Loss of Sonnet 18

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Abstract

This project is an explorative digital art installation that delves into the phenomenon of generation loss in digital signal processing - the inevitable degradation of information (e.g., words) quality through copying and propagation. It transcends the technical realm to probe how this concept applies to the transmission and transformation of words and meanings through time and technology. It consists of a series of videos illustrating the loss of words themselves and their meaning, combined with real-time interpretation from both humans and AI. The project allows the audience to find a border of loss, beyond which, information of words might change.
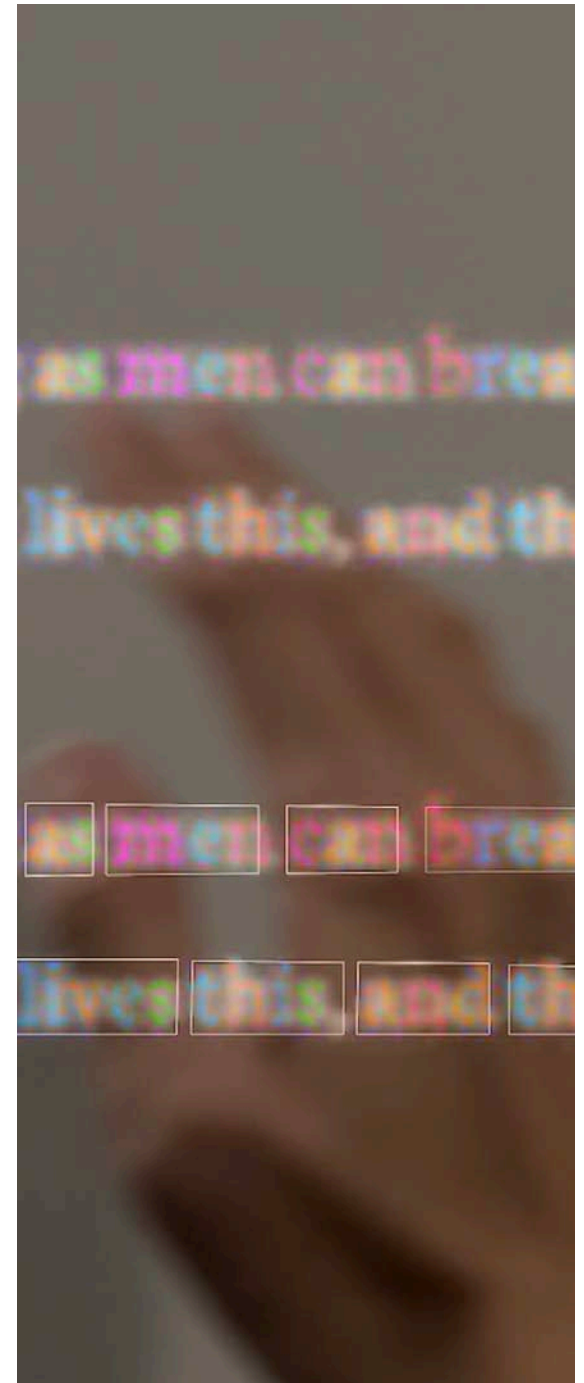
Mediums
Video Installation.

Keywords
Generation Loss; Information Communication; Noise; OCR; Data Art.

Website
https://osf.io/kjtrb/

Conceptual Foundation

At the heart of "Loss of *Sonnet 18*" lies an acknowledgment of the inherent loss in information storage and spreading, echoing through the corridors of human history and our methods of preserving and transmitting words. Although there is an inherent loss in information transfer, the thought behind information (i.e., the "word" in this project context) storage hardly changes.

Depicting the everlasting beauty, regardless of any loss, Shakespeare's *Sonnet 18* serves as our inspiration, a poetic testament to the fleeting nature of beauty and the supposed immortality bestowed through verse. Yet, this project asks a poignant question: **what happens when the medium of this immortality - the words themselves - undergo generational loss?**

We try to describe the loss of information through time and technique in an intuitive way, and invite the audience to feel both the changing and unchanging of thought behind different iterations of storage and spreading.

Inspirations

Drawing from the pioneering works of David Elliott (JPEG compression for 600 times) [1], Alvin Lucier (I'm Sitting in a Room) [2], and Dietmar Offenhuber (Autographic Visualization) [3], "Loss of *Sonnet 18*" represents a synthesis of art, data, and technology. Specifically, we focus on the generation loss of text data through image medium. We choose the last sentence of Shakespeare's *Sonnet 18*, *"So long as men can breathe or eyes can see, So long lives this, and this gives life to thee,"* as the main text content in our piece.

Shall I compare thee to a summer's day?
Thou art more lovely and more temperate:
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a date:

Sometime too hot the eye of heaven shines,
And often is his gold complexion dimmed;
And every fair from fair sometime declines,
By chance, or nature's changing course, untrimmed:

But thy eternal summer shall not fade,
Nor lose possession of that fair thou ow'st;
Nor shall Death brag thou wander'st in his shade
When in eternal lines to time thou grow'st:

So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.

—William Shakespeare, Sonnet 18

Background

——About "Generation Loss"

In analogue recordings, a progressive loss of quality that occurs every time a tape, film, or vinyl disc is copied. The problem of generation loss has been reduced but not eradicated in digital media.

— *A Dictionary of Media and Communication (1 ed.), 2011*

Generation loss is the loss of quality between subsequent copies or transcodes of data.

— *Wikipedia. Generation loss.*
*https://en.wikipedia.org/wiki/Generation_loss*

4 MB

13 KB

The image becomes blurred after being shared many times on social media.

The file size can also become smaller, which means the information within the image decrease.

Artistic Interpretation

Through a blend of traditional poetry and modern technology, we simulate the blurring and compression of text, such as the distortion experienced in social media and digital communication. In a nod to the pre-digital era, we present these texts upon images, like the visual nature of historical mediums written expression – ink on paper, prints, etchings on stone, all of which can be considered as images. This deliberate juxtaposition illuminates the transformative journey of words and meanings, guiding the audience through an experiential narrative where the known gradually morphs into the enigmatic.

Through this artistic process, we invite the audiences to become witnesses to the subtle yet profound metamorphosis of language. They will observe familiar words and phrases slowly erode into realms of ambiguity and reinterpretation, and try to find a border of recognizable loss within this process.
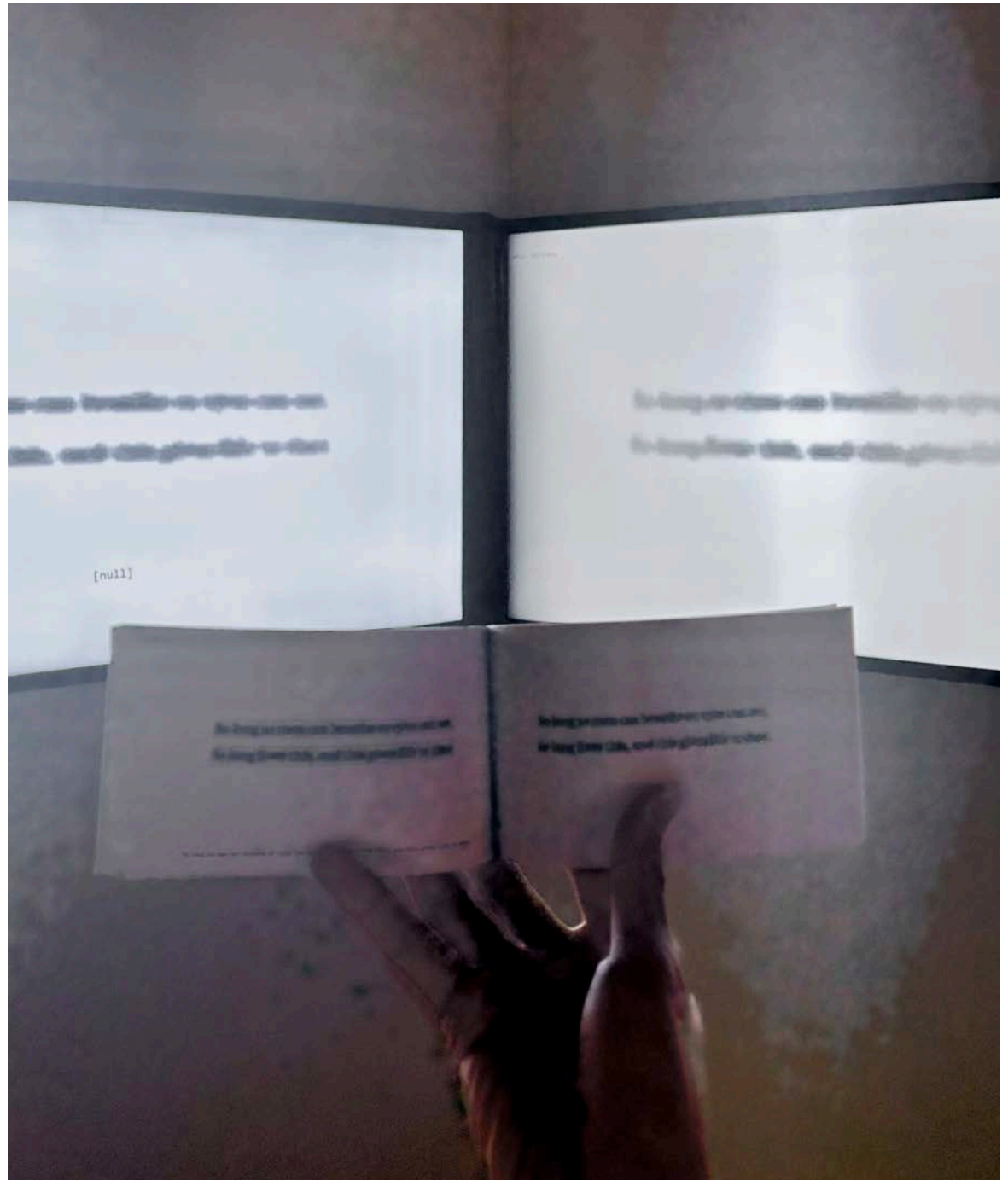
Technical Aspects

The major medium of "Loss of *Sonnet 18*" is a series of videos that record the loss of words being stored and spread. Each video within this artwork is a sequence of 999 images, arranged according to their respective compression iterations. In each iteration, we program to add different types of noises to deliberately degrade the image quality and infuse it with a touch of blur, simulating the gradual erosion of clarity and precision.

This iterative process is cumulative; the output of one iteration becomes the input for the next, creating a layered narrative of loss. Each subsequent image is not just a standalone representation but an aggregate of all the preceding levels of distortion and decay. This continuous progression encapsulates the core theme of our project - the relentless, incremental diminishment of data integrity, mirroring the inexorable passage of time and the transformative nature of memory and perception that might occur on words.

The background sounds in videos consist of two parts. One is the morse code of the poem *"So long as men can breathe or eyes can see, So long lives this, and this gives life to thee."* It is an echo of machine signals, in contrast to the sound in the audience's brain, i.e., the echo of human thought. The other is environmental music we subjectively select to match the main idea of this project. With loss deepening, the background sound also becomes distorted and noisy, generating a kind of sound and picture synesthesia feeling.
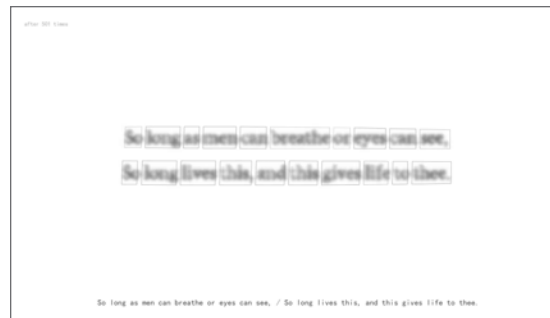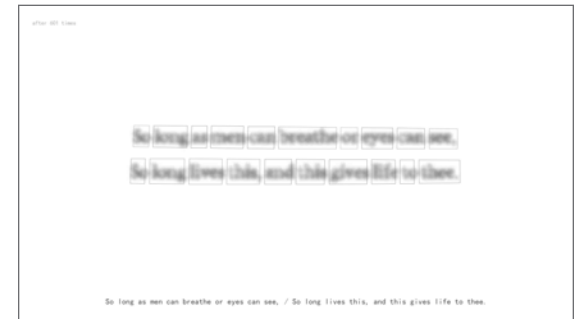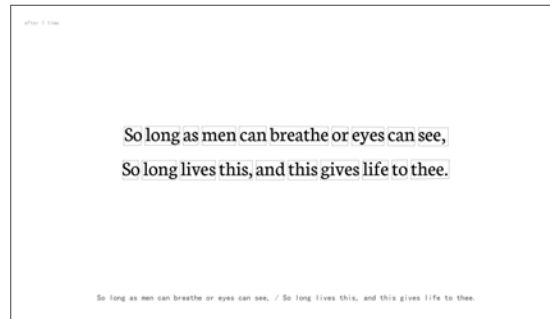
Implementation

We choose the JEPG compression with low quality and blur for the visual effect. We utilize Python with the Pillow library for image processing and Microsoft Azure services [4] for Optical Character Recognition (OCR) and computer vision. We render the video presentation through an HTML5 application.
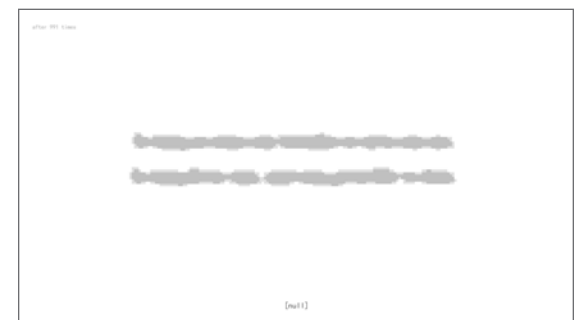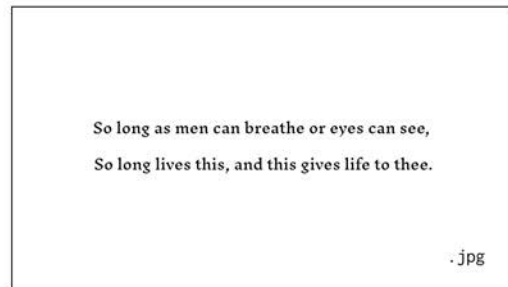
"
So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.
"

Two original poems
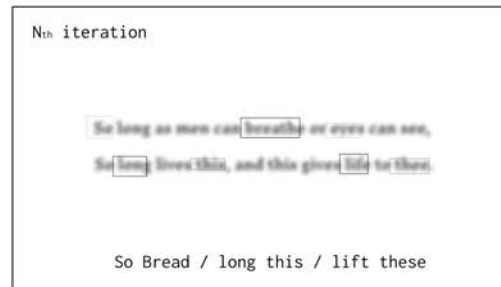from Shakespeare's *Sonnet 18*.

↓

N_{th} iteration

So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.

.jpg

Words are presented through image format.

↓

So long as men can breathe or eyes can see,
So l...

So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.

.jpg

......

So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.

.jpg

Image is compressed and blurred to simulate the loss process
in communication iteratively. The iteration including 999 times.

→

"
So Bread

long this lift these
"

Recognizing words through
Optical Character Recognition Technique

↑

N_{th} iteration

So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.

So Bread / long this / lift these

Viewed by AI model.

↑

N_{th} iteration

So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.

.mp4

These imges sequentially compose a video, illustrating
the process of visually loss.

"
[words observed]

and [meaning learned]
"

Recognizing words through
reading and understanding.

↑

N_{th} iteration

So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.
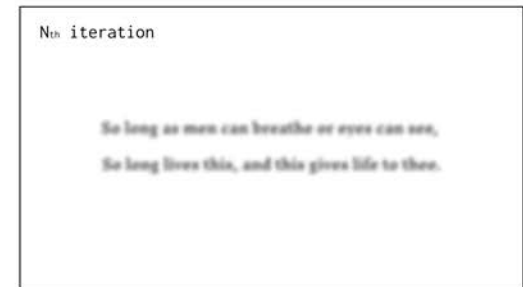
Viewed by human audience.

The vitality and beauty of youth,
the poem, and
other eternal things.

Loss of *Sonnet 18*

A gradual accumulation of
change or damage
compared to the
original data, form, or information.

The loss in our piece appears in different
ways. Images become fuzzy when shared
across media. The original meaning of orally
transmitted poetry fades over time. The clarity
of youthful beauty in timeless lines diminishes.
All of them show that loss is ongoing, not
just a single event. It leaves traces of the
past and opens up new understandings.
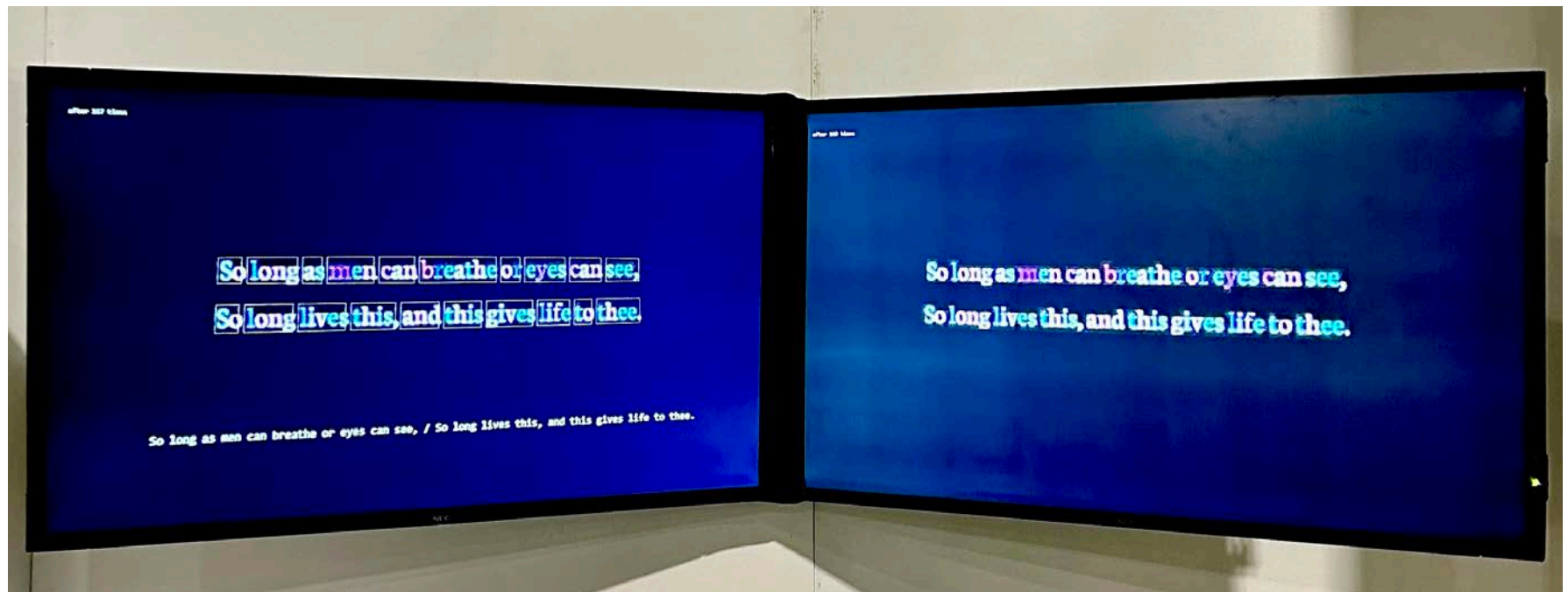
Audience Engagement*

The installation features two screens and one web camera. The primary screen shows the iteration of text loss. The secondary screen presents Optical Character Recognition (OCR) results from AI, including word bounding boxes, to simulate the new understanding of text loss.

Except for OCR AI, the audience also becomes recognition agents, controlling the video's progression with gestures. The web camera is used to capture the number of audience and their gesture.

There are two playing modes in this installation. When there is no audience gesture detected by the web camera, the loss process will automatically play. When the audience's gesture is recognized, then the automated playing is interpreted and will be controlled by the audience's interactions. Only one audience's hand that is the earliest to wave and detected by the camera will be taken into account for interactions. By waving hands, the audience can control the loss process to a specific moment on the primary screen, and observe when words cannot be recognized anymore. The secondary screen will also be synchronized with such control, providing a comparison for the audience on the moment in human's and AI's perspectives.

They could find the frame after which they cannot recognize the text anymore, comparing it with what AI recognized at each frame. This interaction symbolizes the subjective nature of interpretation, as each person's understanding shapes their perception of loss. The number of audience dynamically influences video playback speed, reflecting the collective impact on interpretation and possible meaning deviation. The loss between individual thought and the original idea behind words introduces an accumulative impact on information storage and spreading. The more individual interpretations, the more possible information will be changed during transfer. Hence, the more loss. This setting aims to highlight the loss introduced by the diversity of interpretations among the audience.

In the secondary screen, the bounding box opacity in the results symbolizes AI's confidence in OCR results, a visual metaphor for the clarity of understanding AI.

* The version exhibited in SIGGRAPH Art Gallery 2024 had no interaction modules.
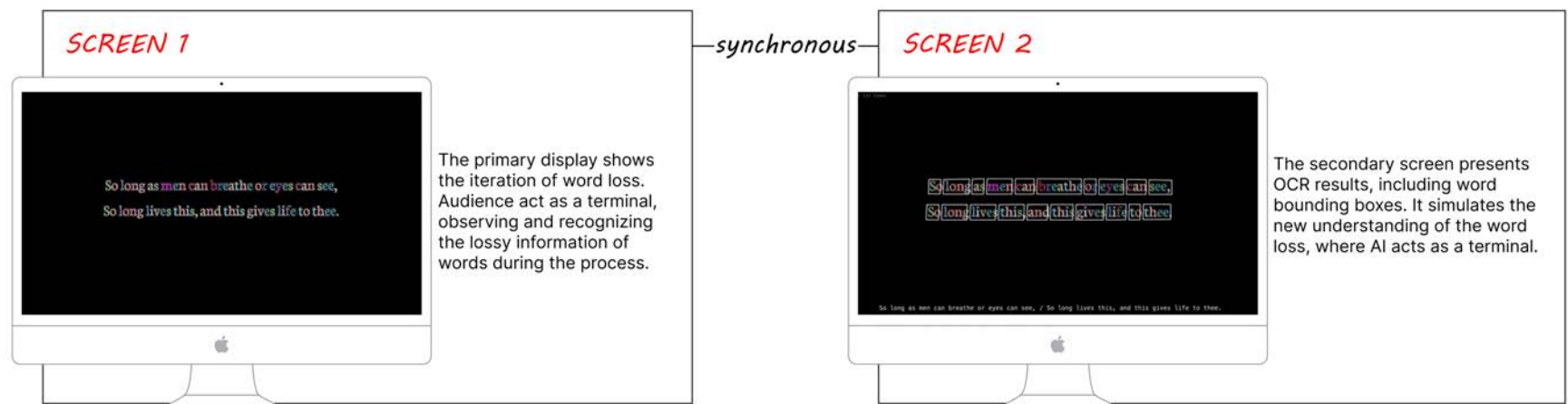

Screen 1

So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.

Audience can use gesture (waving one hand) to control the video playing progress,
to find a border of loss, after which, words cannot be recognized anymore.

Screen 2

So long as men can breathe or eyes can see,

So long lives this, and this gives life to thee.

SCREEN 1 —synchronous— **SCREEN 2**

So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee.

The primary display shows the iteration of word loss. Audience act as a terminal, observing and recognizing the lossy information of words during the process.

So long, as men can breathe or eyes can see,
So long, lives this, and this gives life to thee

So long as men can breathe or eyes can see, / So long lives this, and this gives life to thee.

The secondary screen presents OCR results, including word bounding boxes. It simulates the new understanding of the word loss, where AI acts as a terminal.

There are two playing modes in this installation.

Mode 1. When there is no audience's gesture detected by the webcamera, the loss process will automatically plays by our pregenerated results.

Interaction 1

When the audience's gesture is recognized, the automated playing is interpreted, and the loss process be controlled by audience's interactions.
Only one audience's hand that is the earliest to wave and detected by the camera will be taken into account for interactions.

Mode 2. By waving hands, audience can control the loss process to a specific moment on the primary screen, and observe when words cannot be recognized anymore. The secondary screen will aslo be syncronized with such control, providing a comparison for audience on the moment in human's and AI's perspectives.

00:00   02:14

Interaction 2

The number of audience dynamically influence video playback speed, reflecting the collective impact on interpretation and possible meaning deviation.

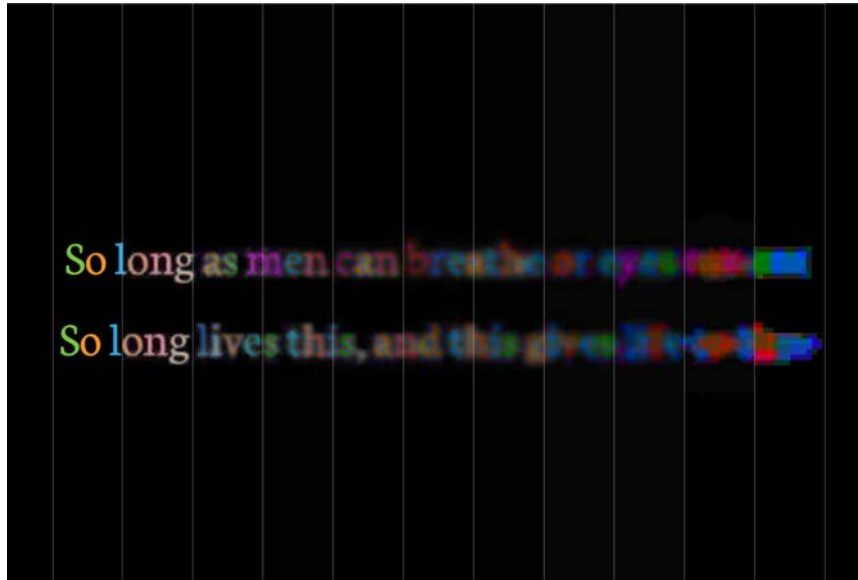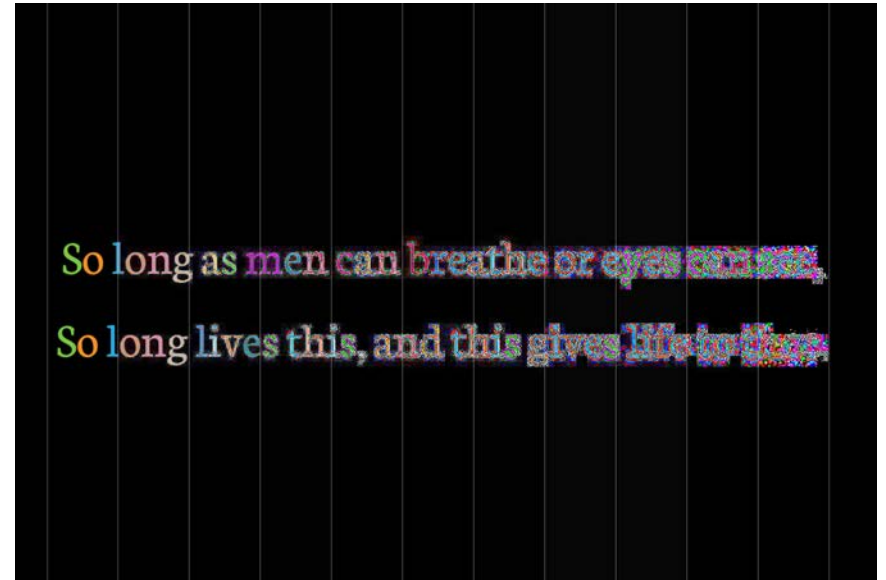*Slow Down*   *Speed Up*

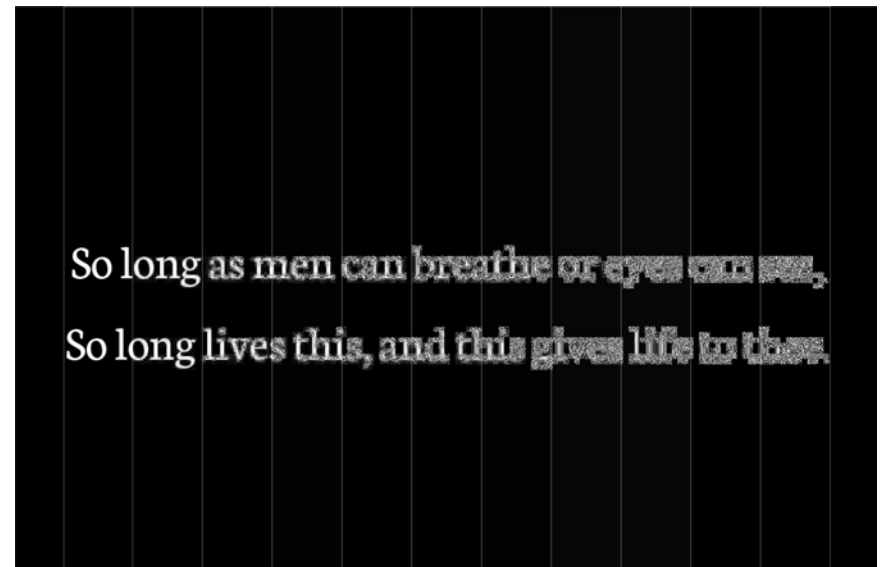0.25x   0.5x   1.0x   2.0x   5x   10x

Black background + Colorful texts + Blur

Black background + Colorful texts + Noises

Black background + White texts + Blur

Black background + White texts + Noises

Philosophical Aspect

The Ship of Theseus, known as *Theseus's Paradox*, is about whether an object is the same object after having had all of its original components replaced over time, typically one after the other. The Athenians preserved the ship that Theseus used to escape, by replacing the parts one by one as they decayed. After several hundreds of years of maintenance, if each individual piece of *the Ship of Theseus* was replaced, one after the other, a question is proposed: Was the ship still the same as the original one?

Photo by Milind Kaduskar on Unsplash.

Leonardo da Vinci, *Salvator Mundi*, c.1500, oil on walnut Getty Images
Left: Original painting after cleaning. Right: Reproduction of the painting after restoration.
Public Domain. https://commons.wikimedia.org/w/index.php?curid=64103353

In this project, the information conveyed in the original poem is the ship, each time of interpretation is like replacing one part of the ship. After many times of communication, propagation, and interpretation, the same question appear:

Was the information still the original one?

If not, when did it change?

Everyone may have their answers while machine also have its own.

Similar things also happen in the field of artwork restoration. After restoration, is the painting still the original artist's work?

When we go back to the term behind the project title, *generation loss*, we think that the term can be took apart into two words. *Generation AND loss*, which means during information communication, there are not only information lost but also information generated. Both of the status compose the current information.

Disucssion

"Loss" is a general concept and phenomena, which exists everywhere. For a broader implications of our art piece, when paper act as the medium to hold the poem, there can be loss of paper when they have gotten mildew, been broken or folded. At the same time, some new visual information appears on the paper, along with the poem.

In our current artwork, we only explore the loss of text through image format but there can be many media for information saving, propagating, and receiving. The kind of loss can include physical, chemical or digital ones, and etc. We are working on a space of loss based on the dimension mentioned above, and expand it to more modality, like audio, image and video. This can be a very general problem with a wide range of exploration space.

Conclusion

This project invites reflection on the essence of communication in our digital age. It highlights the ongoing yet ever-changing nature of loss, leaving a lasting impression of fleeting beauty and the transient nature of understanding. As an art piece, it's an invitation to experience, ponder, and engage with the ever-shifting landscape of communication, technology, and human perception.

Reference

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