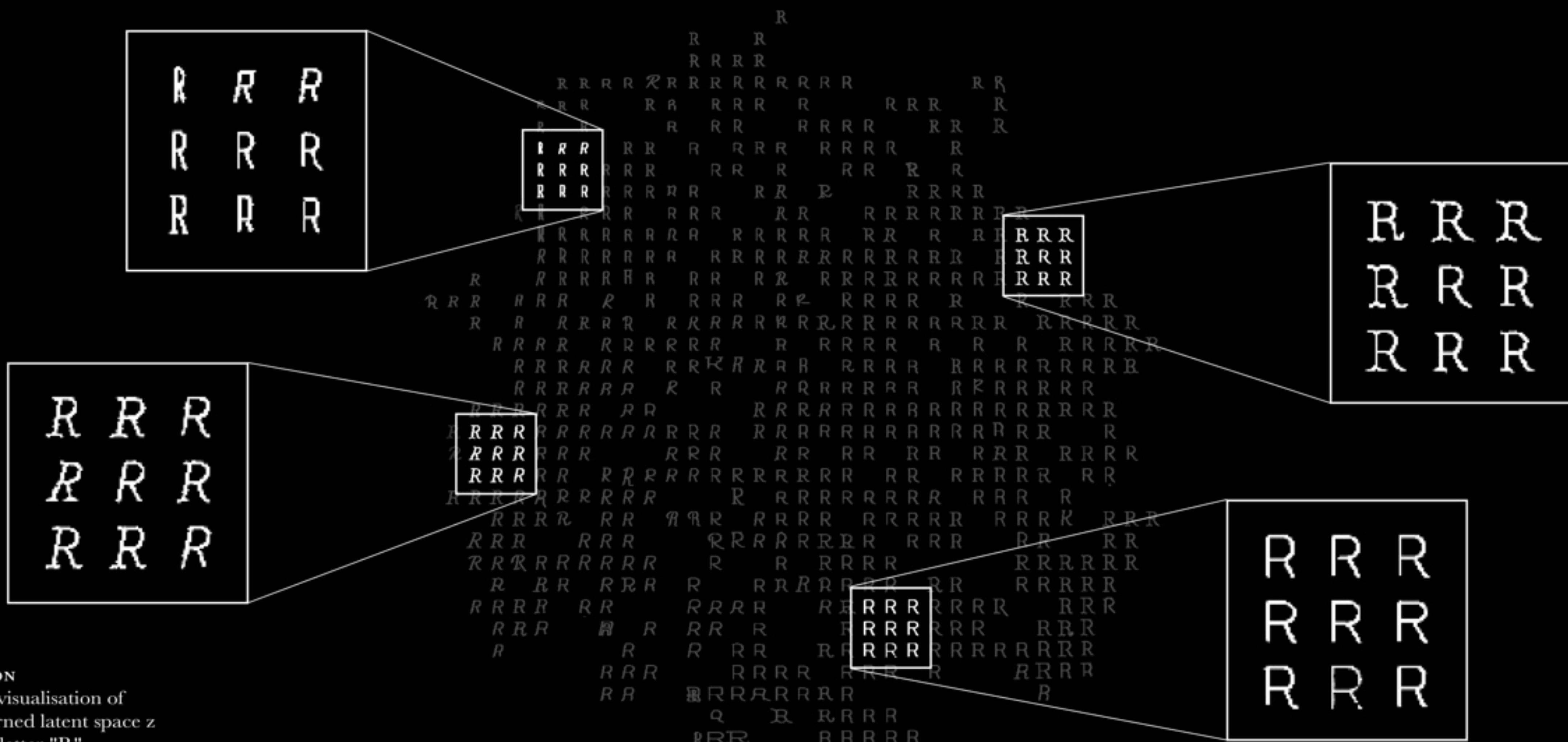
t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

**CAPTION**

t-SNE visualisation of the learned latent space  $z$  for the letter "R".

**CAPTION**

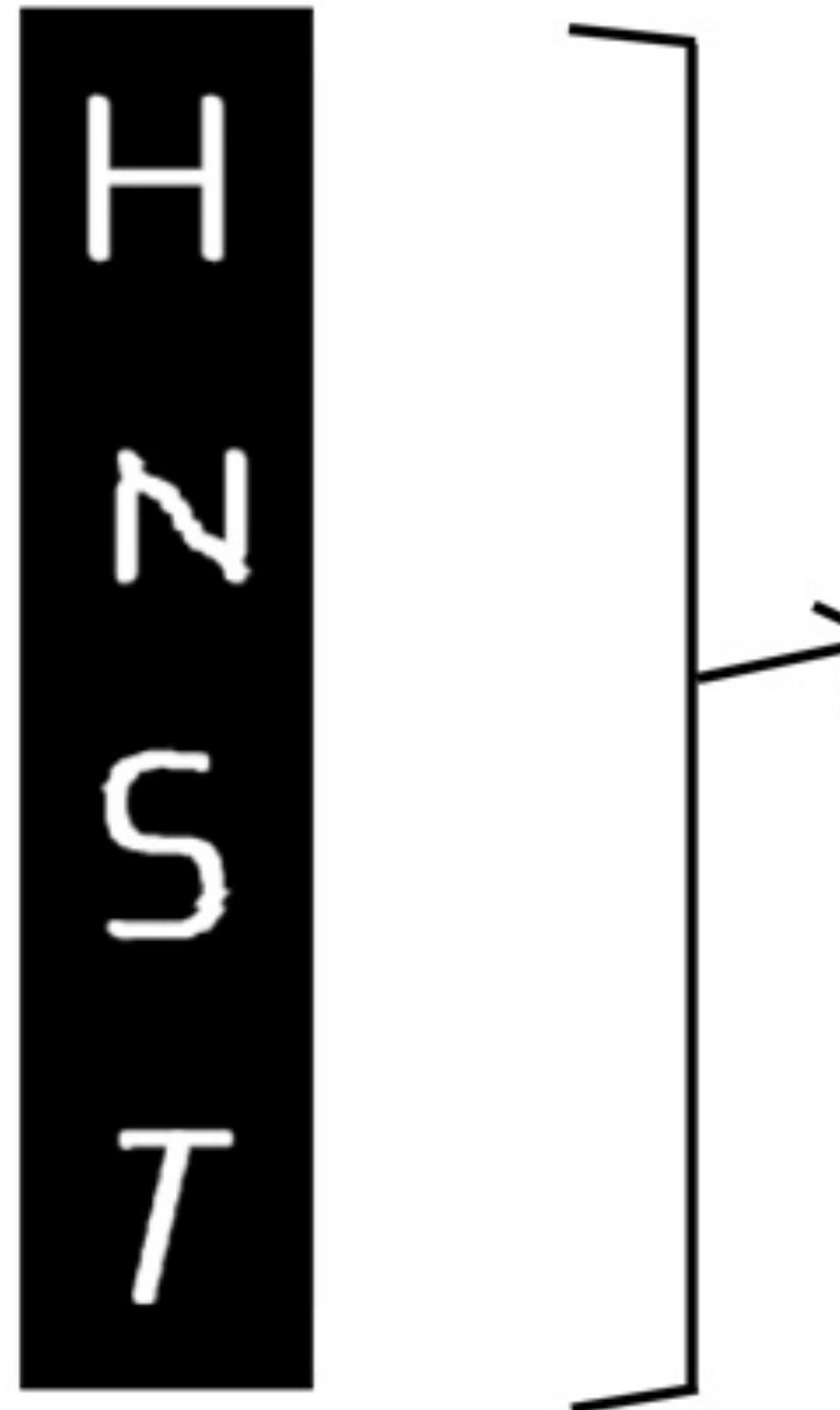
t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".



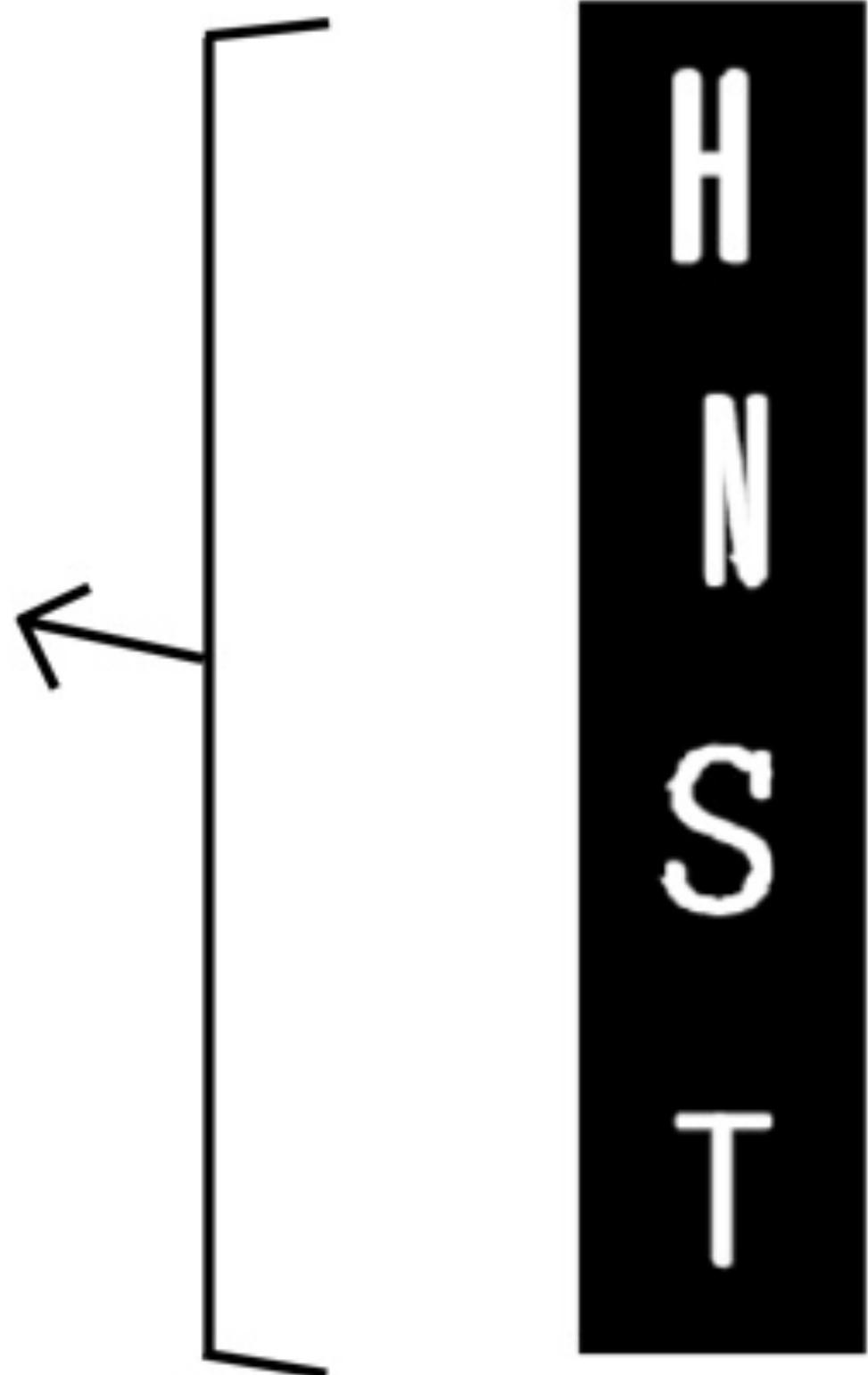
CAPTION  
t-SNE visualisation of  
the learned latent space  $z$   
for the letter "R".

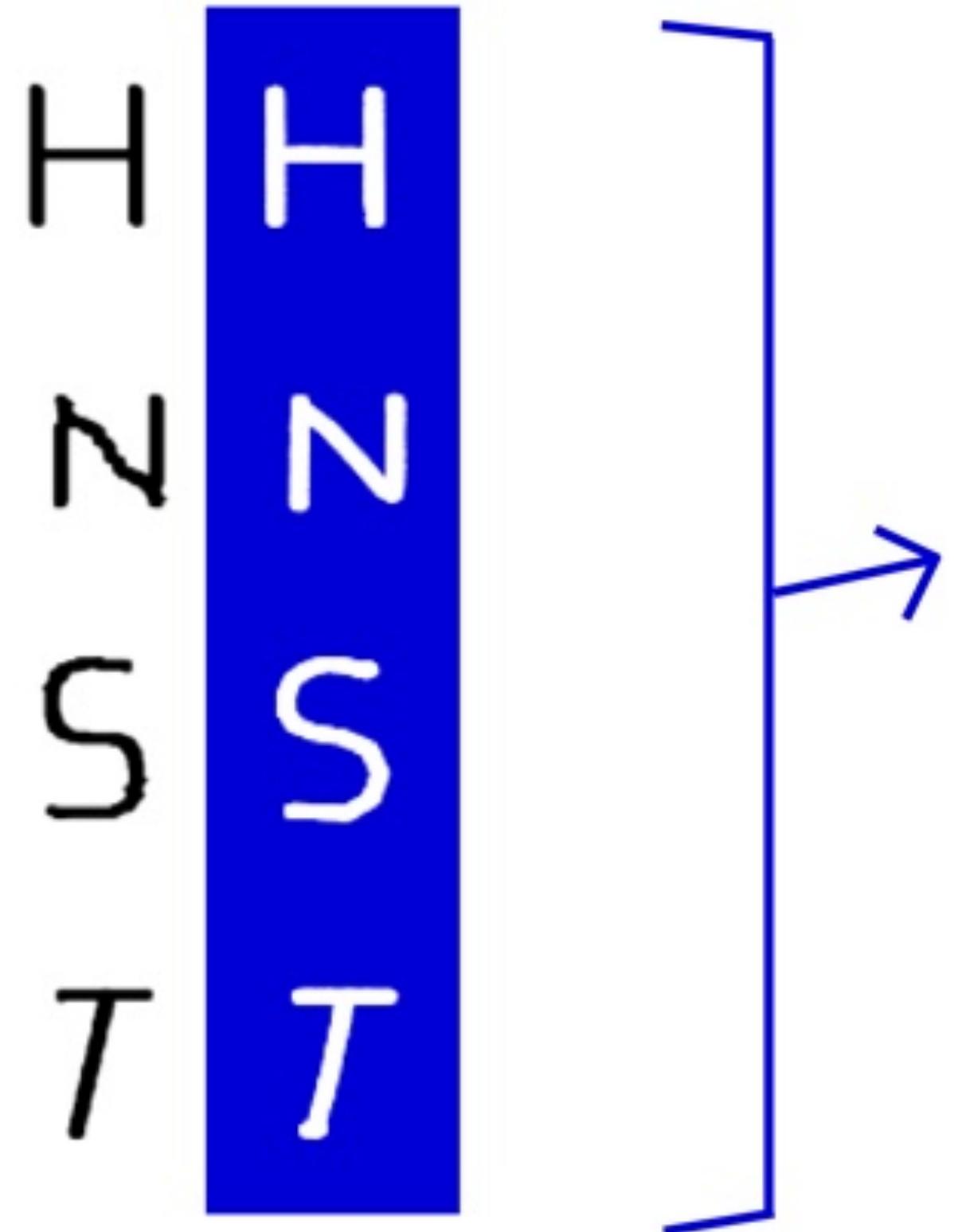
## **Results**

### III. Explore the Latent Space

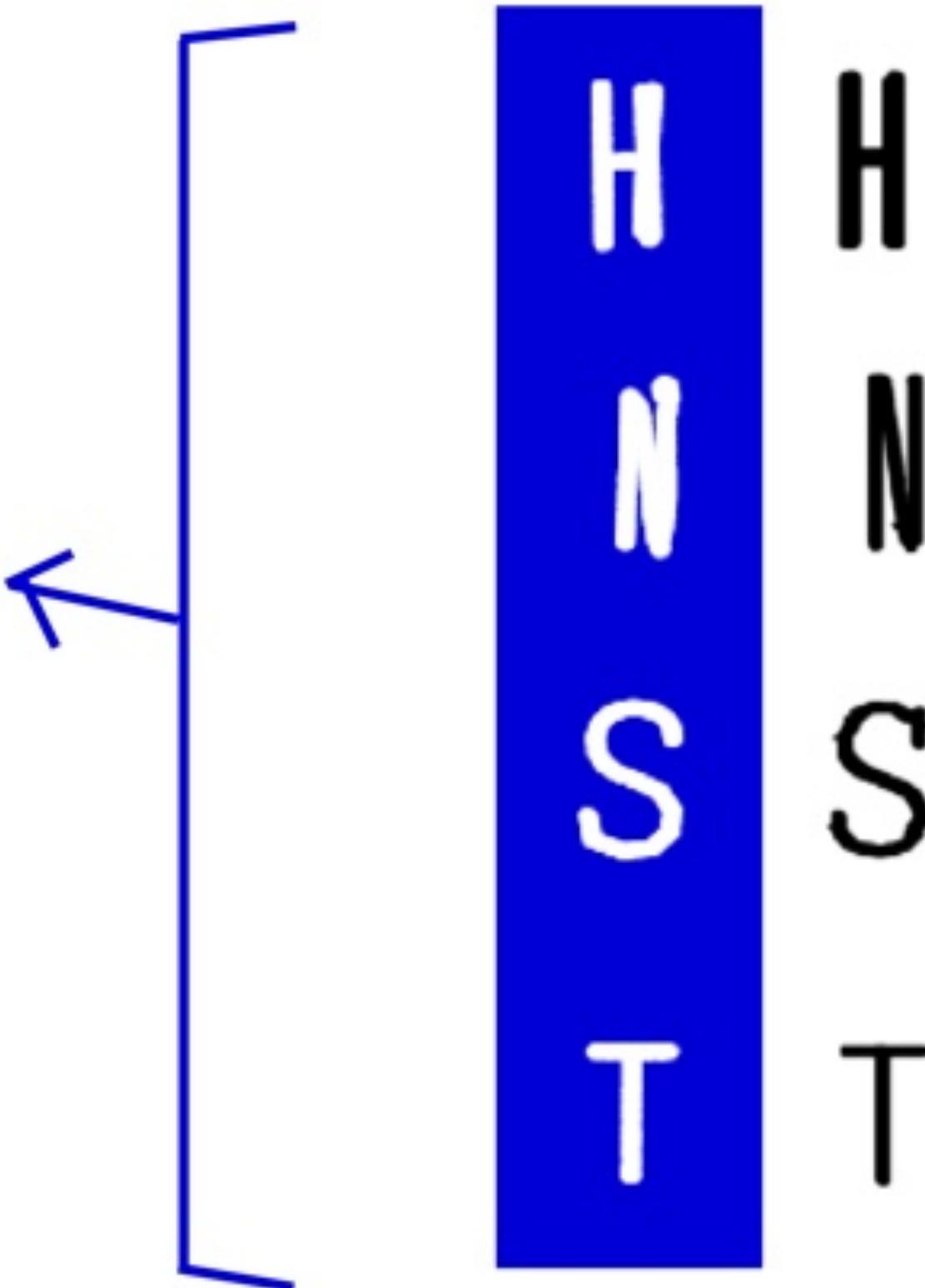


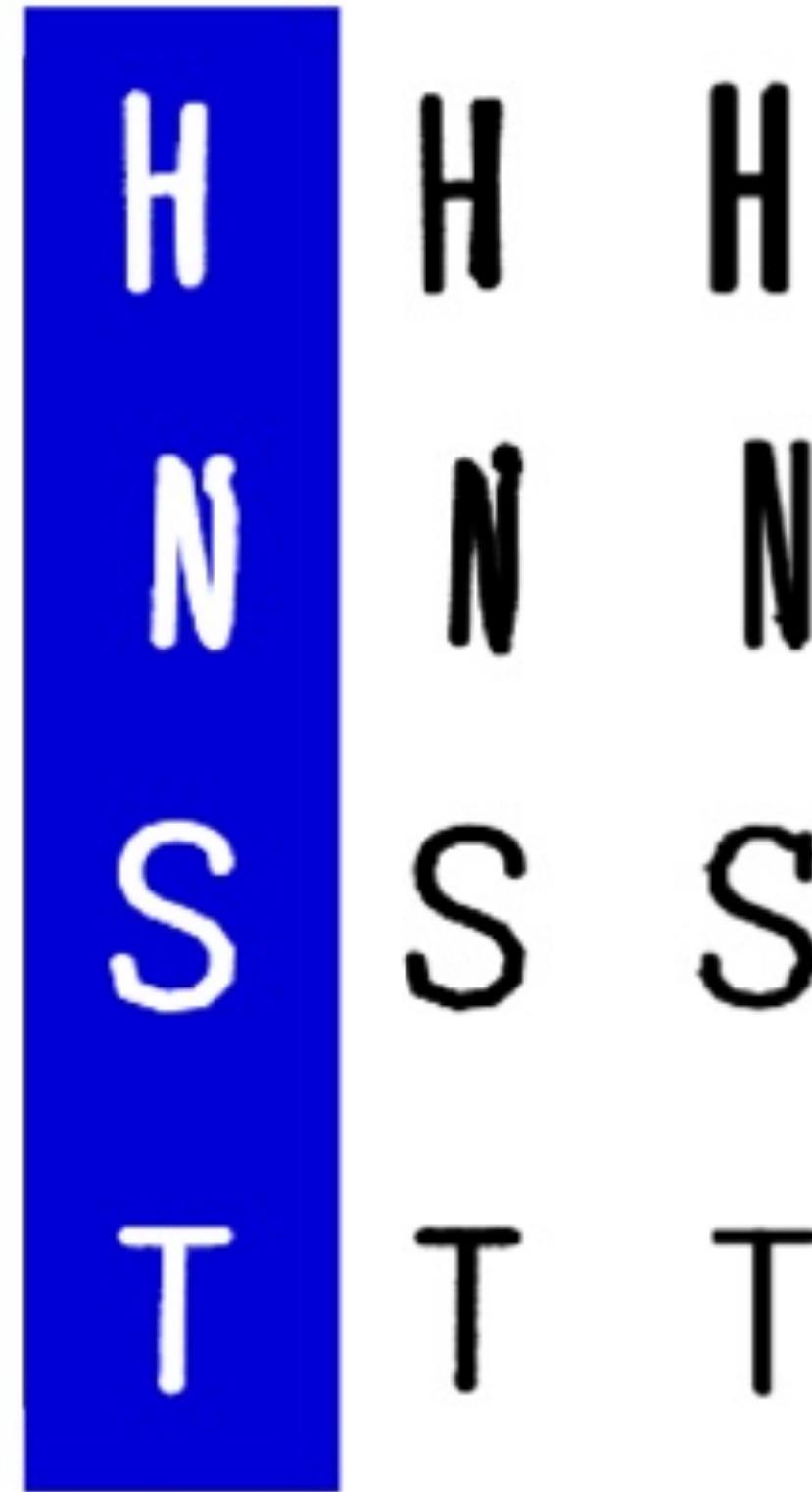
## Reconstructed Skeletons

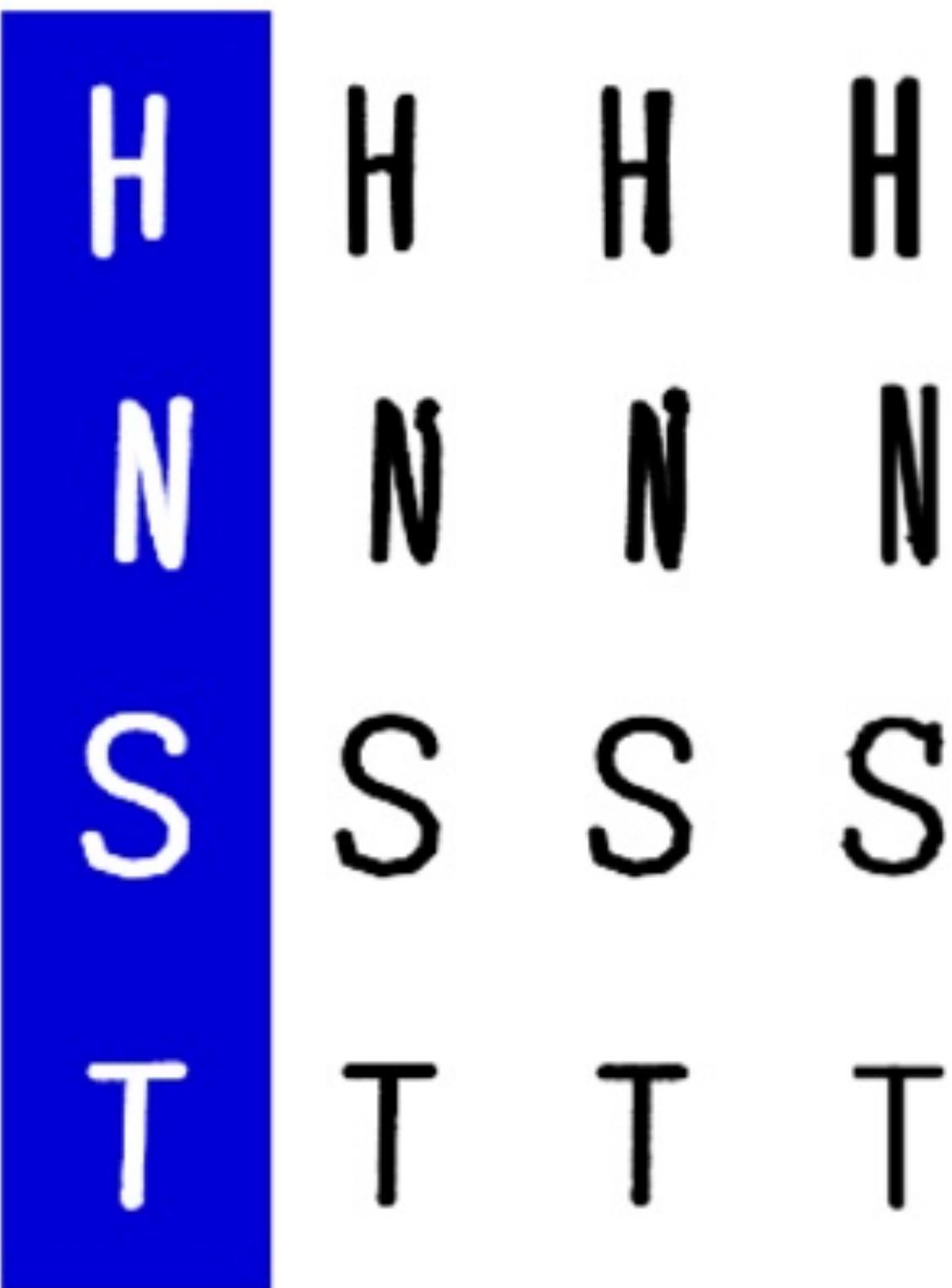
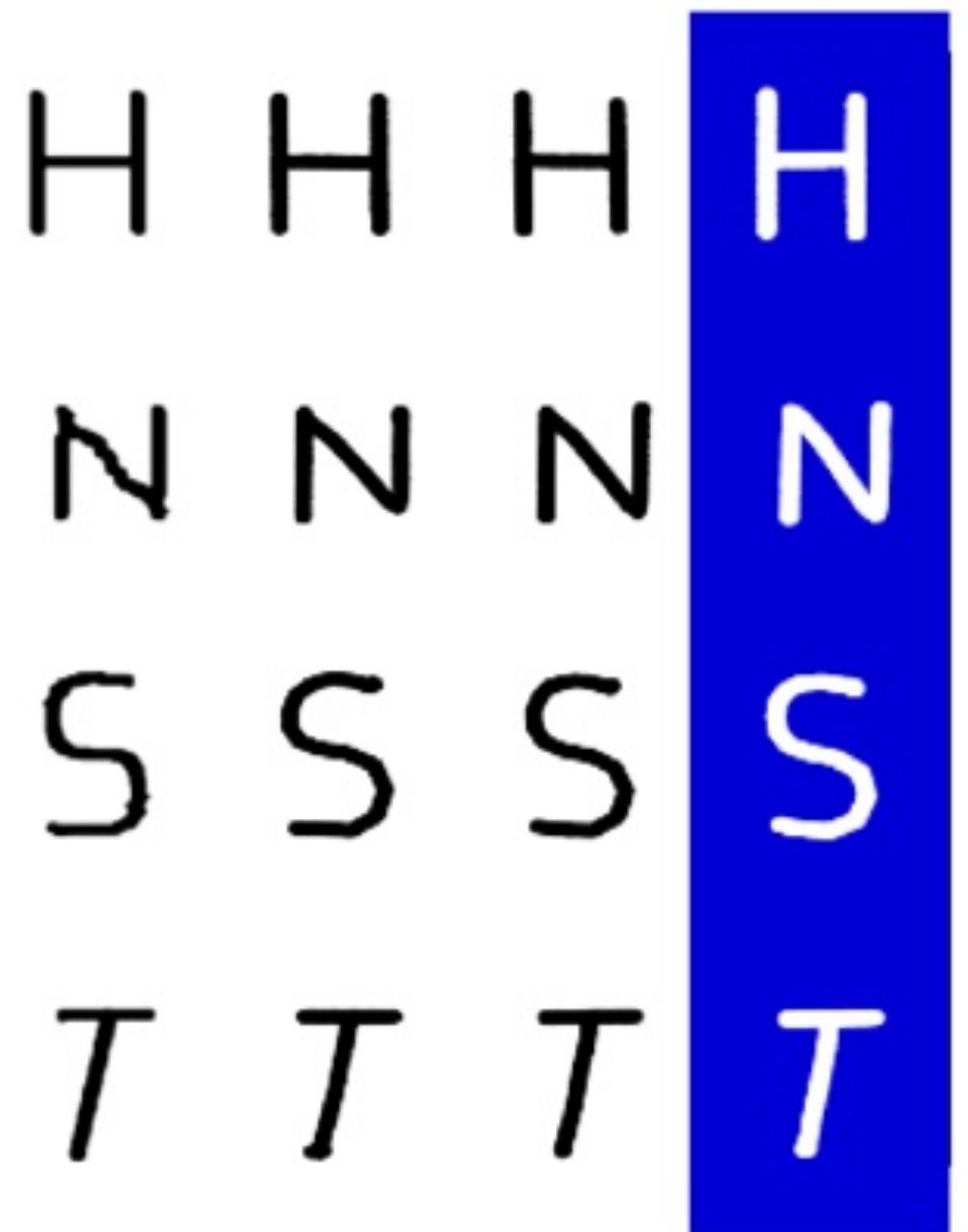


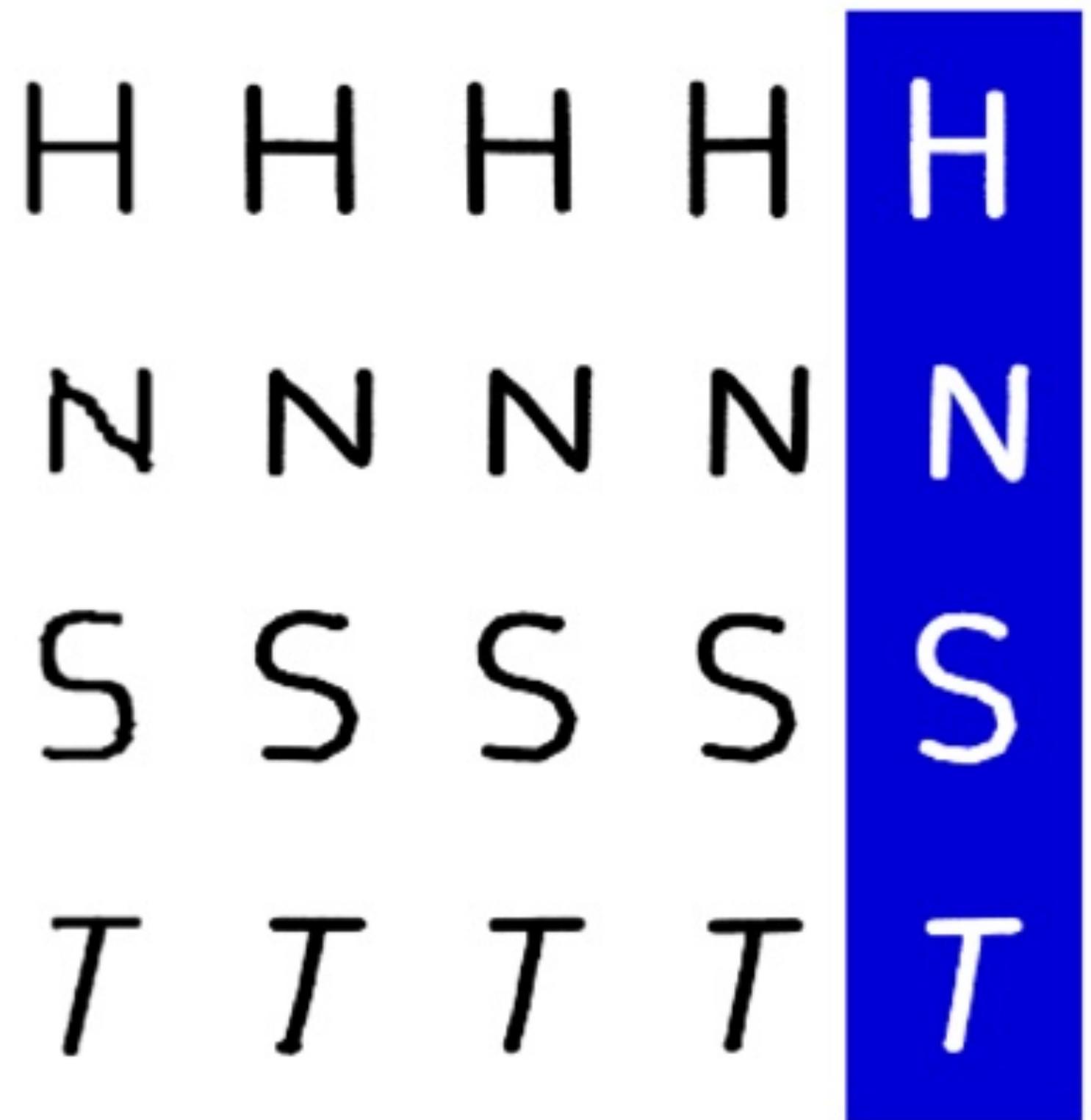


**Generated  
Skeletons**

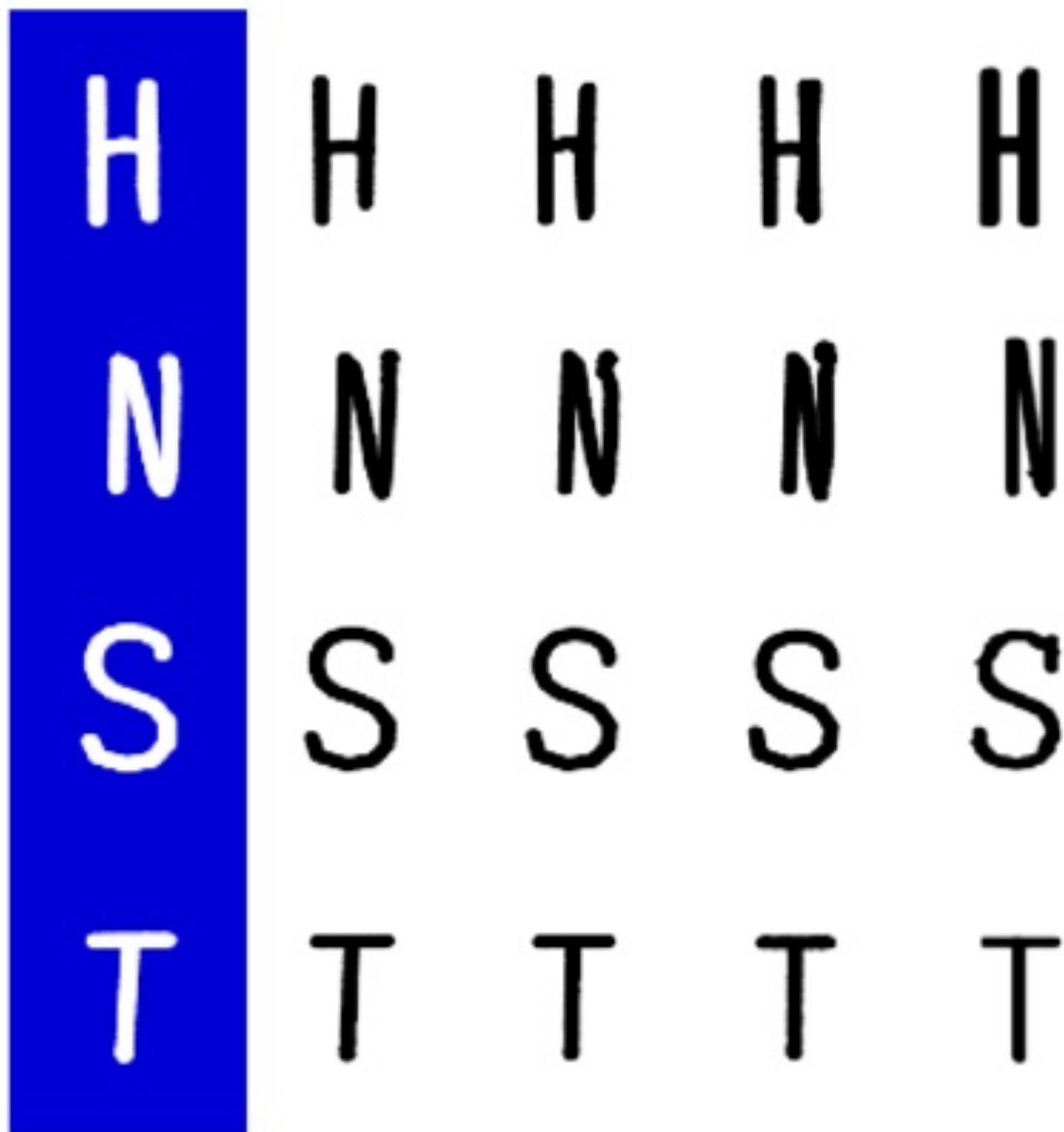




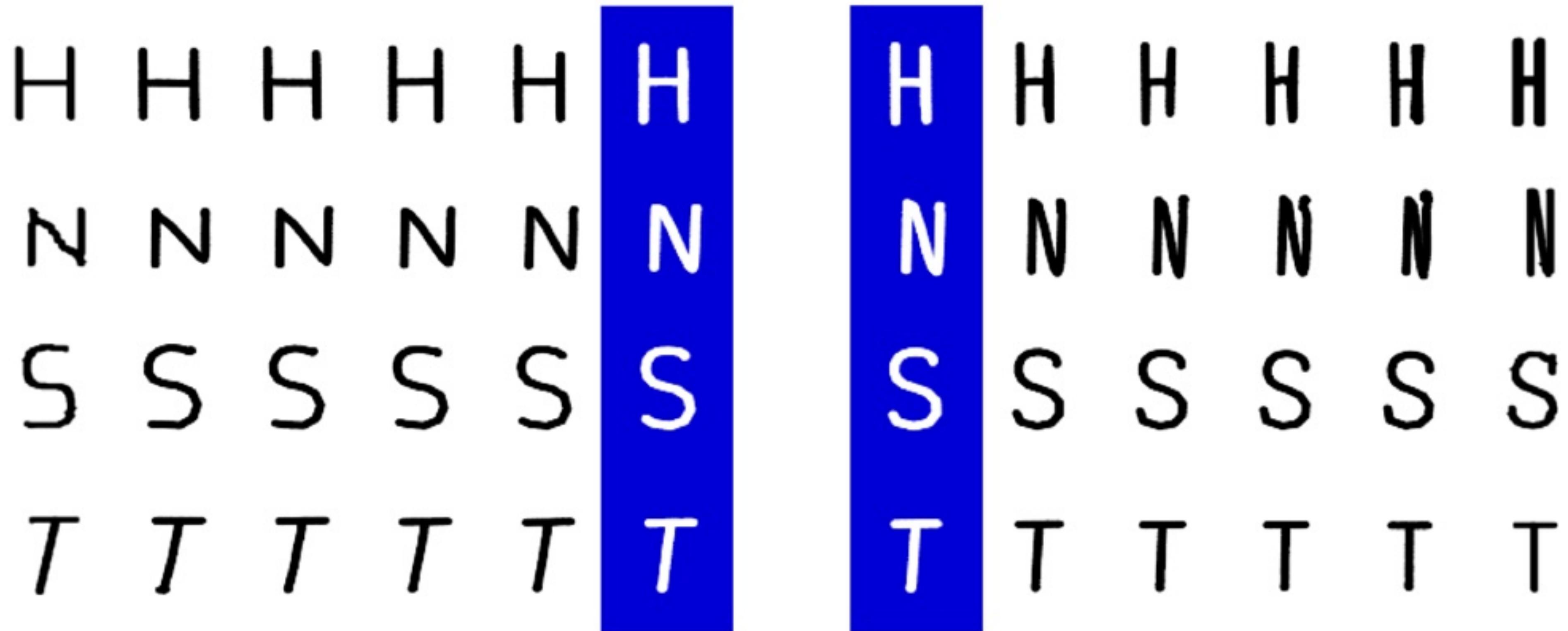


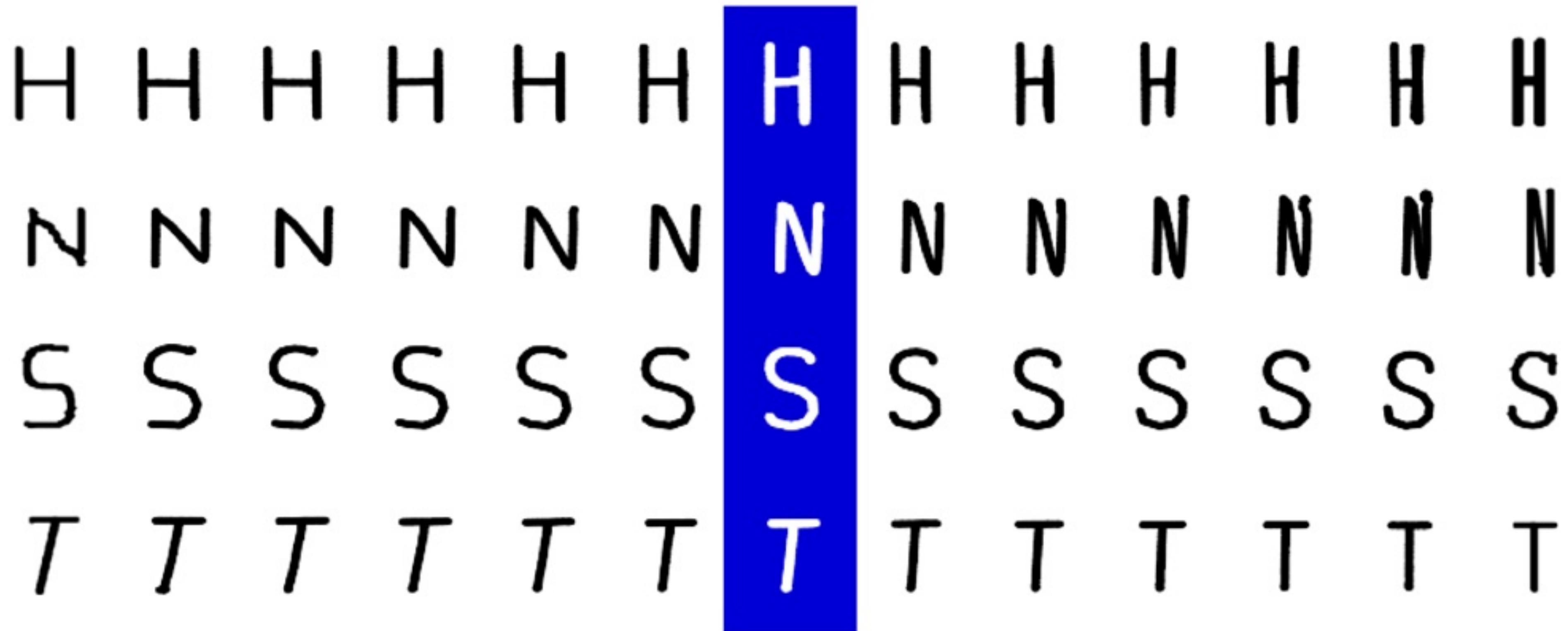


H H H H H  
N N N N N  
S S S S S  
T T T T T



H H H H H  
N N N N N  
S S S S S  
T T T T T





H H H H H H H H H H H H H H H H  
N N N N N N N N N N N N N N N N  
S S S S S S S S S S S S S S S S  
T T T T T T T T T T T T T T T T

H H H H H H H H H H H H H H  
N N N N N N N N N N N N N N N  
S S S S S S S S S S S S S S S  
T T T T T T T T T T T T T T T



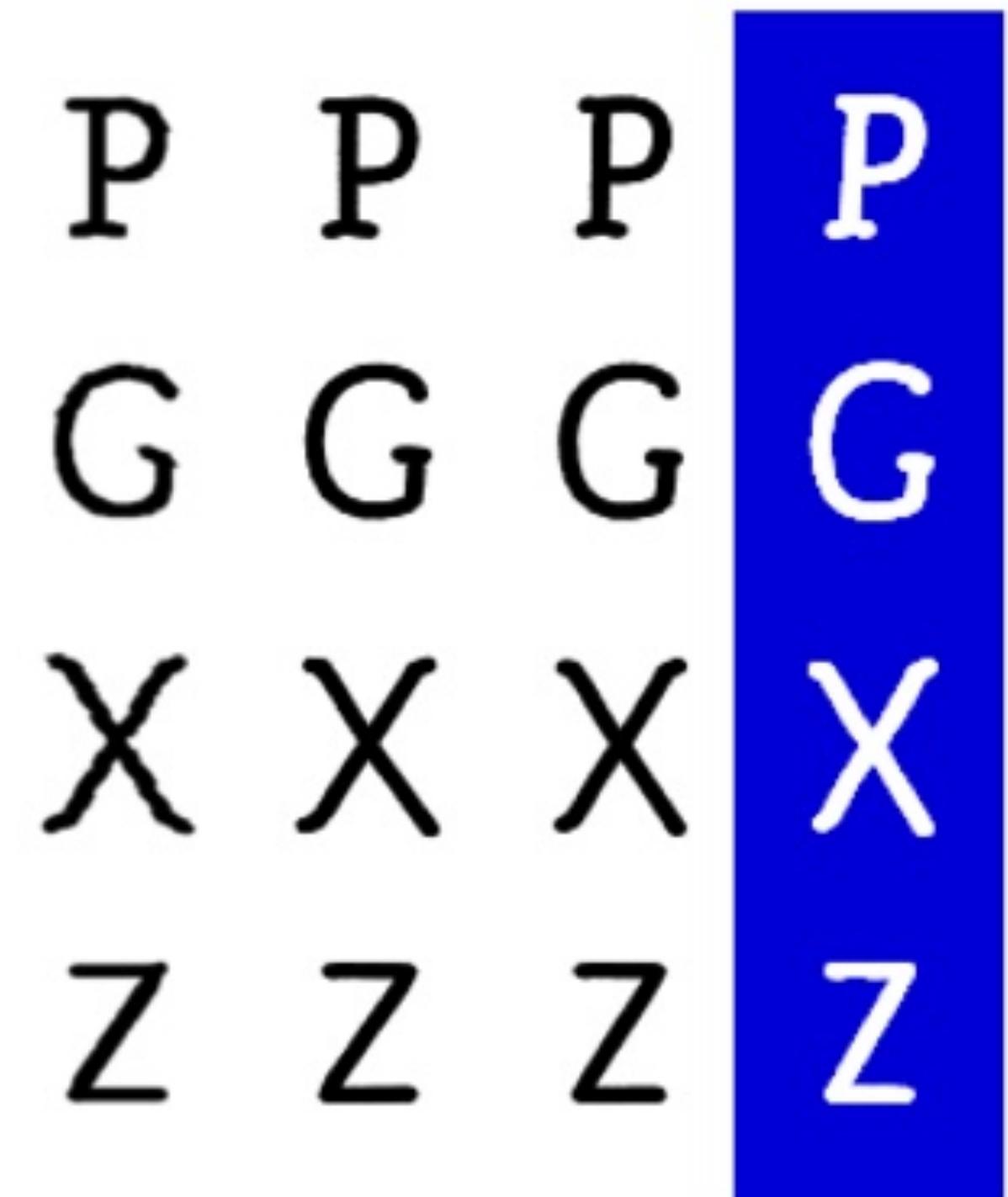
P  
G  
X  
Z

F  
L  
V  
T

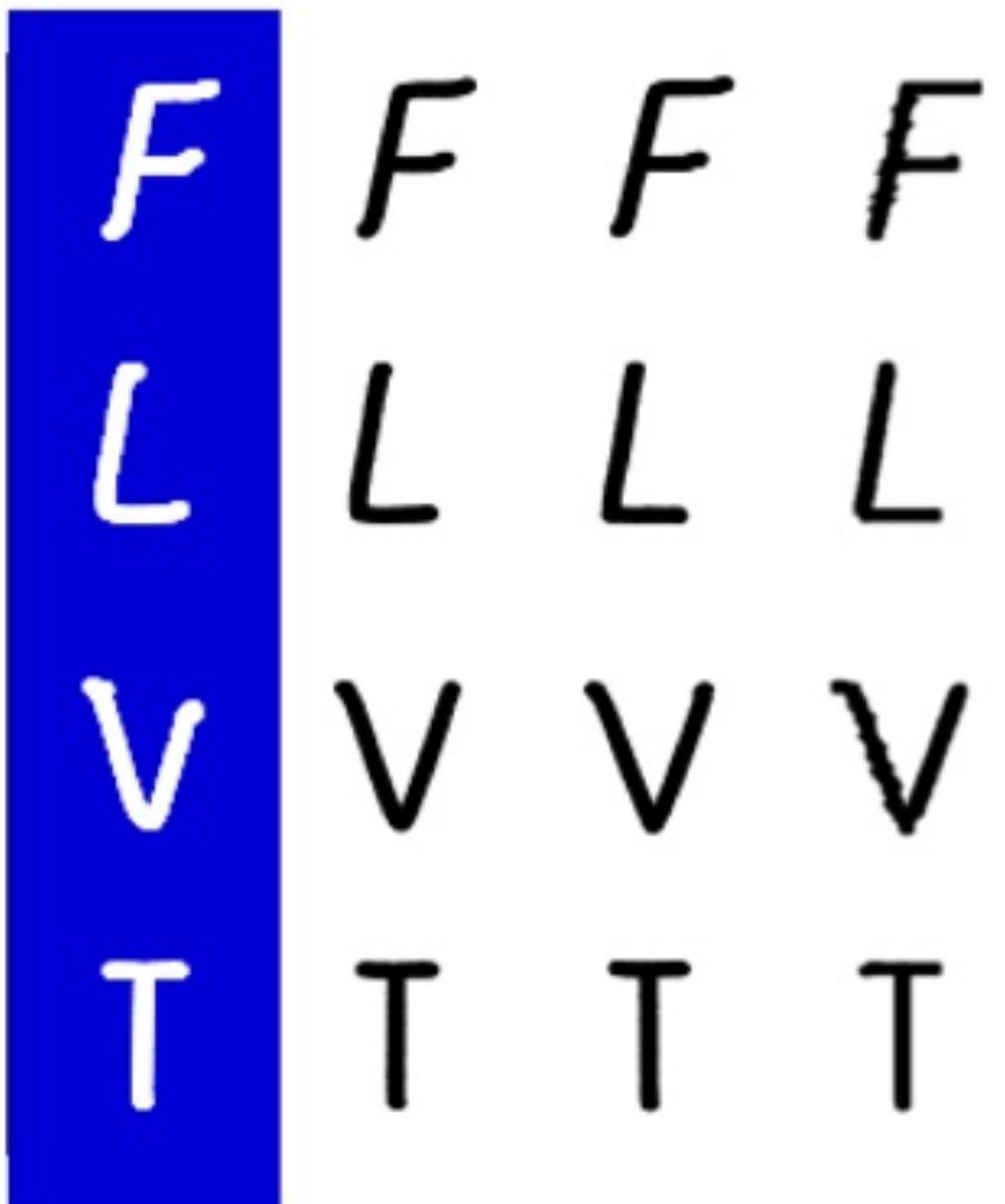
P P  
G G  
X X  
Z Z

F F  
L L  
V V  
T T

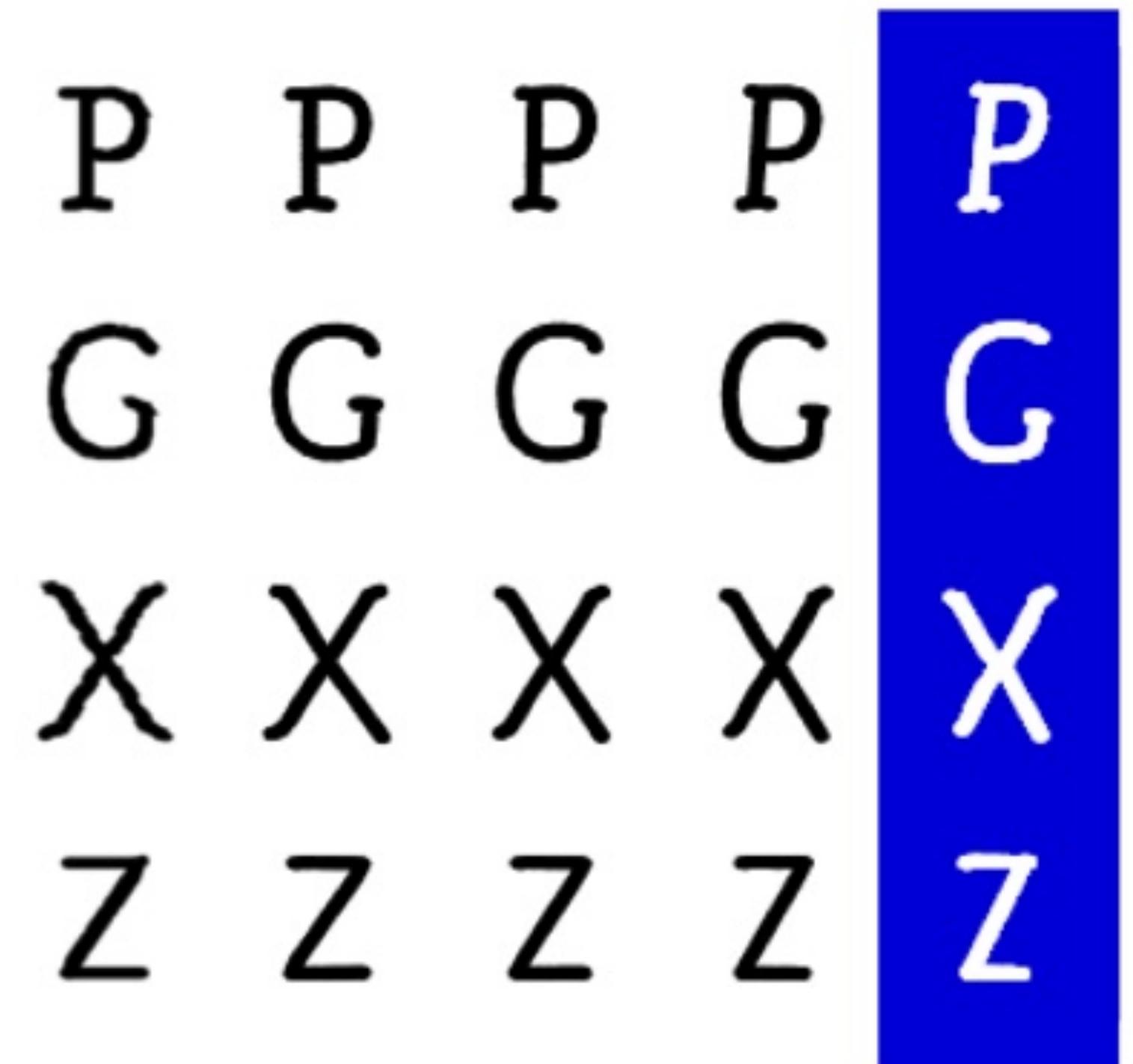




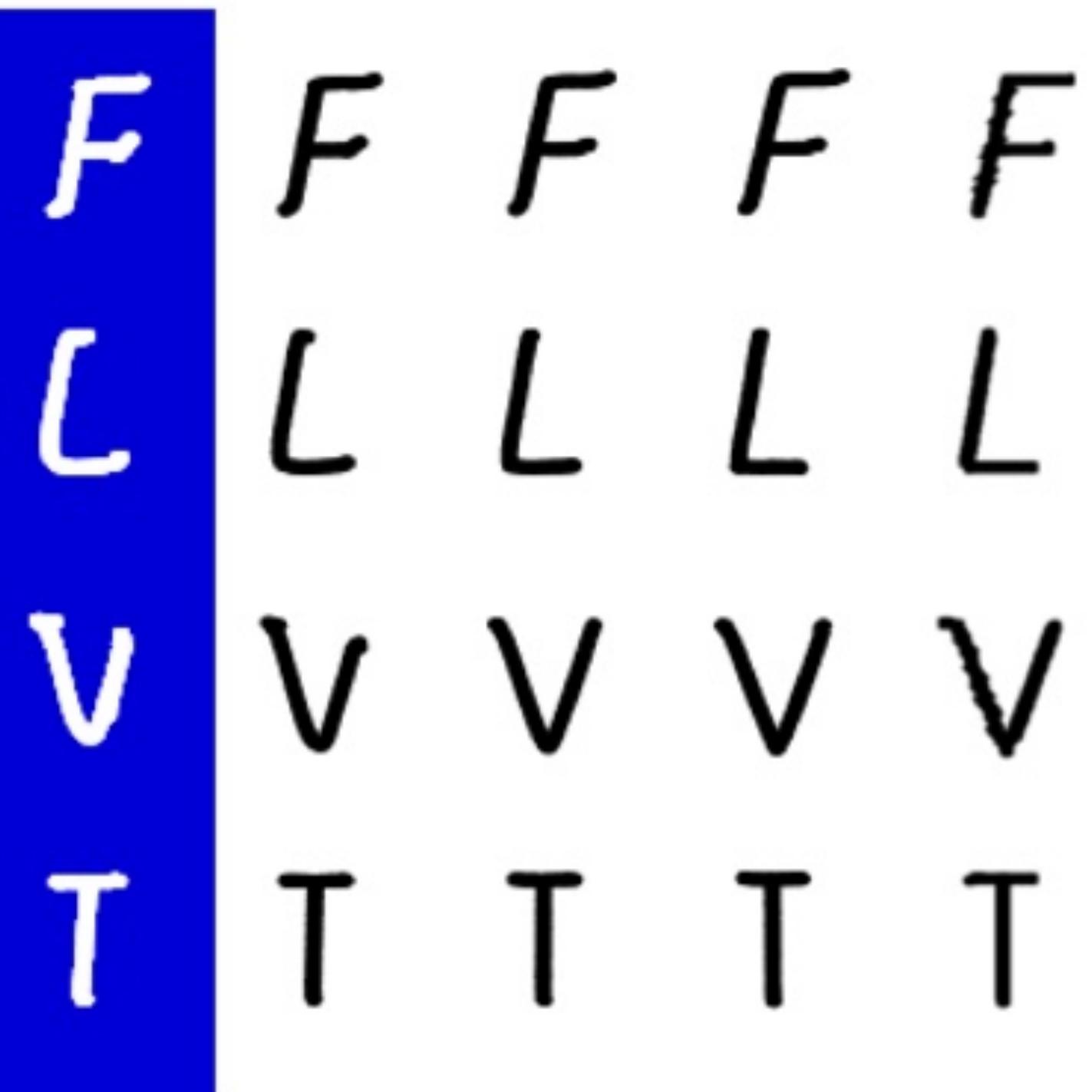
P	P	P	P
G	G	G	G
X	X	X	X
Z	Z	Z	Z



F	F	F	F
L	L	L	L
V	V	V	V
T	T	T	T

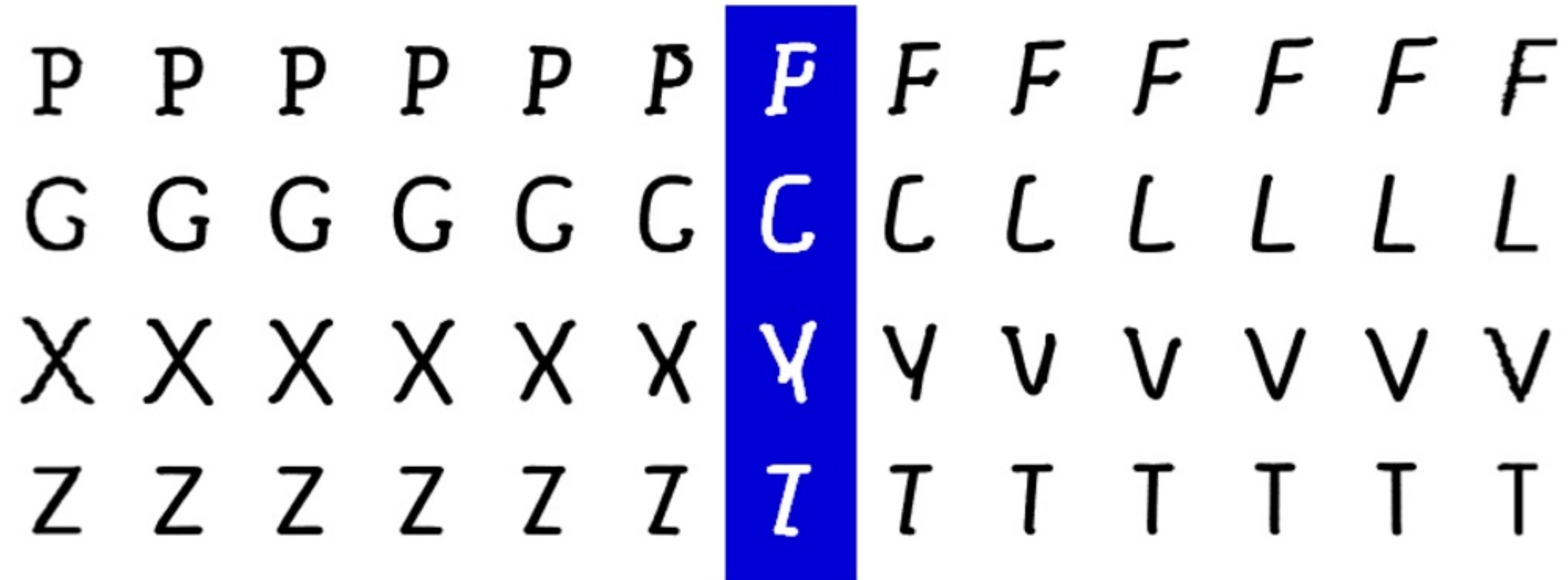


P P P P P  
G G G G G  
X X X X X  
Z Z Z Z Z



F F F F F  
L L L L L  
V V V V V  
T T T T T

P P P P P | P  
F F F F F | F  
C C C C C | C  
V V V V V | V  
T T T T T | T



A grid of letters from a font family, with the central column highlighted in blue. The letters are arranged in four rows:

- Row 1: P, P, P, P, P, P, **P**, F, F, F, F, F, F
- Row 2: G, G, G, G, G, G, **C**, C, C, L, L, L
- Row 3: X, X, X, X, X, X, **Y**, V, V, V, V, V
- Row 4: Z, Z, Z, Z, Z, Z, **T**, T, T, T, T, T

P P P P P P F F F F F F  
G G G G G C C L L L L L  
X X X X X X Y Y V V V V V  
Z Z Z Z Z Z T T T T T T

P P P P P P F F F F F F  
G G G G G C C C L L L L  
X X X X X X Y Y V V V V V V  
Z Z Z Z Z Z T T T T T T

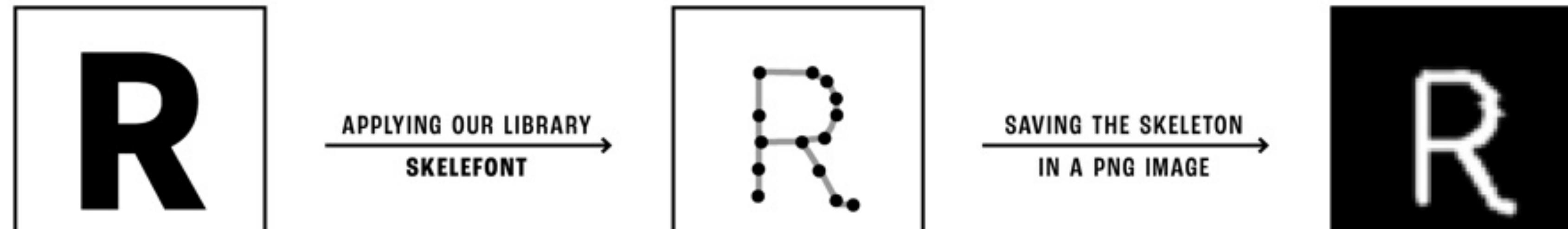
P P P P P P F F F F F F  
G G G G G C C L L L L L  
X X X X X X Y Y V V V V V  
Z Z Z Z Z I T T T T T T

## Results

### IV. Transform Skeletons into Glyphs

## Results

### IV. Transform Skeletons into Glyphs

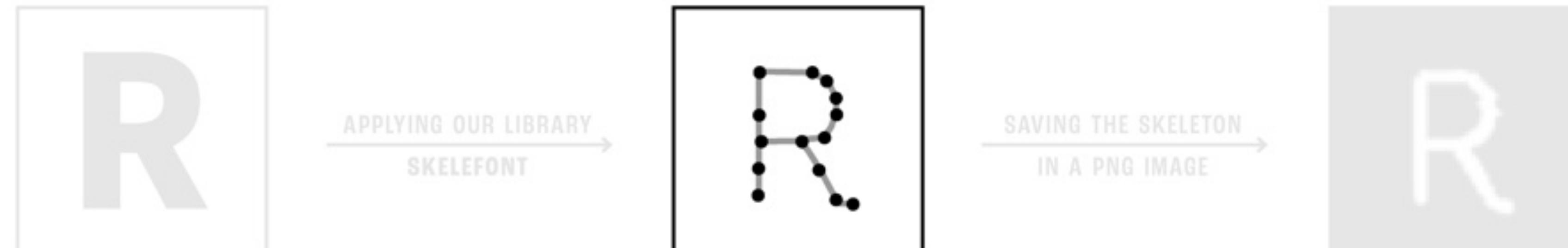


Input  
Glyph

Extracted  
Skeleton

Input's  
Model

A list of ordered:  
**point coordinates**  
and **stroke width**

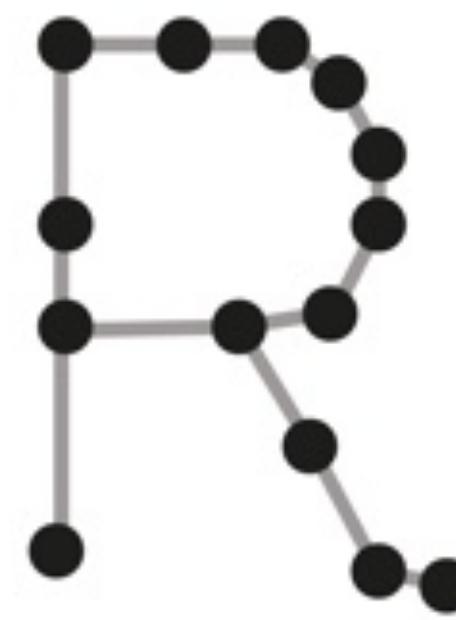


Input  
Glyph

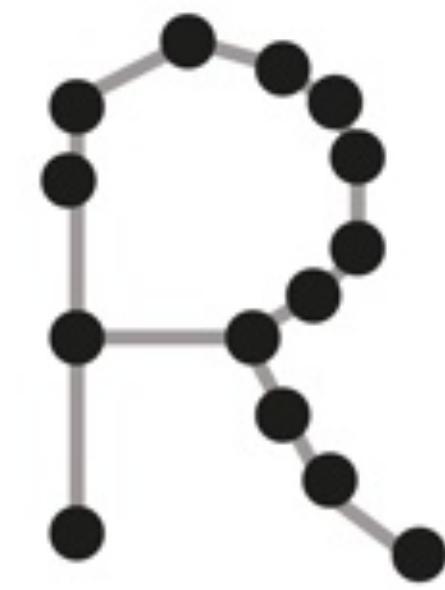
Input's  
Model

A list of ordered:  
**point coordinates**  
and **stroke width**

Select two **Reconstructed Skeletons**

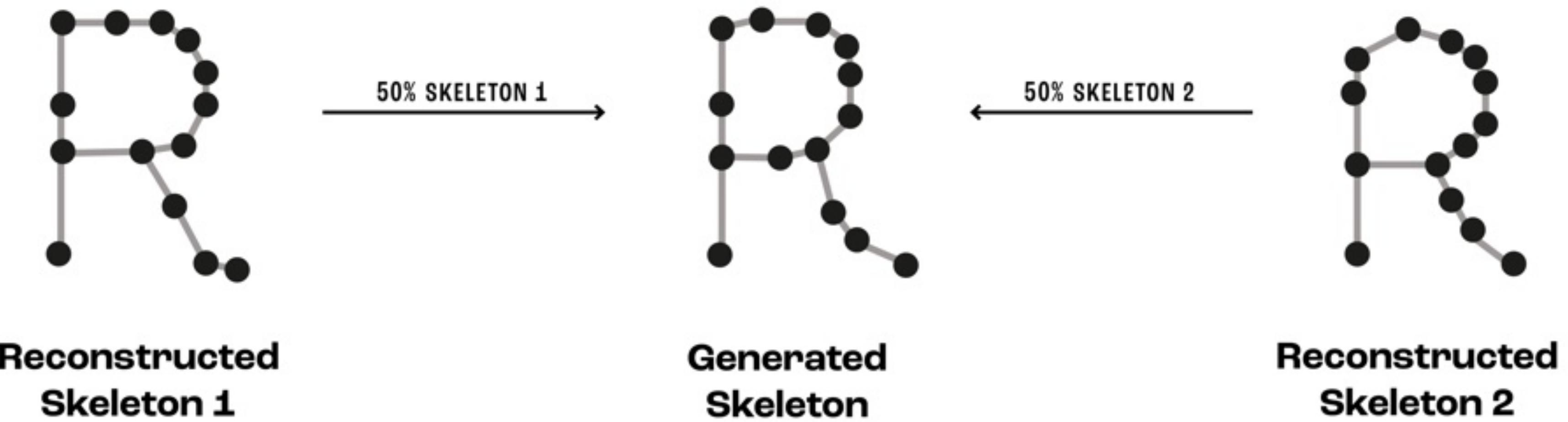


**Reconstructed  
Skeleton 1**



**Reconstructed  
Skeleton 2**

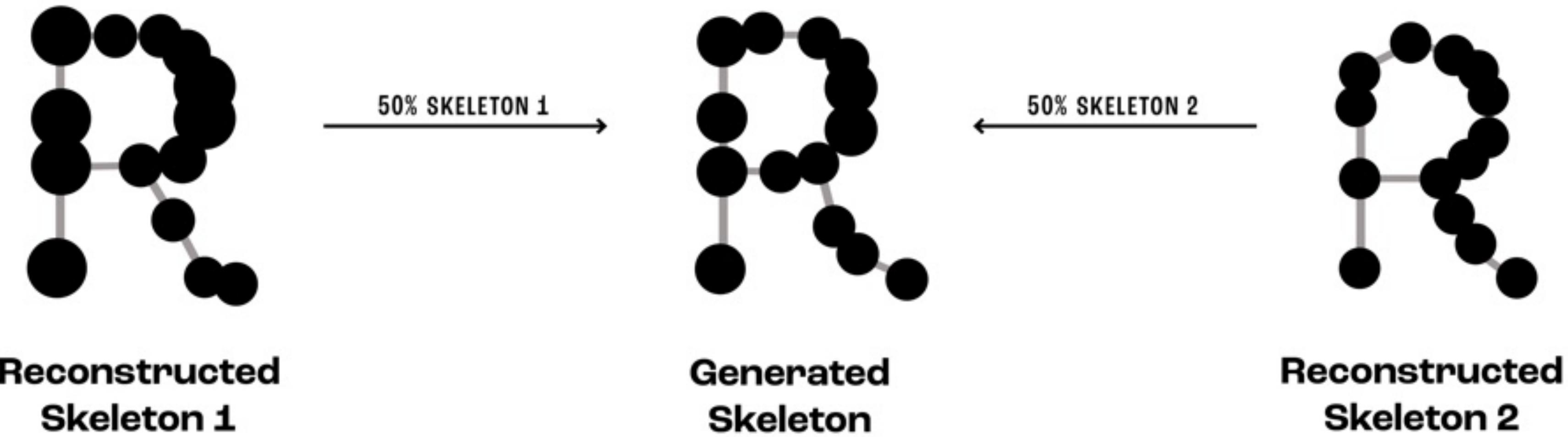
## Create an **Blended Skeleton**



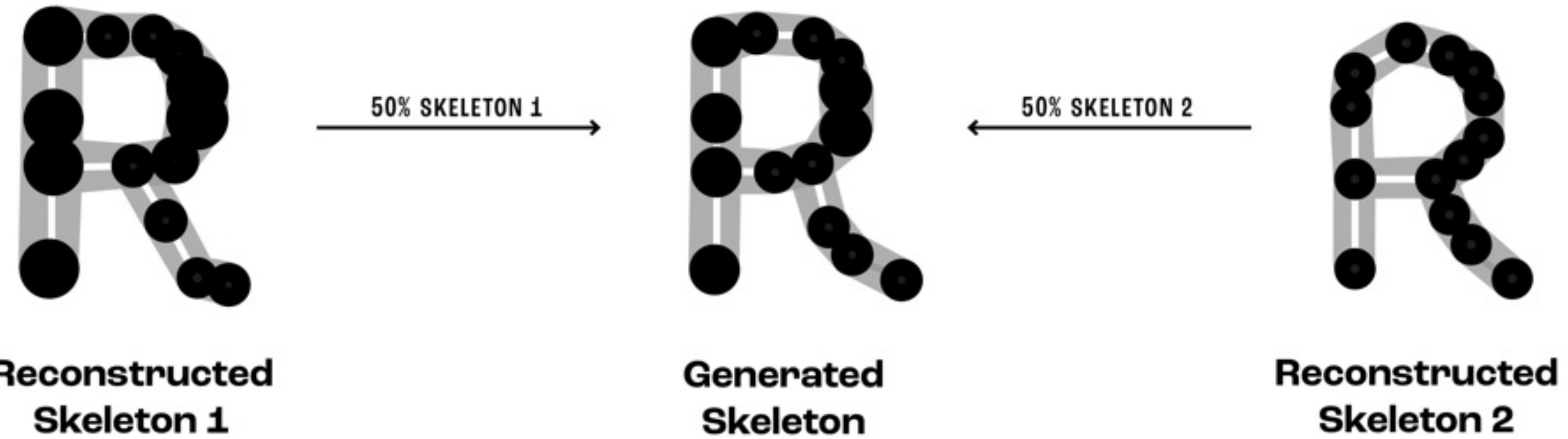
Add the **stroke width** in each point



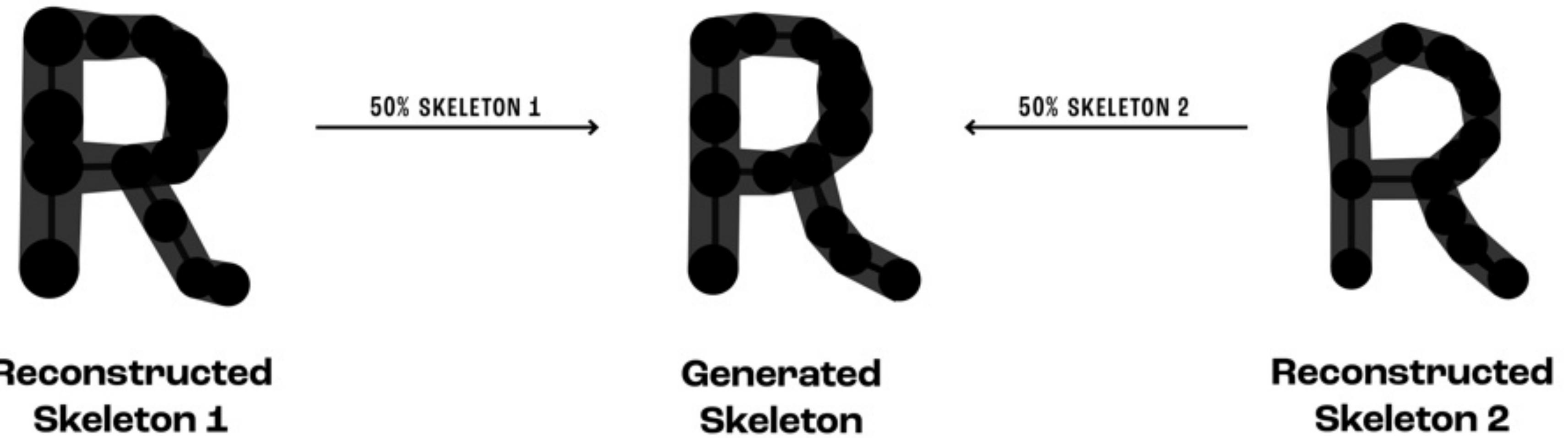
Add the **stroke width** in each point  
and **blend** them to create the new filling



**Connect** the points with a line of varying thickness



Create new glyphs



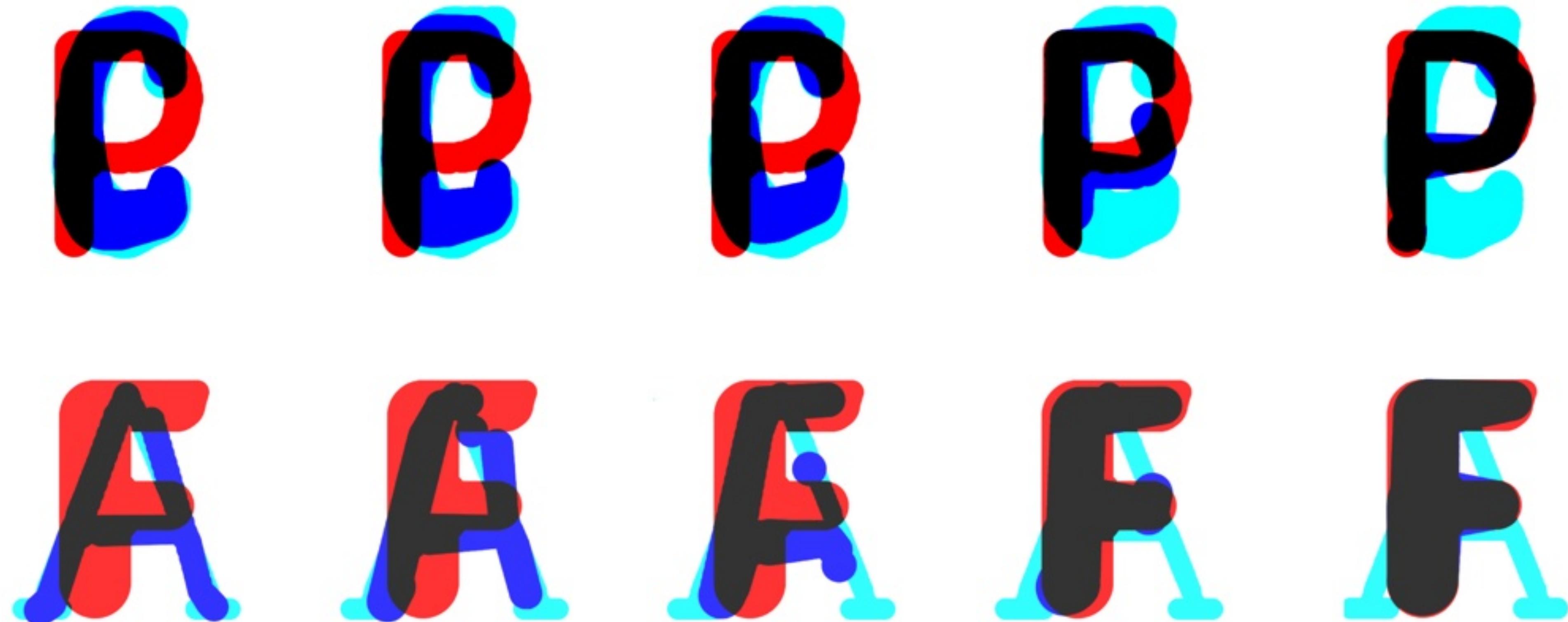
# Create Design Artefacts

# Create Design Artefacts

## I. First Application











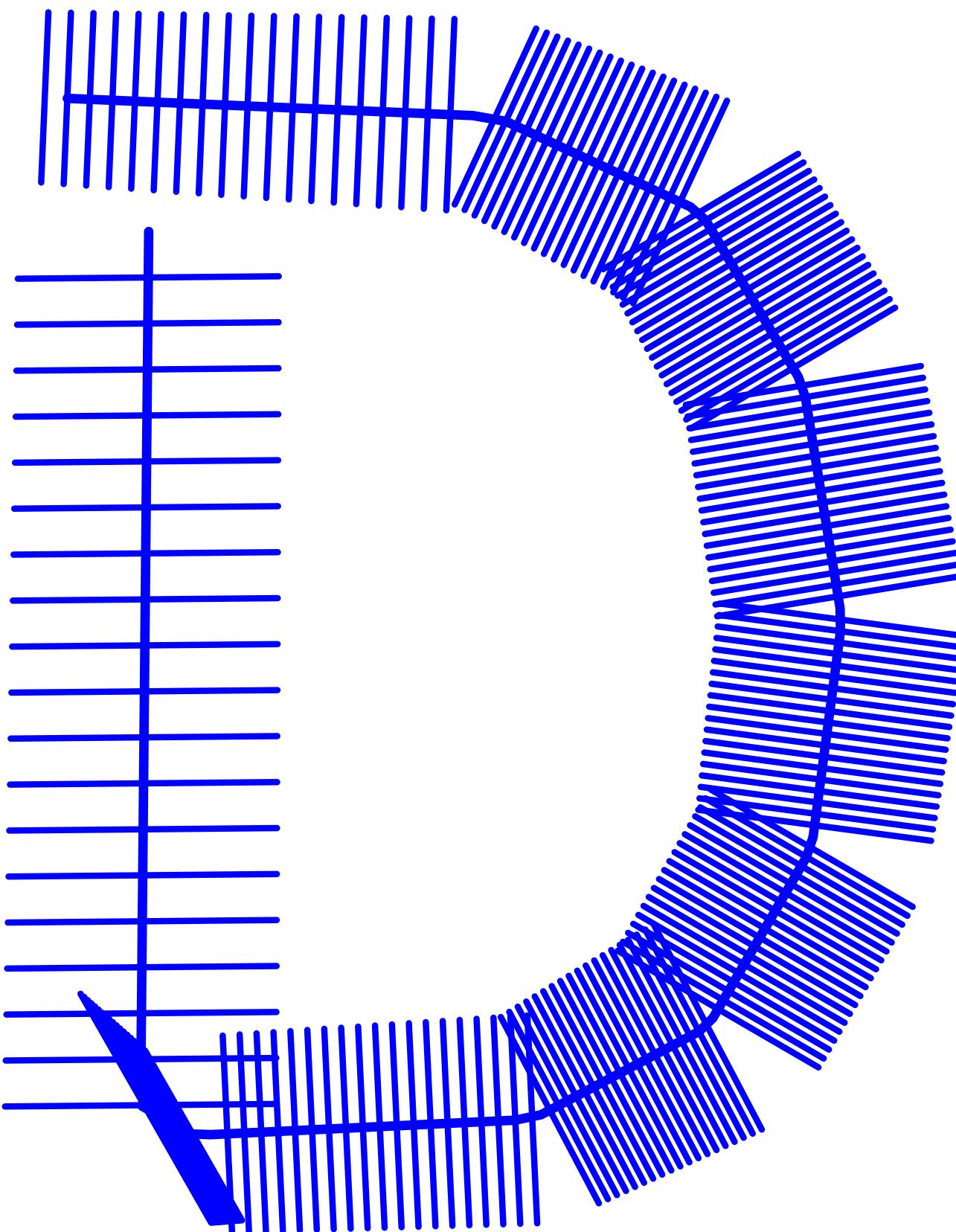


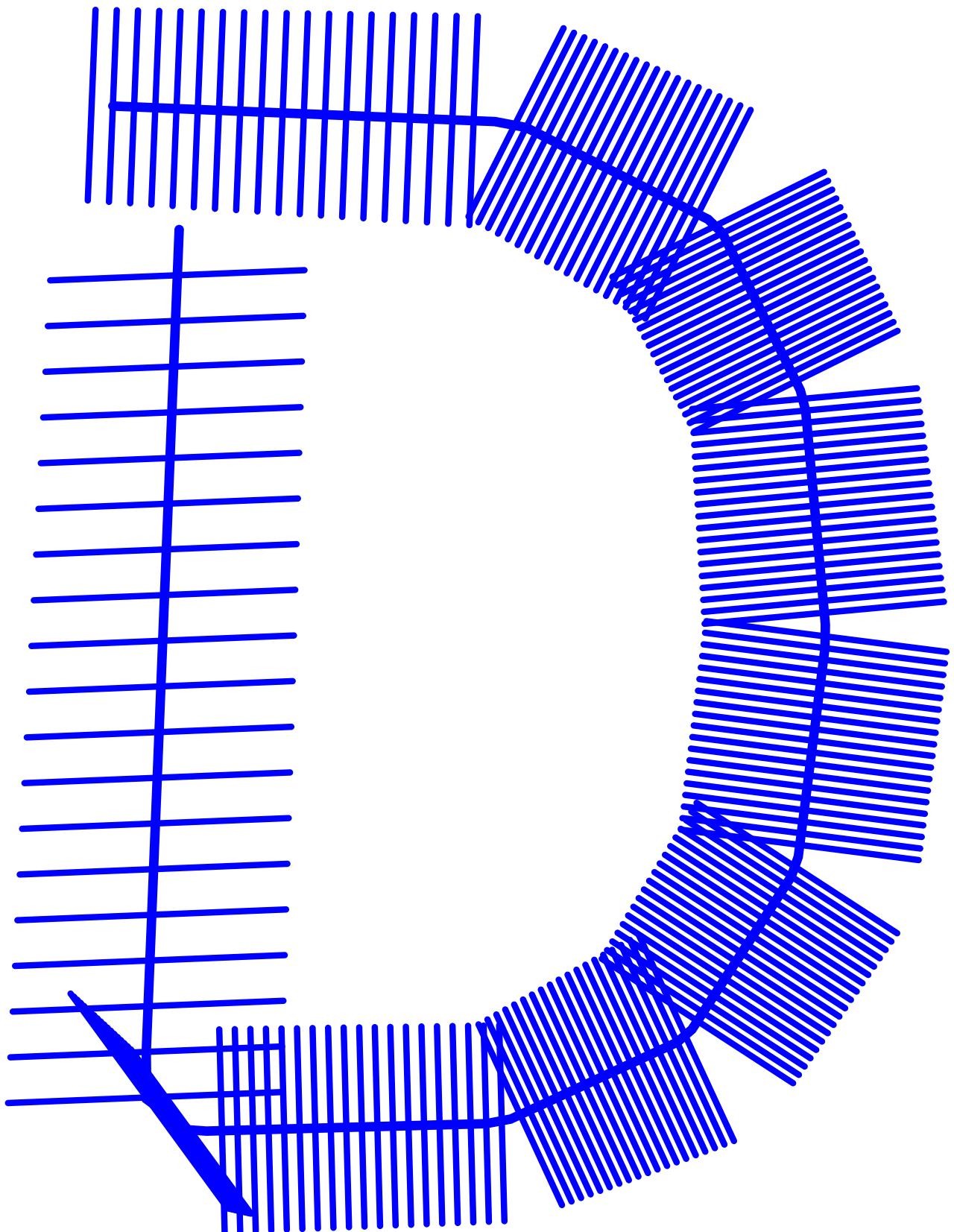
CREATE DESIGN ARTEFACTS — First Application

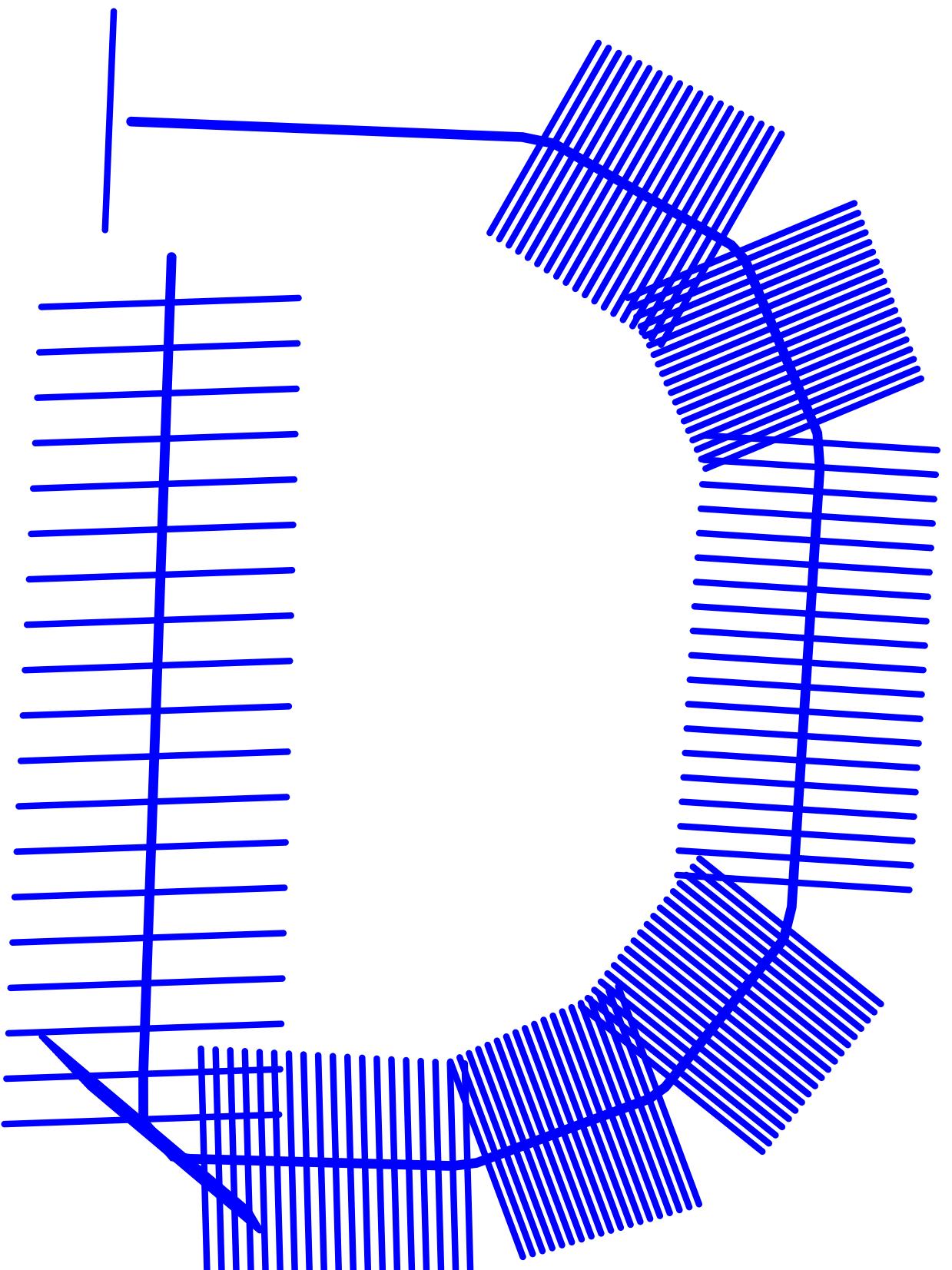


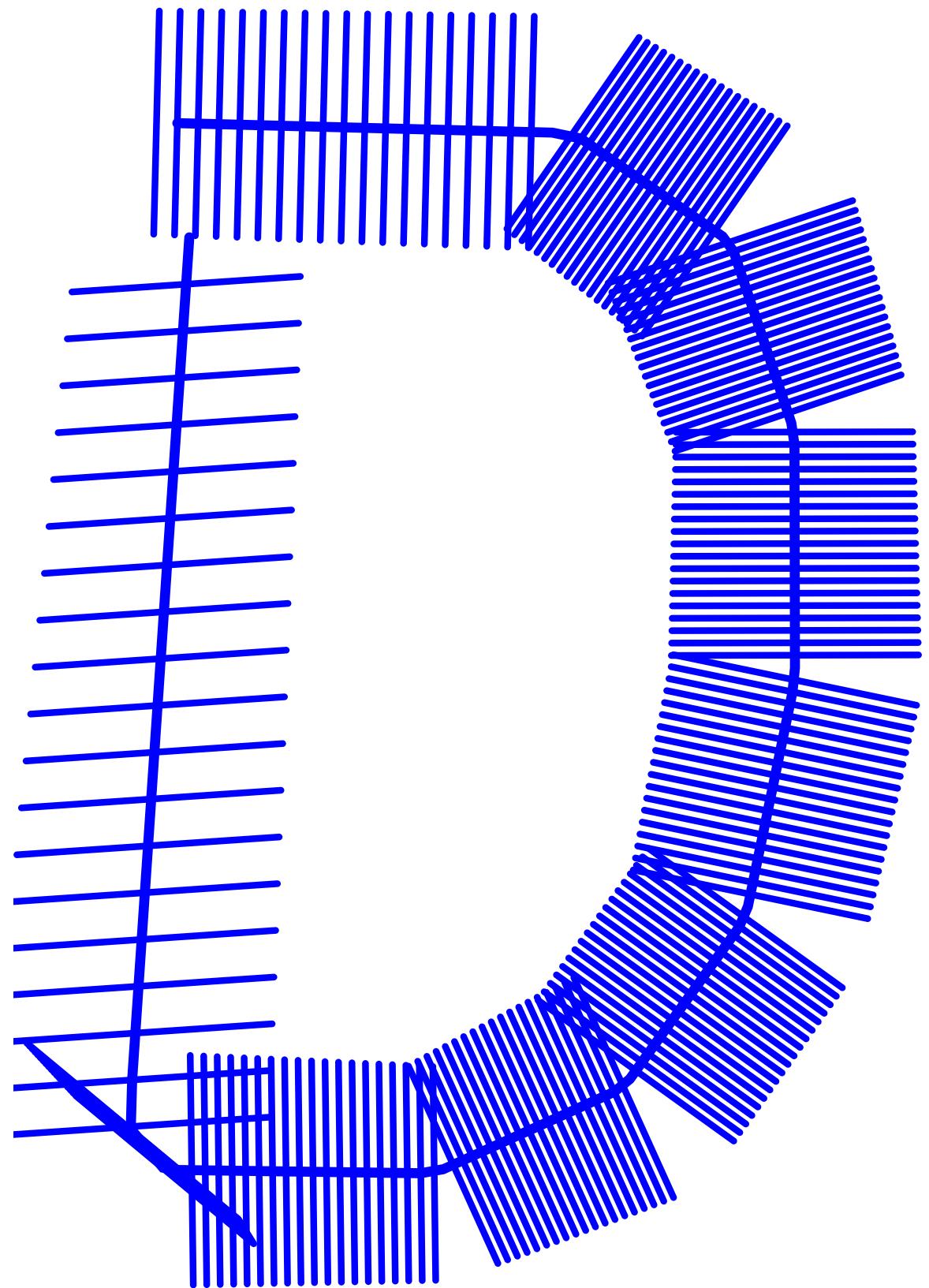
# Create Design Artefacts

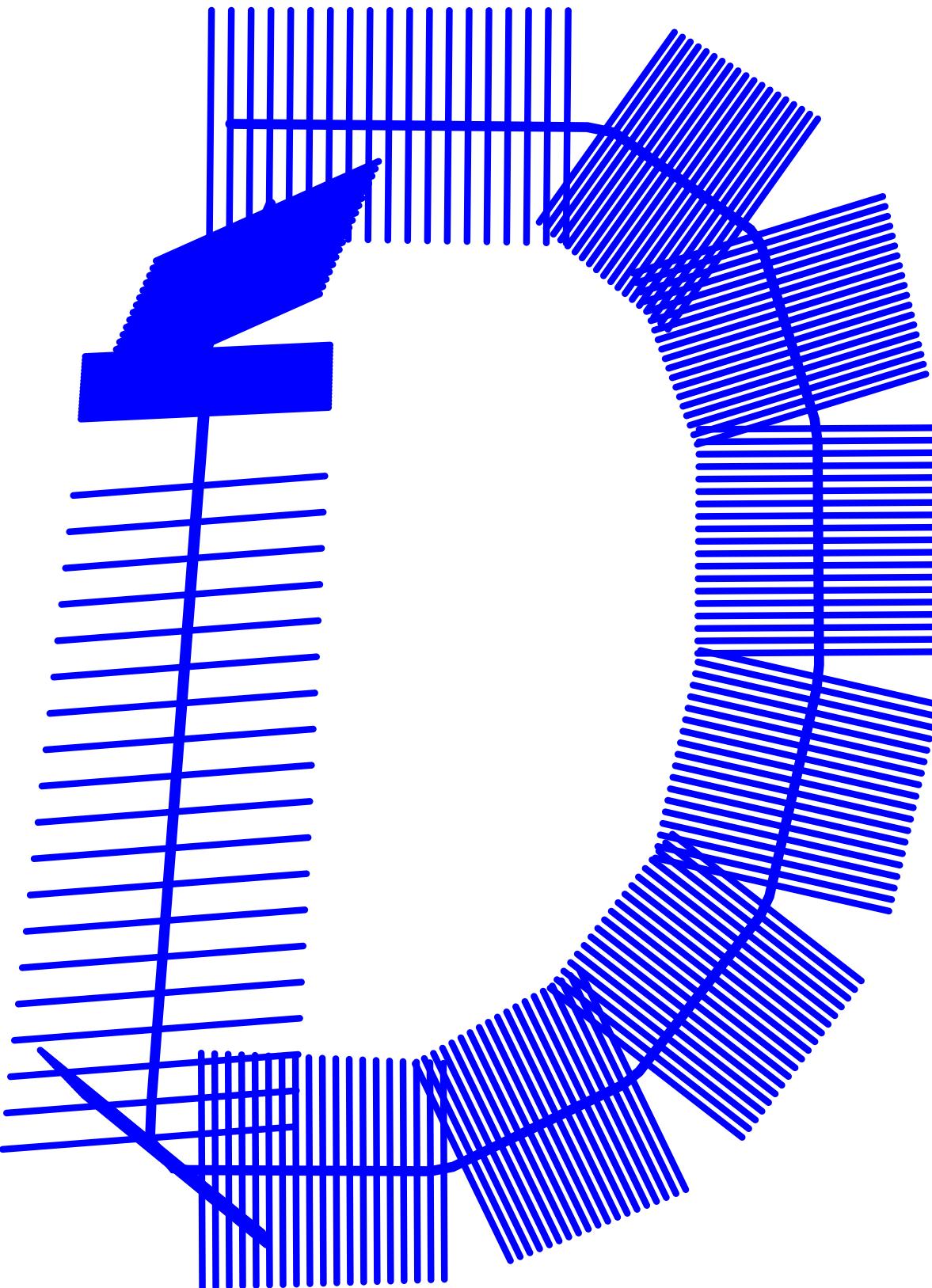
## II. Second Application

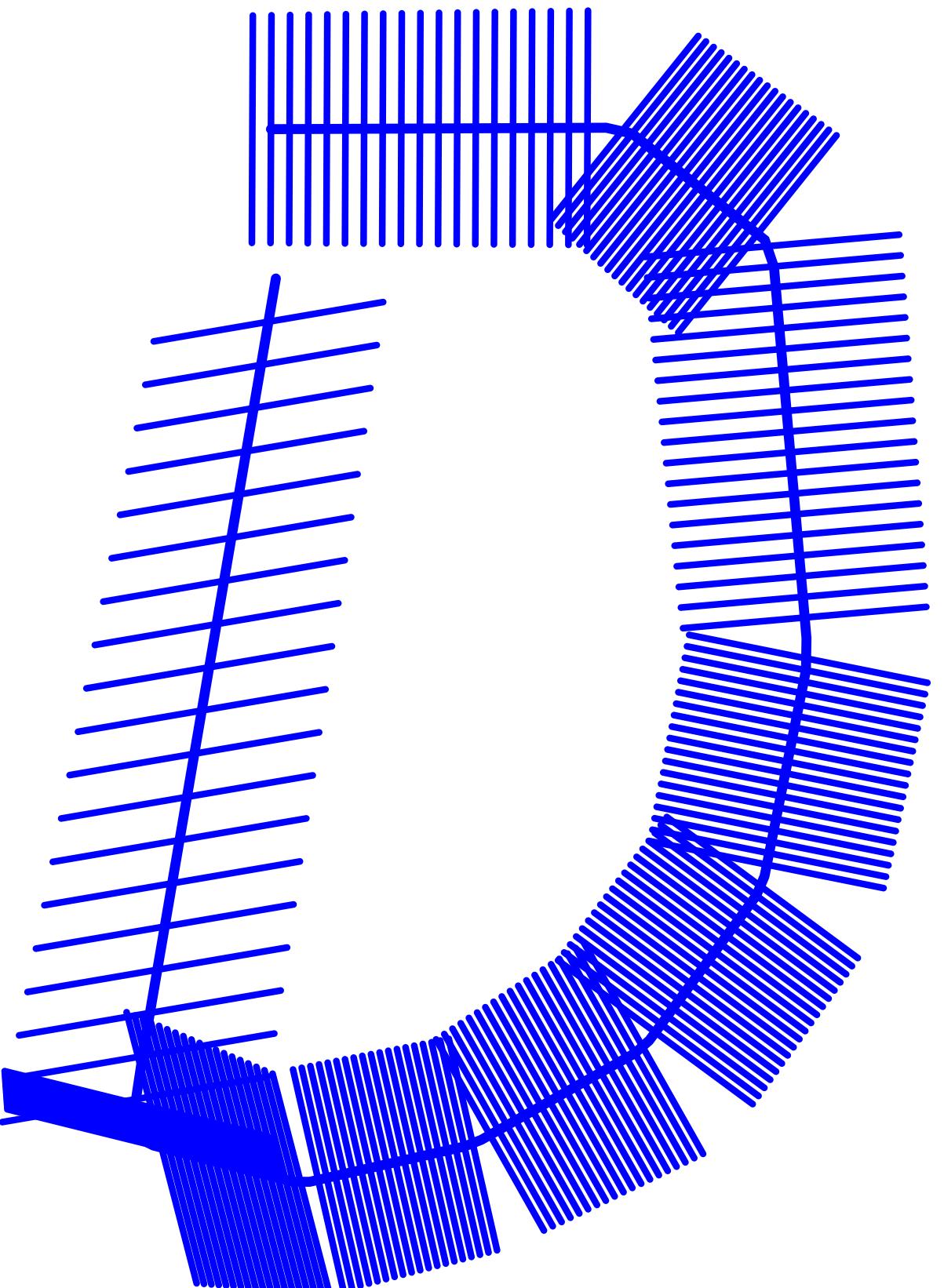


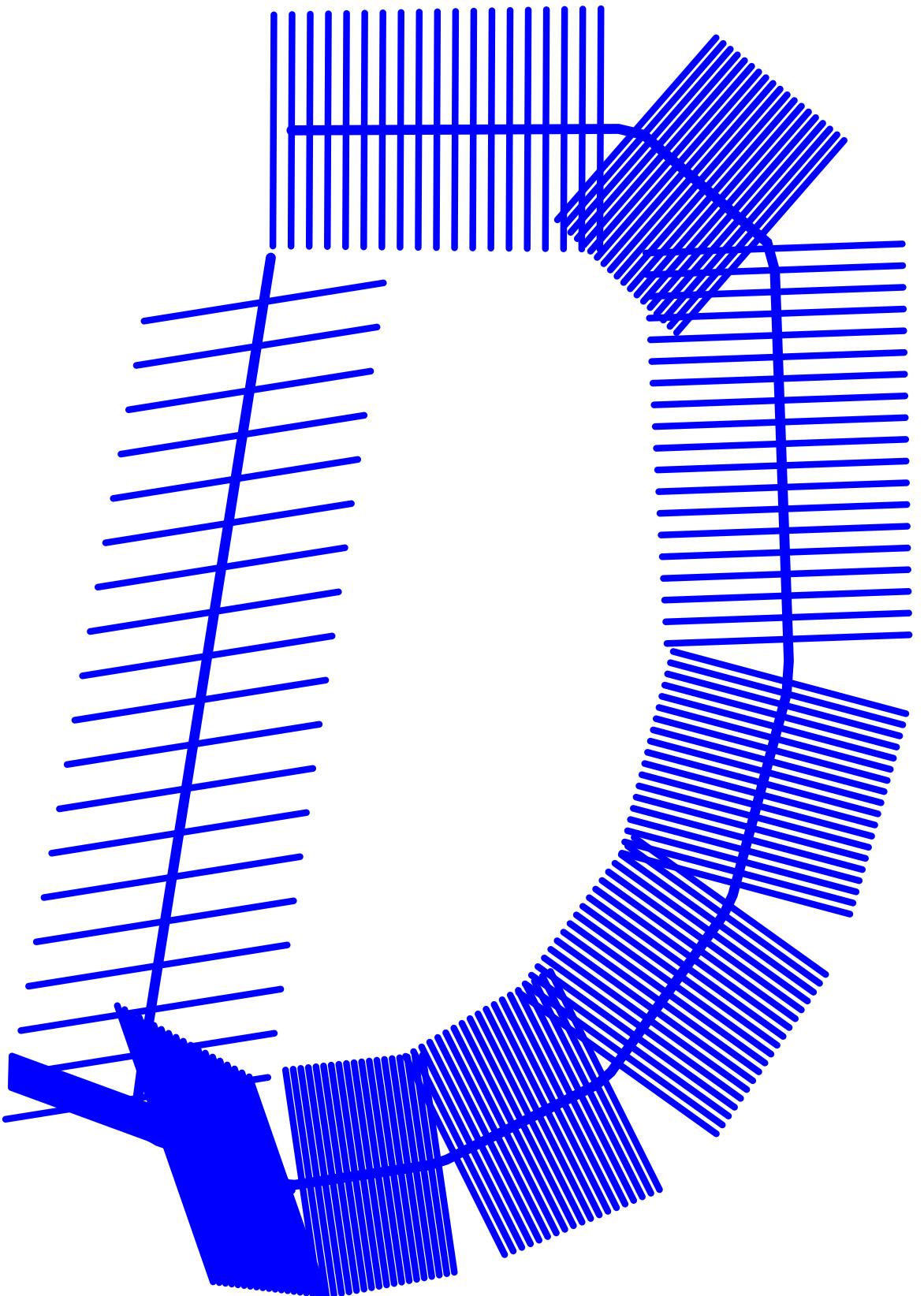


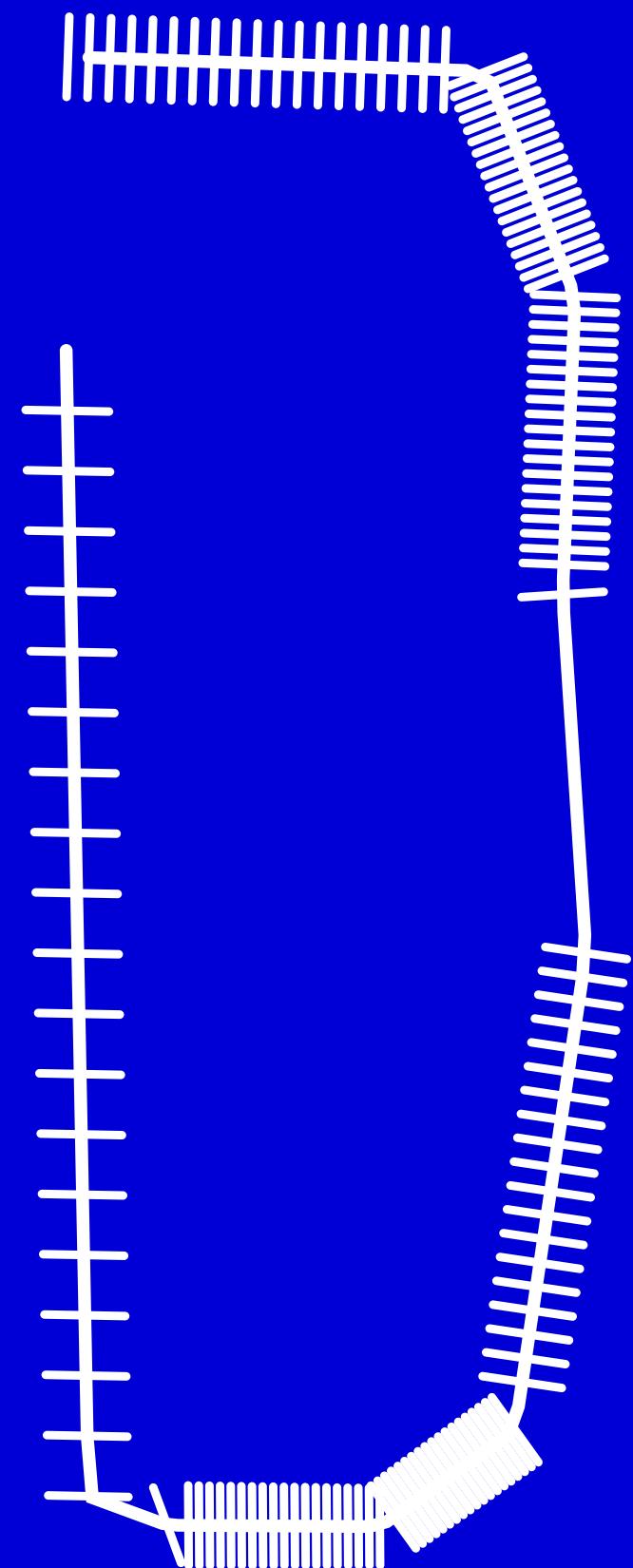


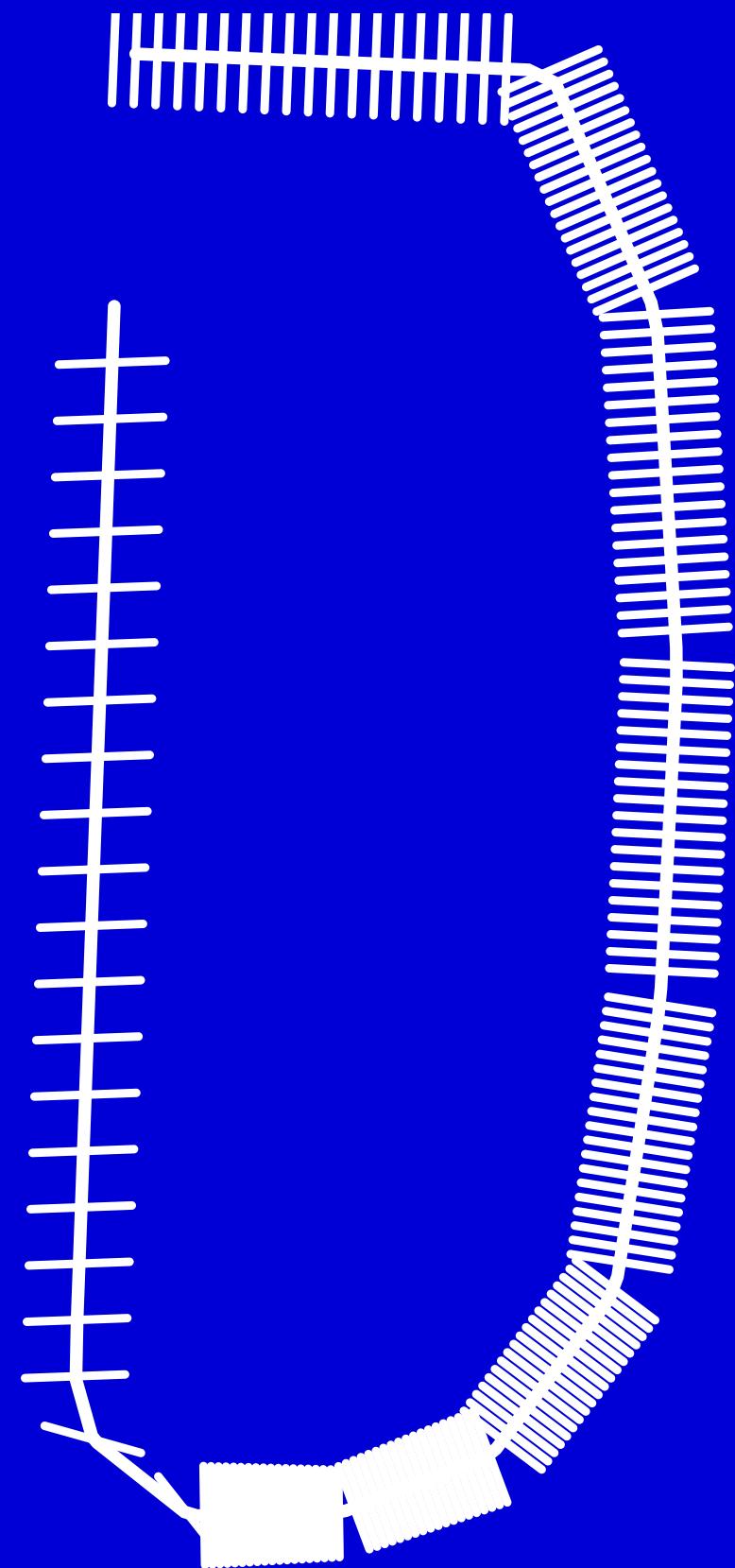


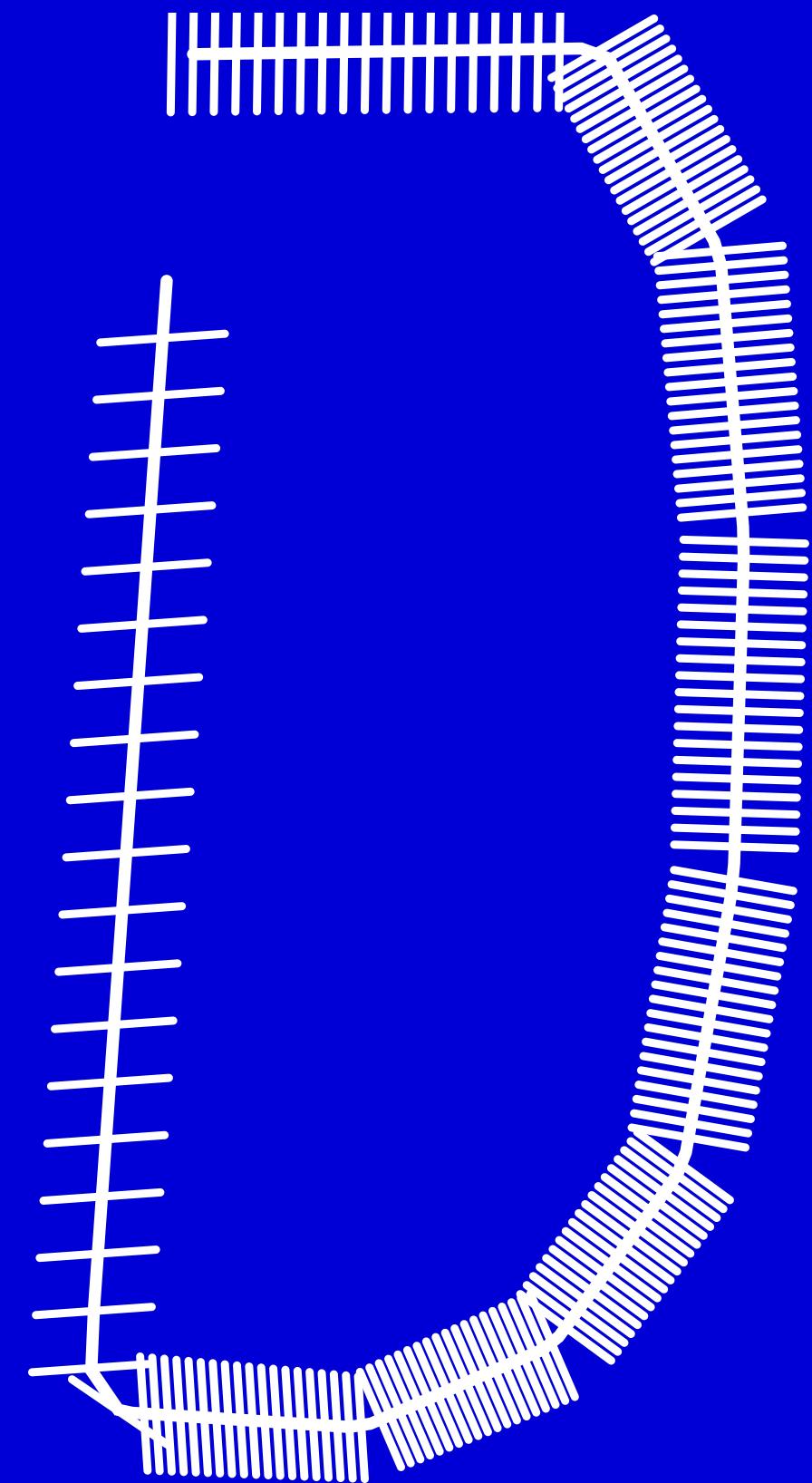


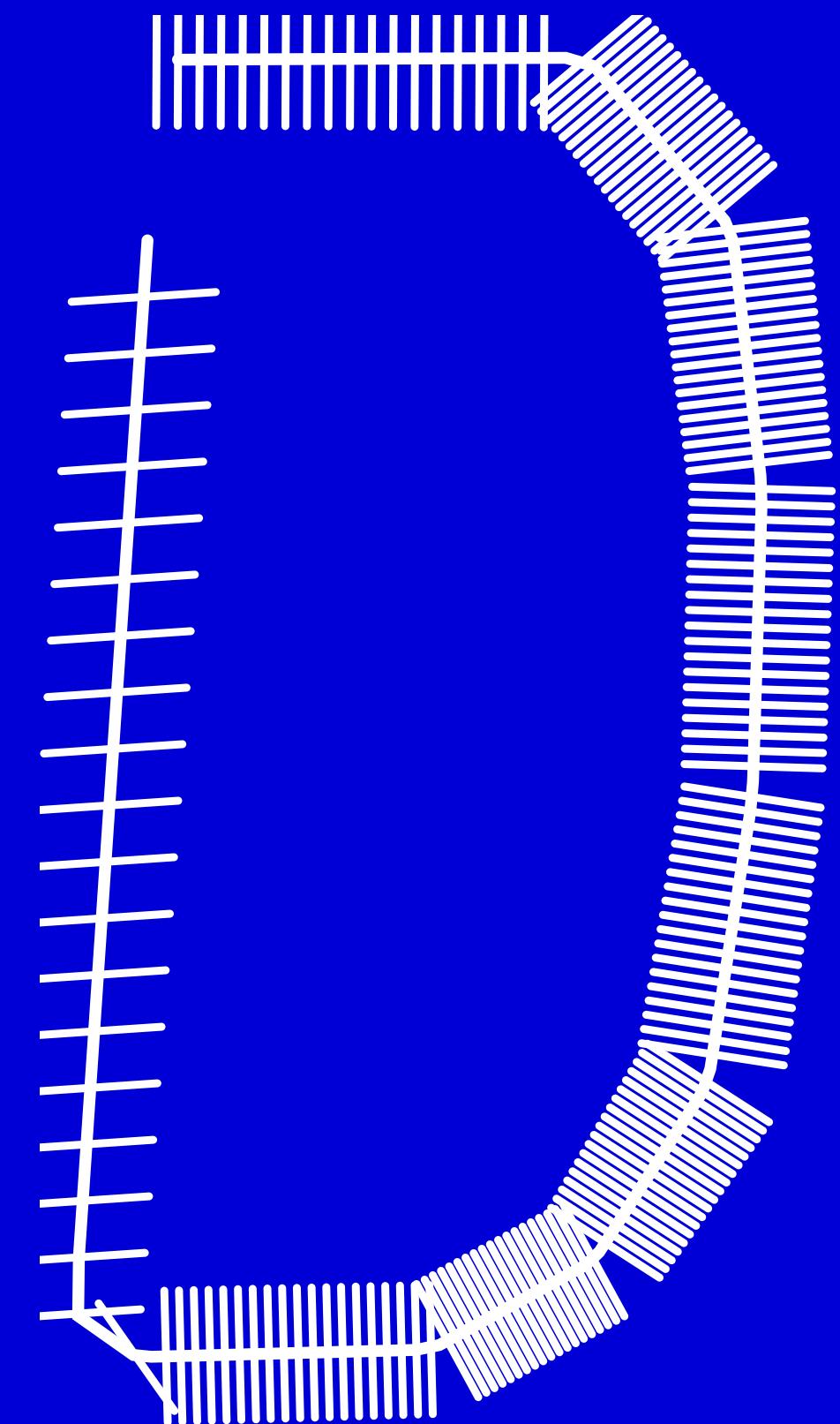


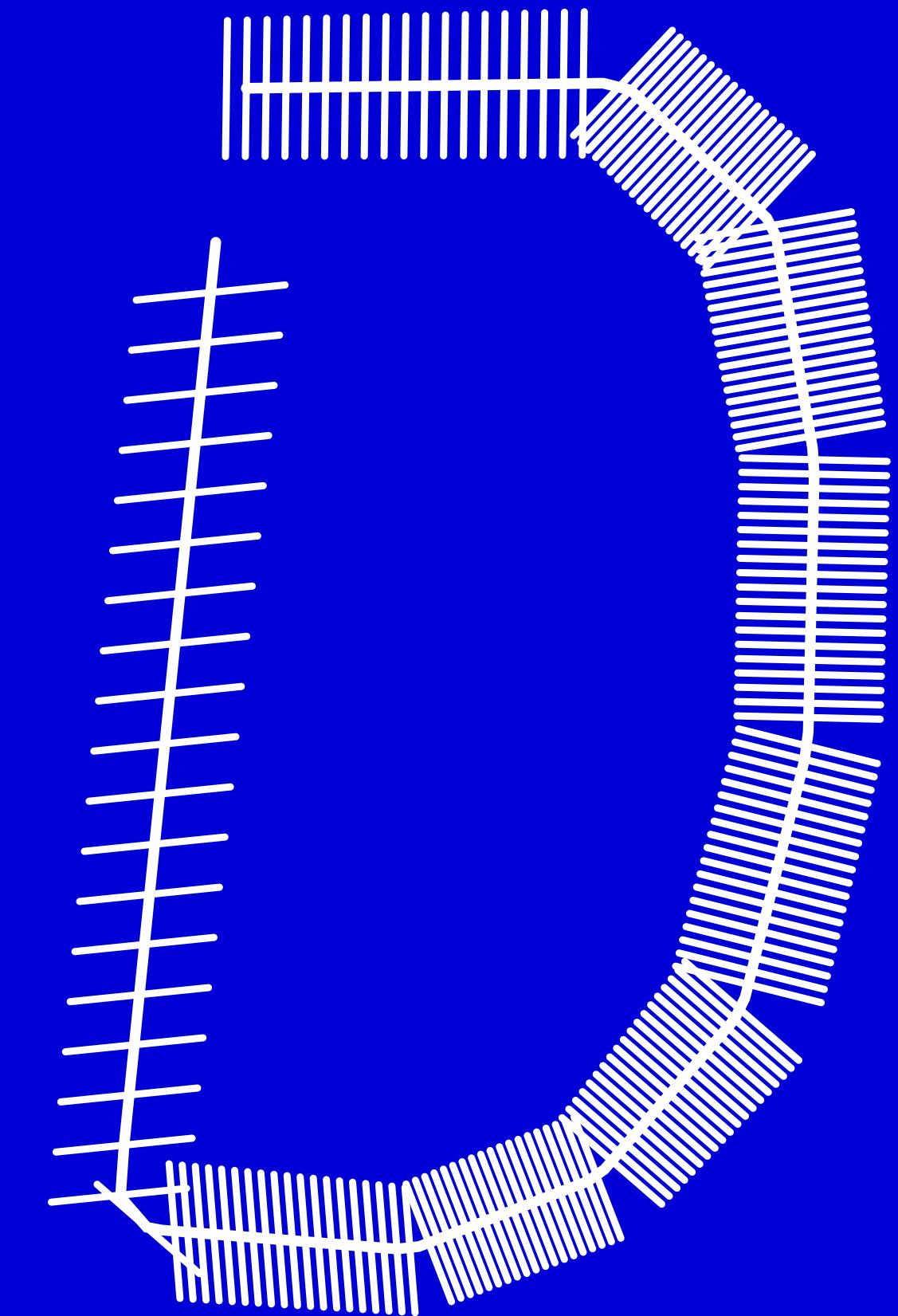


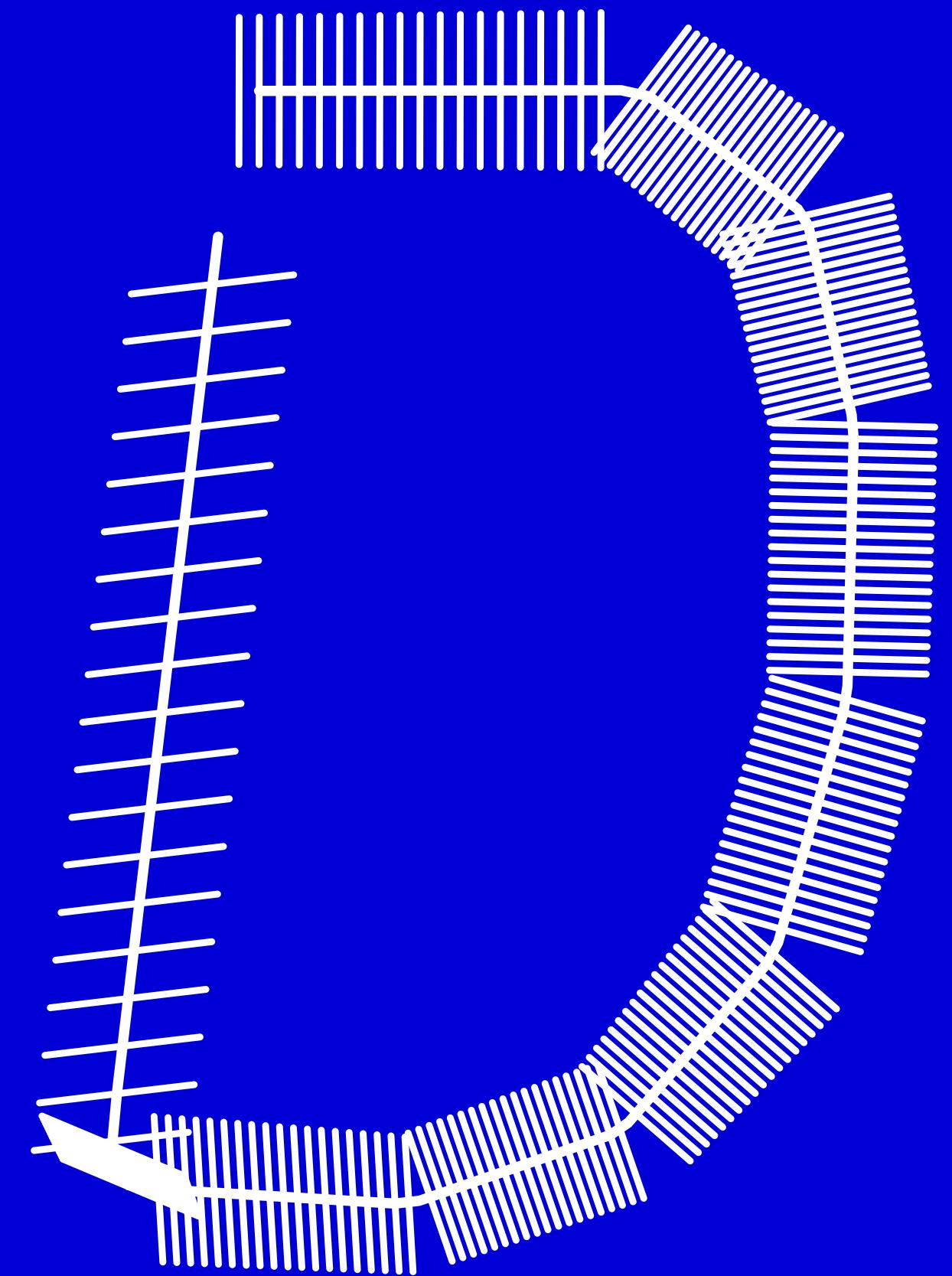


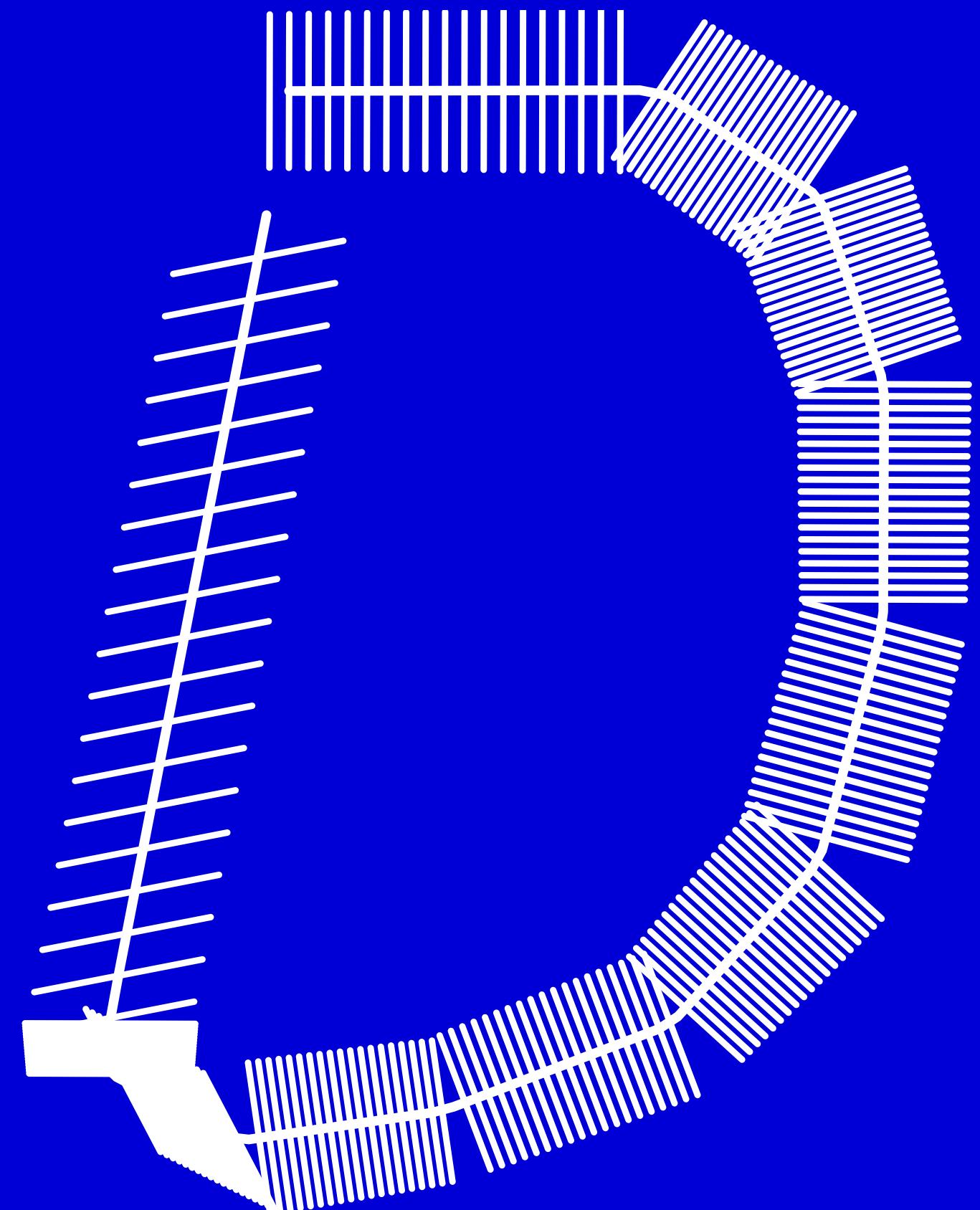


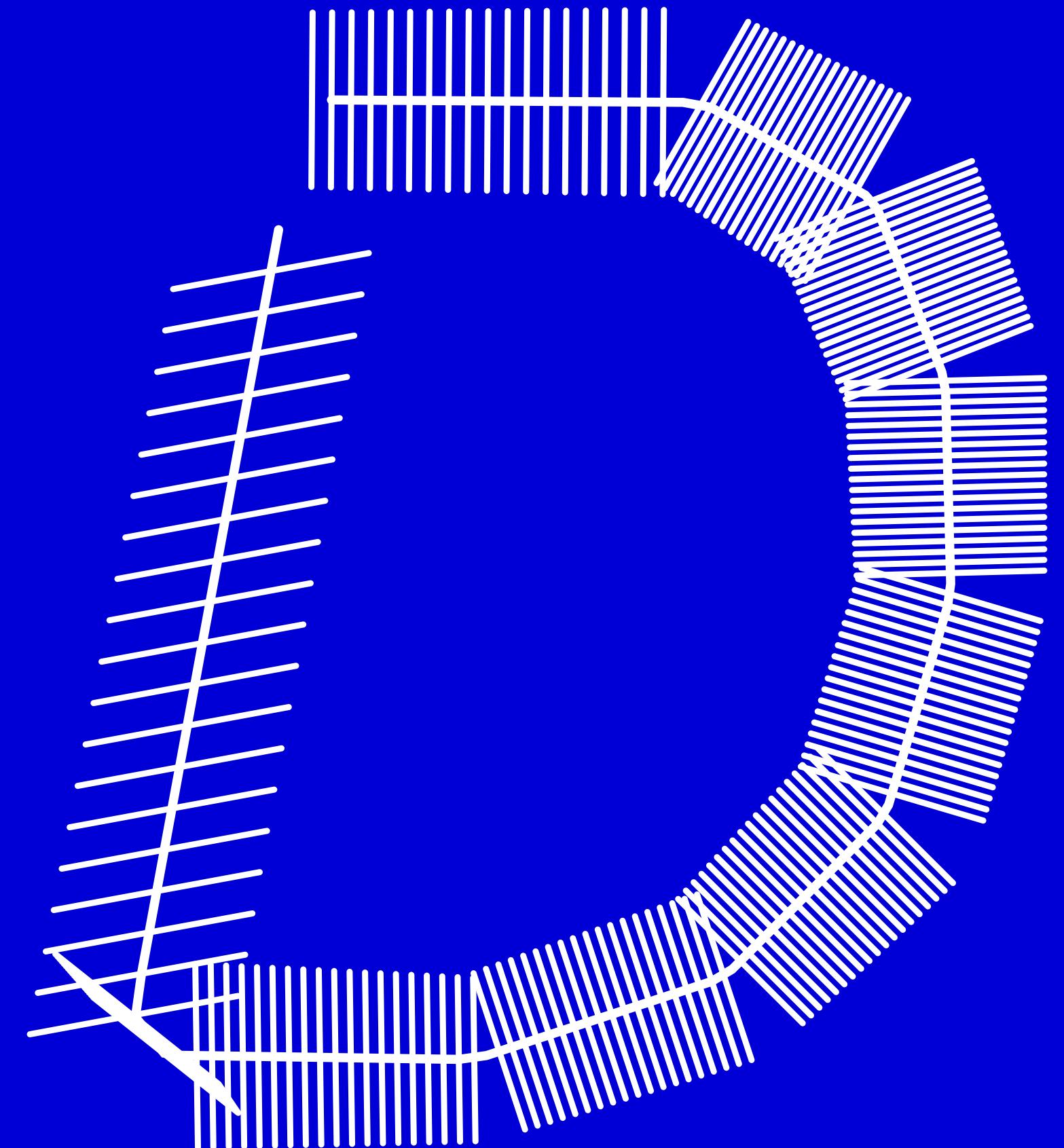












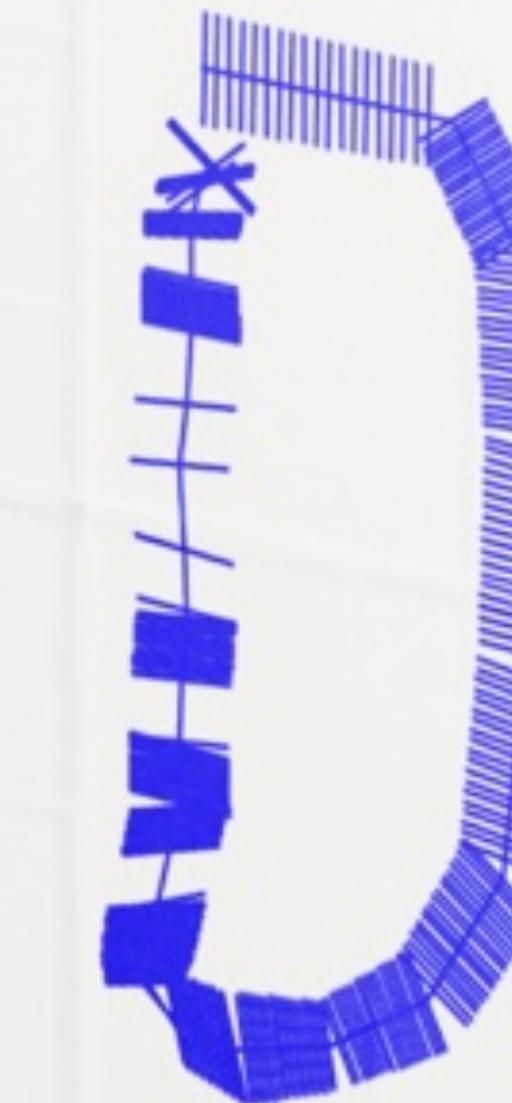


*Albert Whitman & Company*



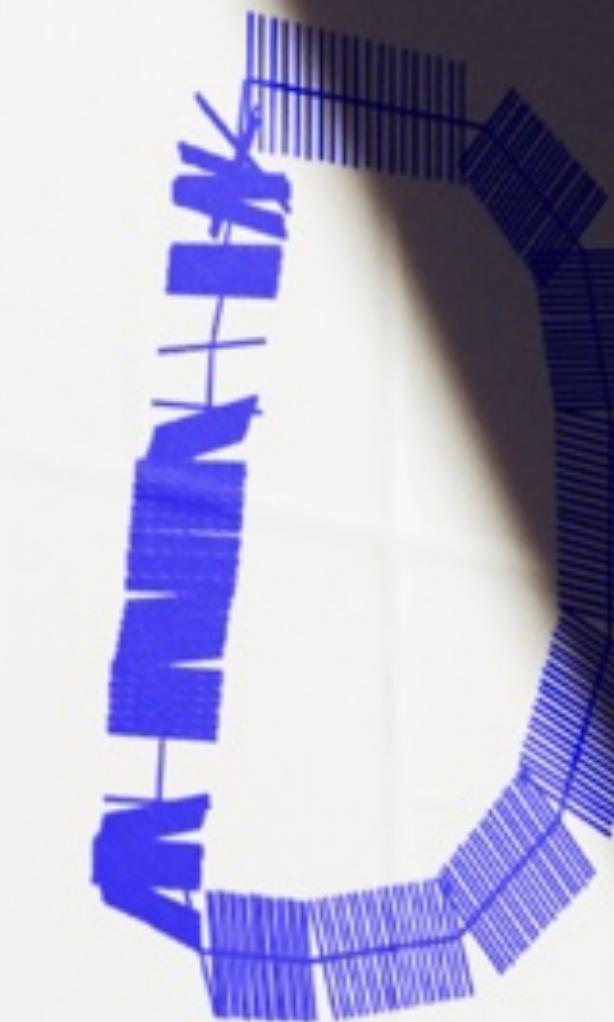
↑

DECONSTRUCTED



↑

*Conversations*



*Albert Whitman & Company*

# Thank You!



LUÍS GONÇALO  
*lgoncalo@dei.uc.pt*

JÉSSICA PARENTE  
*jparente@dei.uc.pt*